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Chips are the New Oil: Sustaining the Strategic Role of the Philippines in the Geopolitics of Semiconductors

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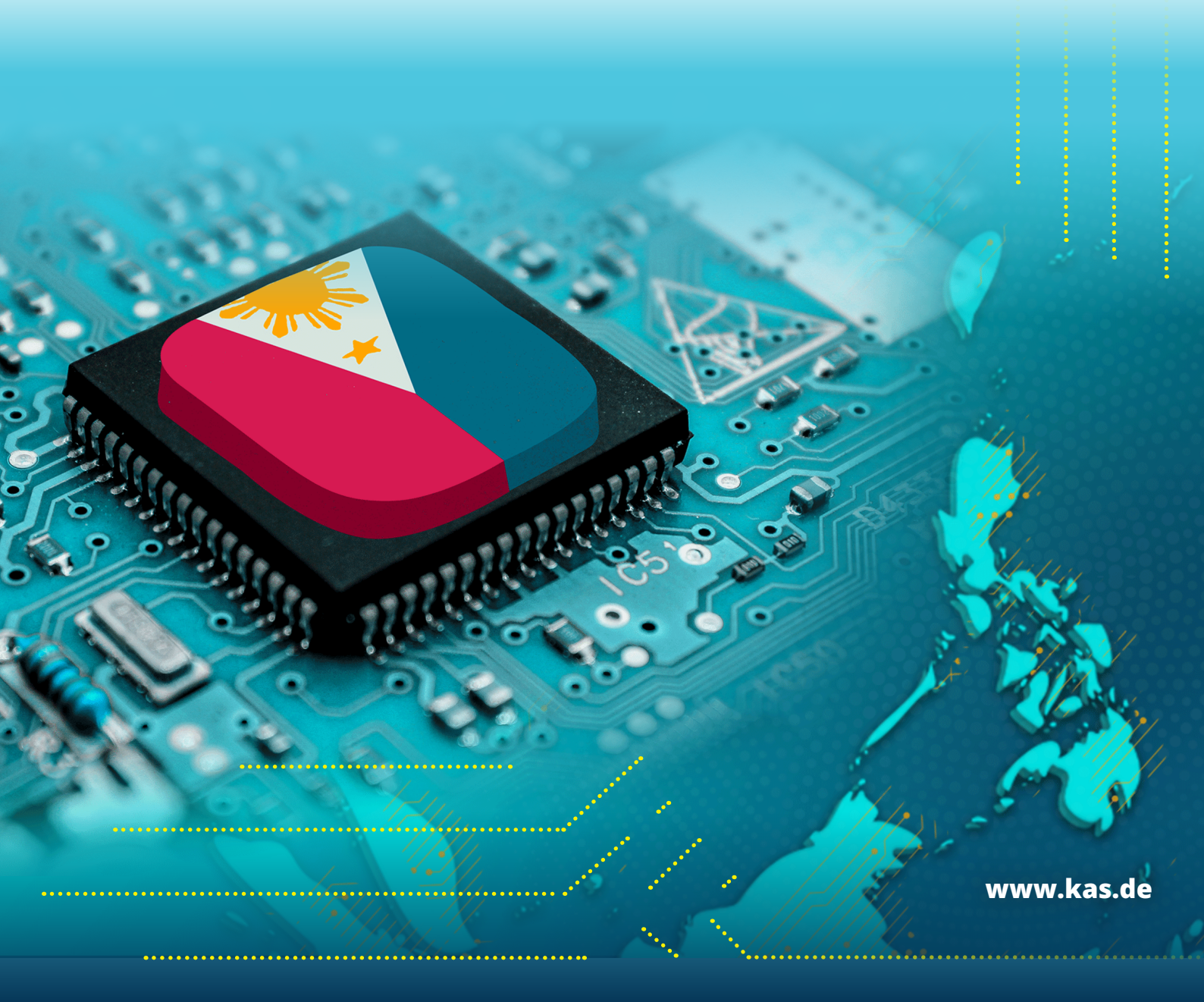

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The **Adenauer Young Researcher's Report** is a series of short articles and opinion pieces on the state of Philippine politics and democracy from the perspective of the youth.

