From Silicon to Society:
A Chance to Drive Indonesia's Global Competitiveness

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ABSTRACT

As the foundation of modern technology, semiconductors power everything from artificial intelligence systems to consumer electronics, positioning them at the core of not only the present, but also the future of the global digital economy. The semiconductor industry keeps growing by day as our world becomes more and more dependent on its technology. As nations compete for leadership in this sector, developing domestic capabilities in chip production has become critical not only for economic competitiveness but also for technological sovereignty and resilience. The South East Asia region is not free from this global 'chip war'.

Our neighboring Malaysia has already made plans to strategically positioned itself as a key player in the semiconductor supply chain. Spearheading this initiative by its National Semiconductor Strategy (NSS), which has secured foreign investments, trained thousands of engineers, and established local integrated circuit design companies. Other neighboring nations also share the same ambitions as the Vietnamese government continue to enact new laws and launch targeted investment incentives to foster the semiconductor industry, especially looking to enhance its capabilities across all stages of the semiconductor supply chain, particularly in manufacturing and design.

For Indonesia, strategic engagement in the silicon chip sector presents a unique opportunity to enhance its global competitiveness while driving inclusive economic growth. Indonesia has undertaken a series of strategic initiatives to position itself as a competitive player in the semiconductor industry. Firstly, Indonesia holds a significant abundance of critical resources, such as silica, found in Java, Sumatra, and Kalimantan. Furthermore, the government has recently established a dedicated National Semiconductor Task Force under the Coordinating Ministry for Economic Affairs to develop a comprehensive ecosystem for the semiconductor industry and has finalized the country's first National AI Strategy to attract foreign investment and guide development across key sectors.

Despite Indonesia's ambitious initiatives in the semiconductor sector, the country still lags behind global leaders in technological sophistication. To evolve from primarily an assembly-focused base to a more advanced and innovative semiconductor player, there is still much to be done in order for Indonesia to strengthen its research and development capabilities, foster deeper collaboration between industry and academia, and enhance integration across the entire semiconductor value chain. Researchers have also noted that the absence of established domestic semiconductor brands and a limited local supplier ecosystem, combined with a shortage of skilled professionals and crucial infrastructure, presents additional barriers that deter foreign investment.

To address these challenges, Indonesia must pursue a coordinated, multi-pronged, and long-term 'Silicon Archipelago Strategy'. First, strengthening research and development is essential for this highly advanced industry. Indonesia must establish national R&D centers focused on advanced chip design, AI-enabled semiconductors, and IoT applications, while providing grants and tax incentives to encourage private sector innovation. Collaboration between universities, research institutes, and industry will accelerate technological learning and innovation. Specialized STEM programs, vocational training, apprenticeships, and partnerships with global tech firms can equip young Indonesian professionals with the technical expertise needed for this industry and create a band of highly-skilled workforce for the country. Third, to support high-tech manufacturing, investments in technology parks, industrial clusters, fabrication facilities, and data centers, combined with reliable utilities and logistics, are crucial to creating a conducive environment for production and innovation. Last but most importantly, the government must also foster domestic industry by encouraging startups and homegrown

semiconductor brands while attracting foreign investment through streamlined regulations, clear policies, tax incentives, and public-private partnerships to facilitate technology transfer and capital inflows.

Indonesia stands at a pivotal moment in its journey to become a significant player in the global semiconductor ecosystem. By leveraging its abundant natural resources, strategic location, and ambitious policy initiatives, the country has the potential to transition from a predominantly assembly-focused industry to an innovation-driven, high-value semiconductor hub. Achieving this vision will require sustained investment in research and development, workforce development, infrastructure, and domestic industry, alongside proactive engagement with international partners. If successfully executed, Indonesia can secure a meaningful place in the global "chip war" while fostering sustainable and equitable technological advancement for mankind.

Keywords: *Semiconductor Industry, Indonesia, Economic Development, Research and Development (R&D), Innovation Policy, Technology*

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