

SUMMARY
REPORT

Fulbright

JUNE 12
2026

THE 2026 STATE AND FUTURE OF VIETNAM'S SEMICONDUCTOR ECOSYSTEM //

**Analysis of
Ecosystem-Building Activities
and Keystone Investor Roles**

Willem Smit

| Tobias Burgers

| Quan Le

| Phuoc Sac Tran

For access to
the Full Report



Copyright and Fair Use Notice

This report contains copyrighted material, the use of which has not always been specifically authorized by the copyright owner. This material is made available in an effort to advance understanding of semiconductor industry development in Vietnam. It constitutes a "fair use" of any such copyrighted material as provided for in section 107 of the US Copyright Law. In accordance with Title 17 U.S.C. Section 107, this material is distributed without profit for research and educational purposes.

How to Cite This Report

Smit Willem, Quan Le, Tobias Burgers, P.S. Tran. (2026). The 2026 State of Vietnam's Semiconductor Ecosystem: SUMMARY REPORT (Report No. FUV-002). Fulbright University Vietnam. <https://fulbright.edu.vn/semiconductor-industry-study/>

Acknowledgments

The report is commissioned by Intel Products Vietnam (IPV) for the occasion of the 20-year anniversary of the company's investment in Vietnam. We thank Kenneth Tse, Nguyen Thi Thanh Nhan, Pham Nguyen Chi Lan, Lam Thi Kim Hanh, Nguyen Thi Theu, and Do Thi Thu Huong for their coordination and organization, as well as IPV staff for practitioner insights.

The team greatly benefits from input, feedback, and comments provided by Ambassador (Ret.) Ted Osius; Le Hoang Phuc (VSAP Lab), Samuel Pursch (Vriens & Partners); Marco Förster (Dezan Shira & Associates), Ha V. Nguyen, Nhat Le, and Dr. Minh Tran (VISEMI); Stan Janssen and Michel Heck (Invest International), Katariina Nilsson Hakkala (Asian Development Bank); Dr. Nguyen Duc Hien and Jacob Pham Nguyen Dong Nguyen (Vietnam Institute for Practical Applications); and Anne Ahrendsen (U.S. Consulate General HCMC).

The team thanks Saigon Fabrication and Huynh Duc Co. Ltd. for industry insights and manufacturing site visits. We also appreciate the perspectives of Saigon High-Tech Park leadership, especially Dr. Le Quoc Cuong and Mr. Nguyen Trong Nhan.

The report was designed by Le Gia Phong.

Disclaimer

This report was conducted by a research team at Fulbright University Vietnam in collaboration with Intel Products Vietnam (including providing interviews and review for accuracy and clarity). However, the analysis, conclusions, and recommendations are solely those of the authors and do not necessarily reflect the views of Intel and Fulbright University Vietnam.

TABLE OF CONTENTS





Chapter 1

Purpose and Motivation _____ 01 – 04

Chapter 2

Ground-Laying Policy Frameworks
and Ecosystem Development _____ 05 – 08

Chapter 3

Attracting Investments _____ 09 – 12

Chapter 4

Building the Semiconductor Footprint _____ 13 – 16

Chapter 5

Stimulating Innovation _____ 17 – 20

Chapter 6

Developing Hi-Tech Workforce _____ 21 – 24

Chapter 7

Enabling Local Suppliers _____ 25 – 28

Chapter 8

Harnessing Global Value Chain
Connectivity and Resilience _____ 29 – 34

Chapter 9

Strategic Pathways for Vietnam's
Semiconductor Ecosystem _____ 35 – 38

Purpose and Motivation



Vietnam's semiconductor industry has transitioned from a peripheral manufacturing base into a strategically significant pillar of national economic development. Over the past decade, the semiconductor industry has gained prominence as a catalyst for productivity growth, technological upgrading, and workforce transformation, especially in the last two years, where it became the pillar of Vietnam's ambition to evolve into a high-income, innovation-driven economy.



This transformation unfolds within a rapidly shifting global context. Semiconductor supply chains, once optimized for cost efficiency, are being reconfigured under the pressures of geopolitical fragmentation, technological complexity, and systemic risk. Within this environment, Vietnam has positioned itself as a stable and increasingly indispensable node in global production networks, particularly in the downstream segment of assembly, testing, and packaging (ATP). The trend of multinational firms relocating production capacity ("reshoring") to Vietnam illustrates how policies and market dynamics are reshaping their global footprints.

This report, therefore, adopts an ecosystem lens to explain this evolution. Rather than analyzing isolated firm-level competition or administrative sectors, it examines how value is created through the interplay of multiple actors: policymakers and government institutions, multinational corporations, domestic suppliers, universities, and global customers. This perspective is critical in semiconductors, as the industry's skills, knowledge, capital intensity, technological interdependence, and complex supply chain mean that no single actor can operate effectively in isolation. In other words, performance is determined by alignment across the system.