The publication aims to foster political participation and cultural exchange among the Filipino and German youth by providing them a platform to publish their own research work, opinion piece, or commentary containing their intellectual perspectives on issues related to the Philippines.

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Chips are the New Oil: Sustaining the Strategic Role of the Philippines in the Geopolitics of Semiconductors

Justine Obias

Introduction

In the dynamic landscape of technological advances, few resources have garnered as much attention and significance as oil. For decades, oil has been the lifeblood of the global economy, powering industries and shaping geopolitics significantly. But as the world forges into the 21st century, a new resource has emerged to possess a value just as strategic and influential, if not more. These are none other than semiconductors.

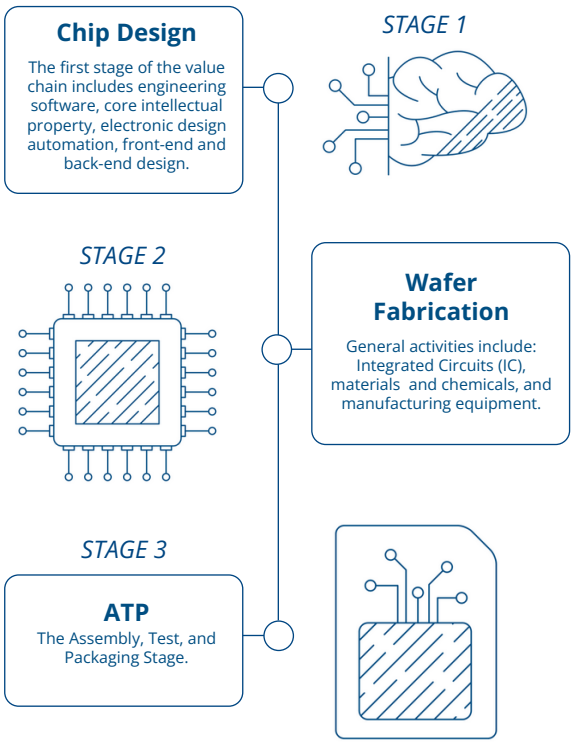
Semiconductors go by various names – microchips, integrated circuits, computer chips, or chips. All the same, semiconductors are materials that occupy the middle ground between conductors and insulators.[1] This composite type of properties allows the fine control of electrical current flow, which makes the functioning of most modern technology possible.

Like oil, semiconductors are an increasingly crucial material upon which states and everyday society rely heavily to function. Such reliance is driven by the growing demand for electronic devices across various sectors.[2] Moreover, this surge in demand can be attributed to several technological factors, including the rapid digitization of economies, the rise of artificial intelligence and machine learning (AI and ML), Industry 4.0 (4IR), Internet of Things (IoT), and the deployment of 5G communications.[3] Simply put: semiconductors are basically the hidden enablers of the modern world.

Global Semiconductor Value Chain Explained

Given these technological developments and increasing demand, understanding the fundamental activities behind semiconductor production is crucial as it underpins the critical role of these components in the modern world. These activities are core parts of the intricate sequence within the semiconductor value chain, which refers to the global ecosystem involved in the production, assembly, and shipping of semiconductors, from the initial chip design and fabrication of semiconductor wafers to the assembly, packaging, and their distribution to end-users. It encompasses various activities in each stage, including research and development (R&D), electronic design automation (EDA), integrated circuit (IC) design, assembly, testing, and distribution. As demonstrated in the figure below, these processes can be simplified into three distinct stages: 1) chip design, 2) wafer fabrication, and 3) assembly, test, and packaging (ATP). Each stage involves a complex network of specialized firms, research institutes, suppliers, manufacturers, and service providers, functioning interdependently to produce diverse semiconductor products for the global market.

Figure 1. General Semiconductor Value Chain[4]



Numerous stakeholders, such as states or companies, possess key specializations in specific stages of the global semiconductor value chain. As they excel in different and sometimes overlapping value-added roles vis-à-vis other stakeholders, competition is thus inevitable. Considering such an intricate ecosystem, it is only logical that semiconductors have been an area of increasing geopolitical competition. Just as states have vied for control over oil reserves, the competition for dominating the global semiconductor industry continues to intensify over time. After all, its strategic importance and comprehensive utility across many industries transformed it into highly coveted tools of foreign policy, especially in a geopolitical landscape fraught with tensions following the onslaught of COVID-19, the Russian invasion of Ukraine, and the US-China rivalry.

Geopolitics of Semiconductors: Silicon Nationalism and the US-China Trade War

Several countries and companies are investing considerable resources to ensure they remain at the forefront of the industry, striving for self-sufficiency and safeguarding against competition and supply chain vulnerabilities. This growing geo-economic behavior of most states nowadays is demonstrative evidence of techno-nationalism, which is called another specialized term in the semiconductor industry: "silicon nationalism." Silicon nationalism pertains to strategic state behavior that prioritizes the self-sufficiency, sustainability, and advancement of their respective semiconductor capabilities as a crucial aspect of their national interest and security.[5] General strategies in doing so include securing supply chains domestically and with allied states, decoupling with the opposite states of concern, and enacting more protectionist industrial policies. Recent efforts and commitments like these have likewise affected global semiconductor supply chains in the past few years.

This competition is best demonstrated within the growing tensions between the United States and China. Both great powers regard semiconductors as a technological lever of power, which led to them being systemic rivals in the

global semiconductor value chain. In response to potential security concerns of foreign-made chips and chip-making abroad, both the United States and China have made bold steps in recent years to decouple their respective semiconductor industries from each other.[6] Generally, this involves reducing dependence on either Chinese or American technology by promoting domestic manufacturing, research, and development.

On one hand, China started its seminal interest in technological decoupling with its Made in China 2025 industrial policy, which emphasized aggressive investments to high-tech industries like the semiconductor manufacturing sector. By focusing on these sectors, China was able to gradually localize the production of semiconductors, its raw components, and necessary equipment that were previously sourced from foreign suppliers, especially those sourced from the United States.[7] This specific policy, which was implemented in 2015, was deemed as a major security threat by the United States and was one of the causal factors that prompted the ongoing US-China trade war to occur.

Meanwhile, the United States has a three-pronged approach to its techno-nationalist semiconductor policy. The first one is the flagship CHIPS and Science Act, which aims to provide "US$52.7 billion (approximately Php 2.8 trillion) for American semiconductor research, development, manufacturing, and workforce development."[8] To further bolster the position and market share of the United States, recipients of the fund from the said Act cannot construct chip-making facilities in China and other countries of concern. Funding aside, amendments to the Export Administration Regulations (EAR) have specifically addressed the geopolitical risks resulting from the current dependence on China and other state entities of concern. According to the U.S. Bureau of Industry and Security (BIS), the said policy imposed trade restrictions on China, specifically tightening the export controls of crucial semiconductor manufacturing equipment in the Chinese semiconductor industry.[9] Such a policy also blocked off China's access to raw components of chip-making and chip design software of the United States, thus hindering the development of China's semiconductor industry. The United States' last approach focused on fostering multilateral economic arrangements such as the Indo-Pacific Economic Framework for Prosperity, Chip 4 alliance, EU-US Trade and Technology Council with relevant partner countries.[10]

Aside from these three primary measures, other minor initiatives include several tariff increases against China and the addition of leading Chinese semiconductor firms in the BIS Entity List, which placed heavy restrictions and licensing requirements.[11] Due to the sheer influence of these two great powers, the said trade war caused disruptions in the global semiconductor supply chain, as mutual tariffs and trade restrictions heavily affected the flow of raw materials, components, and finished products between and beyond the scope of the two countries.

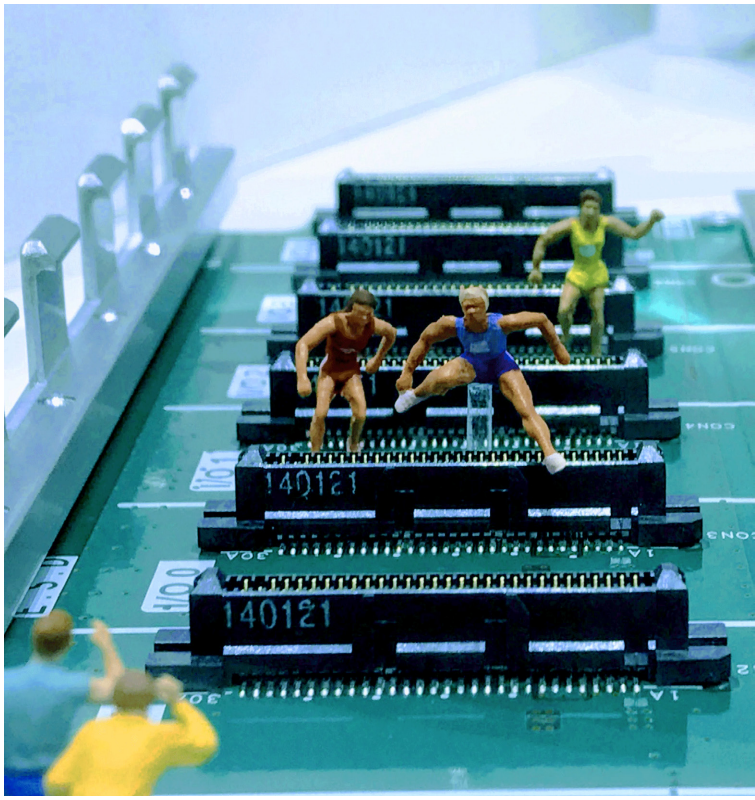


Image via Unsplash/John Cameron

Industry Needs

Of course, the semiconductor market has its specific challenges. The industry faces the threat of supply chain disruptions, great power competition, and market volatility. These challenges were particularly evident during the COVID-19

pandemic. The pandemic, which paralyzed the movement of people and goods, disrupted the global supply chain and affected the production and availability of critical components across all industries. In response to such challenges, actors in the global semiconductor market are exploring new ways to diversify supply chains, attract a more skilled workforce, improve production capabilities, and develop more resilient supply chains. Given the status quo, there is an ongoing industrial need and growing interest to reconfigure new sourcing strategies. As a result, collaboration and partnerships between states and companies have become essential to ensure the stable and sustainable growth of the entire market.

Geopolitical Significance of the Philippines as a Semiconductor Outsourcing Hub

Amid US-China trade tensions, the resulting global supply chain disruptions, and chip shortages, many foreign investors prioritize supply chain resiliency and efficiency for the global semiconductor industry. This need translates to trade agreements with suitable state partners based on their domestic industries, potential semiconductor production capacity, and the like. In this regard, the Philippines can become such a pivotal state partner for several strong reasons.

First, the Philippine semiconductor industry has consistently been among the top 10 integrated circuit exporters over the past decade.[12] In 2022 alone, the Philippines' semiconductors and electronics trade accounted for a whopping PHP 1.04 trillion (approximately US$19 billion), representing 59.6 percent of the total merchandise exports.[13] This substantial contribution is driven primarily by in-demand exports of automobile electronics, consumer electronics, and data processing products, which experienced massive growth during the same year. Besides this, the industry contributed a substantial 7 percent of the total manufacturing Gross Value Added (GVA) for the first three quarters of 2022 and employed over 3 million workers.[14] Exports-wise, 47 percent of the total goods exported from the country belong to the semiconductor industry, with a monetary equivalent of PHP 1.6 trillion.[15]

In its position in the semiconductor value chain, three stages, namely, backend manufacturing, R&D, and Integrated Circuit (IC) design, remain to be the top semiconductor specializations of the country.[16] Most assembly, testing, and packaging (ATP) facilities and other dedicated production sites for these semiconductor specializations operate in these four locations: Metro Manila (52.3%), Calabarzon (40%), Northern/Central Luzon (5%), and Cebu (2.7%).[17]

Most importantly, there is a consistently low exit rate from foreign companies and other industry players. This can be attributed to the English-proficient and service-oriented workforce, which eliminates the need to translate technical job specifications to a native language, and decent government incentives, be it fiscal or non-fiscal.[18]

As the Philippines clearly occupies a strategic position within the global semiconductor industry, the Philippine government has shown growing interest and political will in further developing the sector. According to the National Economic and Development Authority's (NEDA) 2023-2028 Development Plan, the semiconductor market is listed as one of the priority global value chains, prompting renewed government efforts to upgrade, reposition, and diversify its participation in the said value chain.[19]

Moreover, the Philippines has made immense progress over the last years in forging new economic links with other states to increase its funding, resources, and chip-making capacity.

For instance, it already secured US$500-million funding under the United States' CHIPS Act in 2022, as well as US$5.3 million to establish the 2022-2027 Advanced Manufacturing Workforce Development Alliance (AMDev) under the United States Agency for International Development (USAID).[20] In the first quarter of 2023 alone, foreign investment pledges amounting to PHP 10.49 billion from Japan, Germany, and the Netherlands are specifically allocated for the manufacturing sector.

Regarding potential economic agreements, the Philippines and the European Union have recently committed to continue free trade agreement (FTA) negotiations. Although semiconductors are considered sensitive technologies under the EU's foreign investment regulations, an FTA agreement might allow both parties to secure concessions and clearances to reap mutual benefits. Additionally, notable Philippine-based semiconductor companies, such as Integrated Micro-Electronics and Xinyx Design, and their current market shares will also benefit from such an agreement, mainly by facilitating access to the European market.

Aside from this, the Philippines enjoys numerous trade facilitation measures from its membership in the Regional Comprehensive Economic Partnership Agreement (RCEP), Indo-Pacific Economic Framework (IPEF), and various intra-ASEAN agreements. These multilateral instruments further enhance the country's potential to become a long-term player in the geopolitics of semiconductors. However, it deserves mentioning that the Philippines can still realize its strategic significance as a promising manufacturing hub beyond merely securing trade agreements.

Since supply chain bottlenecks and localized delays are recurring issues, many states and multinational corporations have joined the trend of diversifying the geographical distribution of their suppliers and semiconductor production. As a result, the Philippines has become an attractive outsourcing hub for the sector, primarily due to being a strategic gateway to ASEAN. Furthermore, the Philippines is also equidistantly positioned from the economic capitals of several major Asian powers. Thus, it will only take a convenient four-hour air travel time to reach such countries.[21] Additionally, the Philippines is located between the Strait of Malacca, which is quite a strategic choke point among global sea routes, and the United States, which possesses the largest economy.[22]

Furthermore, the government has implemented various policies to support the growth of the semiconductor industry and recent legislative developments to pave the way for enhanced investment prospects. The amendment of the Foreign Investments Act and the passage of the Public Service Act led to the removal of the protectionist 60-40 ownership rule in the business and public services sectors, thereby opening doors to greater investment opportunities and economic growth. Besides these two policies, foreign semiconductor companies benefit from investment incentives, tax breaks, and infrastructure development programs both gained from the Special Economic Zone Act and the Corporate Recovery and Tax Incentives for Enterprises (CREATE) Act. Fiscal incentives such as exemptions from payment of local taxes and fees as well as tax-and-duty-free imports of critical raw materials and equipment have encouraged both foreign and local companies to establish manufacturing facilities and research and development centers in the country, especially within special economic zones.[23] Due to the previous factors mentioned, the country has attracted multinational corporations and state investors seeking to leverage its regional position, competitive costs, and favorable business environment.

Figure 2. Resident Semiconductor Companies in the Philippines[24]

Select Semiconductor Companies	Location	Segment in the Value Chain
Texas Instruments	Baguio City and Pampanga	IC Assembly and Testing
Continental Temic Microelectronic GmbH	CALABARZON	Manufacturing Equipment; Assembly and Testing
Philips	CALABARZON	IC Design
Analog	CALABARZON	IC Design
Onsemi	CALABARZON and Cebu	IC Assembly and Testing
Rohm	Metro Manila	IC Design
Fairchild	Metro Manila and Cebu	IC Assembly and Testing
Inari Amertron Berhad	Pampanga	IC Assembly and Testing
Xinyx Design	Metro Manila	IC Design

Challenges Facing the Philippine Semiconductor Industry

Nevertheless, several challenges continue to hinder the local semiconductor industry from properly receiving investment prospects and increases in chip-making capacity.

First, the Philippines must address its relatively higher operating and power costs versus other ASEAN member states. Based on the December 2021 electricity prices among Southeast Asian states, the industrial rate of the Philippines was US$0.12/kWh, second only to Singapore (US$0.15/kWh) and relatively higher than Malaysia (US$0.8/kWh), Indonesia (US$0.7/kWh), and Thailand (US$0.10/kWh).[25] Disaster risk, which is practically inseparable from the country profile, significantly accounts for the high costs as it is detrimental to infrastructure and disruptive of domestic supply chains, negatively impacting business operations. This vulnerability alone remains a huge deterrent for more foreign direct investments from entering the country, especially since the industry is reliant on stable infrastructure and cost-effectiveness.

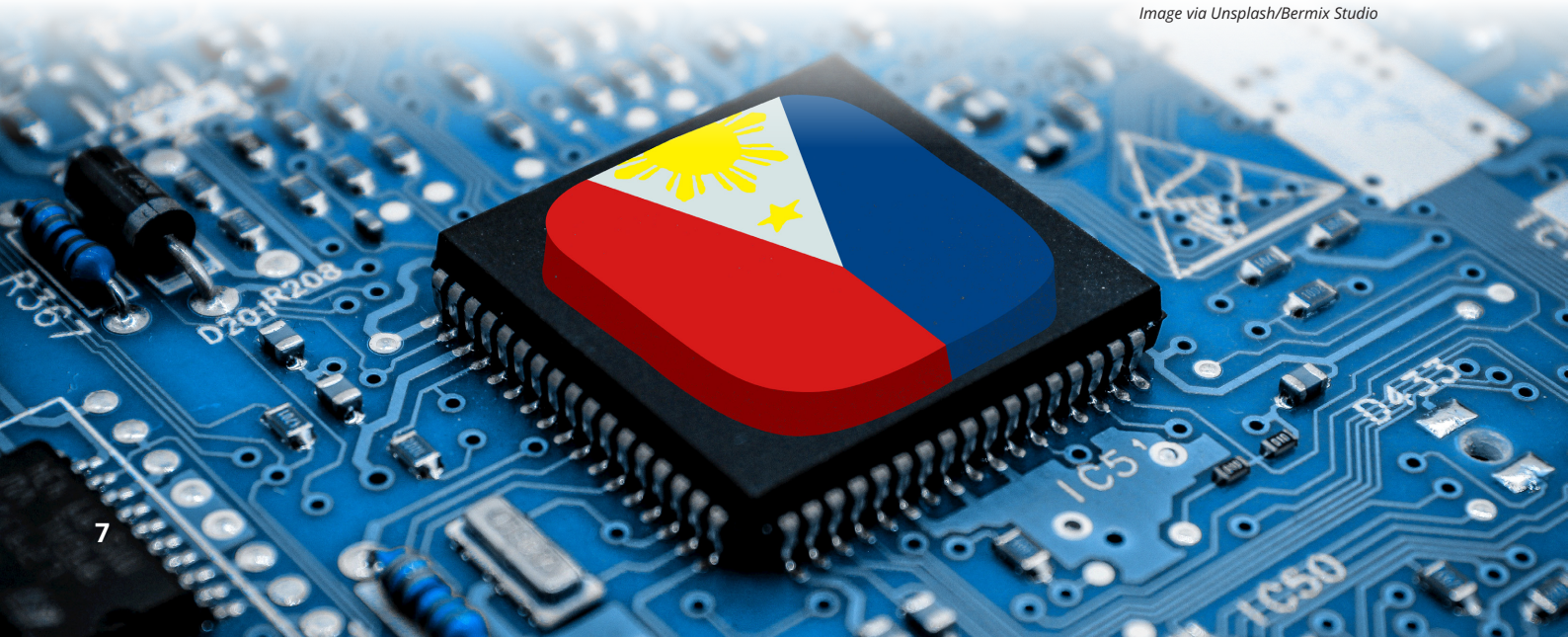
Visible dependence on China's critical raw materials (CRMs), such as gallium, germanium, and silicon, also remains a persistent challenge for the industry.[26] The Philippines can only become self-sufficient when it comes to its cobalt supply since the country is the fourth global producer. However, for other CRMs, most are sourced, with difficulty, from China.[27] Such dependence has a lot of concerning implications given that techno-economic ties with China are currently associated with considerable impact risks, from its aggressive techno-nationalist policies to its strained economic relations with the United States.

The last challenge may not seem like a downside for foreign state and private investors, but it could affect the local workforce if not adequately resolved. The "non-unionized promotional literature" advertised by some government agencies and leading private semiconductor actors can be perceived as an incentive for potential investors abroad but at the expense of workers' rights. Standard labor procedures in the industry are characterized by compressed work weeks that include holidays and weekends, which should not go unnoticed.[28] In a risk assessment report conducted by Electronics Watch, there have been multiple breaches in labor standards, especially when it comes to freedom of association and collective bargaining since trade unions and the like are not tolerated in the semiconductor and the broader electronics industry.[29]

Recommendations

The Philippine semiconductor industry has definitely made solid progress in establishing economic linkages, retrofitting domestic policies, and improving the export-oriented approach over the years. It can even be said that the incentives the Philippines can offer to foreign investors are decently comparable with its fellow ASEAN member states and other middle powers. To further solidify this progress, it is thus vital to address the gaps influenced by the industry challenges mentioned previously. Encouragingly, however, some of the recommendations that will be mentioned are already concrete objectives of

Image via Unsplash/Bermix Studio



certain ongoing governmental initiatives. Despite this, an in-depth review of these recommendations can still guide and inspire policymakers to revisit current roadmaps when it comes to the semiconductor industry.

Expanding R&D and IC design capabilities

Policymakers should encourage more industry-academe partnerships. In particular, research on emerging technologies, IC design, and core intellectual property should be a primary priority. While most outsourced work in the Philippines revolves around assembly, packaging, and testing, only a small portion of the R&D capabilities are utilized when doing such low-value-adding activities. Therefore, it is vital to invest in R&D to elevate the country's position and that economic productivity contributions are not spent only on meager ATP responsibilities but also on higher-value-adding activities in the value chain. Furthermore, the government should reevaluate, realign, and even overhaul the specialized curricula of vocational and undergraduate education to fulfill the industry's local needs and strategic goals. Besides this, R&D-related programs and industry-academe partnerships should not only be exclusive to top-performing universities. Instead, there should be a horizontal distribution of all key enhancement actions to local universities and colleges (LUCs) and state universities and colleges (SUCs). By doing so, the country's talent pool and chip-making capacity will improve substantially.

Investing and upskilling the workforce

Current labor standards in the industry should be reevaluated. The Philippines certainly does not lack in terms of how many skilled graduates enter the industry annually. However, concerns regarding working hours and rest days should be addressed and standardized if needed. Other major risk factors, such as intolerance to trade unions, should also be properly assessed and, if possible, eliminated from the system completely.

Furthermore, it is important to provide support through more training venues and development opportunities that can assist the labor industry in satisfying the human resource requirements of resident foreign companies. Some usual issues with the current workforce typically involve skills mismatch and curricular inefficiency. To address these issues, relevant government agencies like the Technical Education and Skills Development Authority (TESDA) and the Commission on Higher Education (CHED) should endeavor to properly incorporate the ever-changing competency requirements in the standard curricula for courses related to the semiconductor industry. Skills development and changes in curricula should also strongly match with recent developments in the Fourth Industrial Revolution (4IR), so that the Philippines can keep up with the frontlines on innovative semiconductor technology.[30] Finally, backend manufacturing, one of the specializations of the Philippines, can be further improved by reevaluating and expanding the competencies and training regulations of many semiconductor-related vocational training. By crafting more training programs related to semiconductor work, the workforce will gradually be able to upskill and expand their skill set.

Image via TESDA

Find alternative sources of necessary critical raw materials and sub-components

Cooperation with allied state partners would massively lessen the country's dependence on China's critical raw materials. Potential states to form strategically advantageous economic linkages are the Netherlands and other resource-rich states with no visible risk factors. While there is no easy fix to this particular challenge, the current situation is still manageable, given the plethora of trade partnerships.

Throughout the report, there was a clear realist tendency to be more internationally competitive among many states, including the Philippines. While there is no doubt that interstate cooperation is a necessary tool given the essence of such a globalized industry, competition remains the dominant state behavior needed to either maintain or elevate their positions in the semiconductor value chain. Recent geopolitical trends like silicon nationalism, in and of itself, serve as a telling reminder of the current landscape. That is why most of the recommendations mentioned above deal with strengthening the local chip-making capacity so that the Philippines can competitively maintain its role or possibly even improve it. In a world marked by techno-nationalism and fierce power competition, the Philippines must harness its strengths and advantages, as well as identify its current weaknesses as a growing middle power. By doing so, it can ensure its continued growth and prosperity on the global stage for many years to come.

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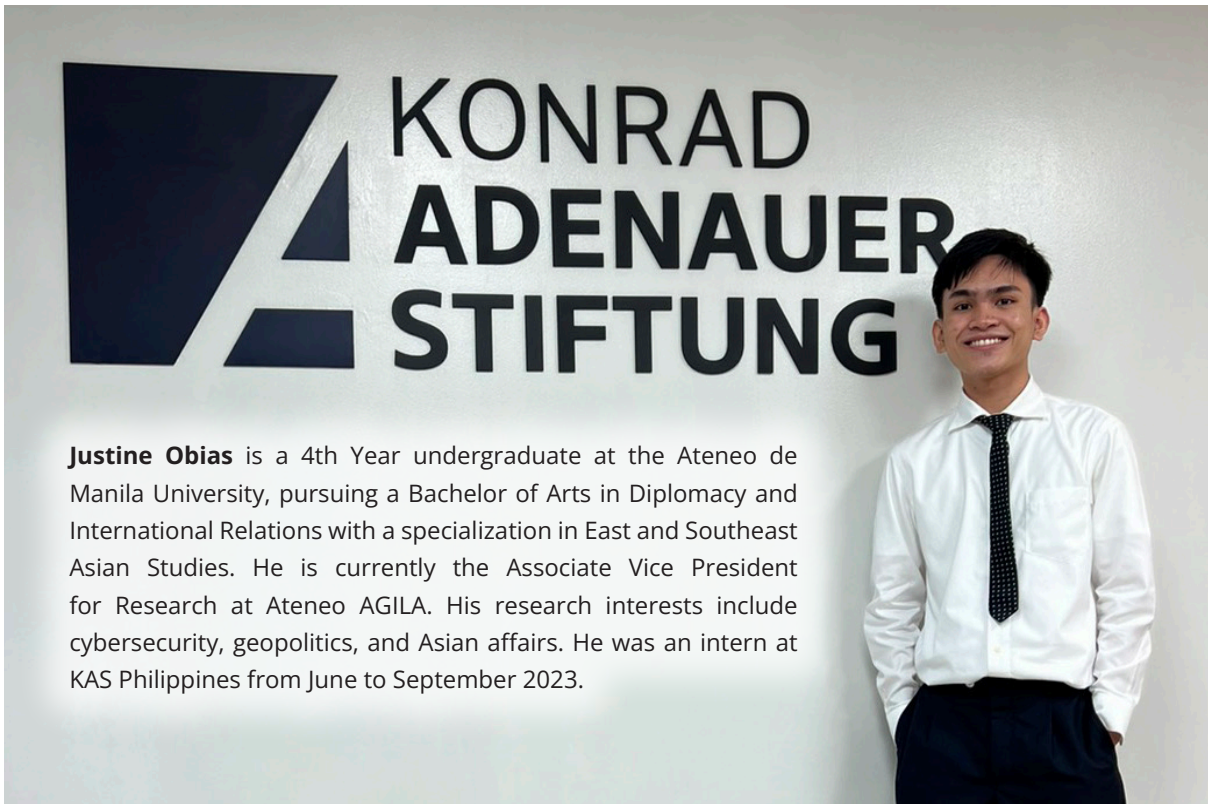

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About KAS

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KAS has been active in the Philippines since 1964. It is the oldest KAS Office in Asia. Ever since 1998, the main activities of the KAS in the Philippines have focused on the social market economy, institutional and political reform, and peace and development in Mindanao. In recent years, KAS Philippines' activities have expanded towards youth empowerment, foreign relations, security, and innovation.

We cooperate with governmental institutions, political parties, civil society organizations, experts, and key stakeholders, building strong partnerships along the way. Together with our partners we make a contribution to the creation of an international order that enables every country to develop in freedom and under its own responsibility.

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