Four insights define Vietnam's trajectory. First, the country has moved from an electronics-assembly base to a credible participant in global semiconductor manufacturing. Second, this transition has accelerated since 2018 thanks to global supply chain shifts and targeted policy interventions. Third, the development of the ecosystem is anchored by key firms that act as coordinators and capability builders rather than mere organic growth. Fourth, Vietnam now stands at a strategic inflection point, where its aspiration to expand into higher-value domains such as advanced packaging, IC design, and applied R&D faces internal capabilities.



The ecosystem reflects this systemic complexity, including lead firms such as Intel, Marvell, Samsung, and Amkor Technology; a growing base of suppliers and education & training initiatives; and an increasingly proactive government policy apparatus. These actors operate within a broader geopolitical and market context that shapes demand, investment flows, and risk considerations.

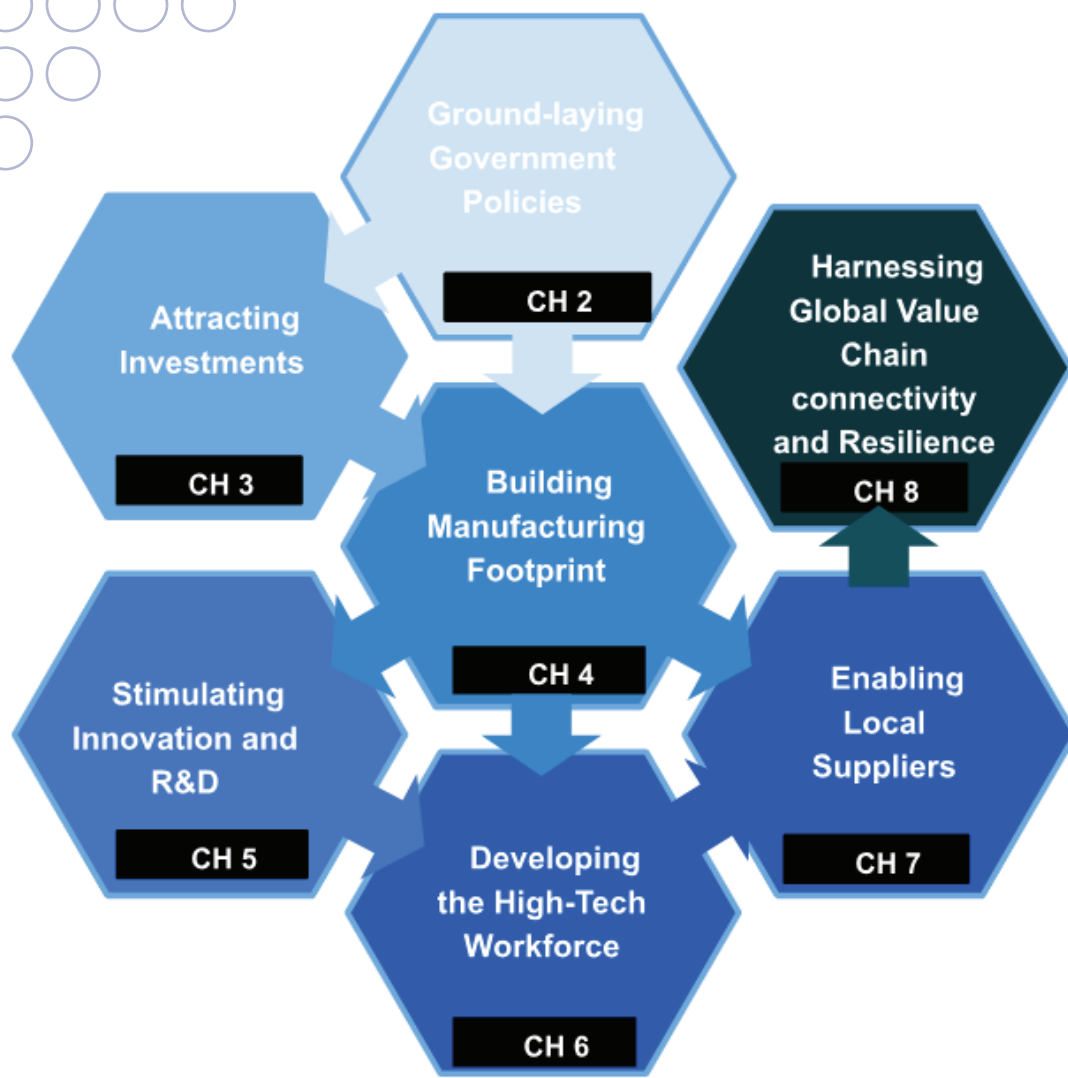
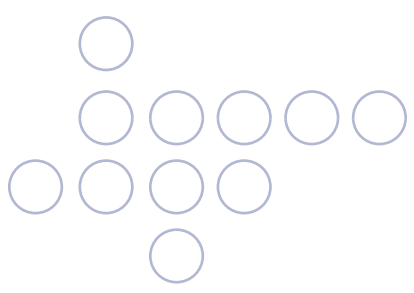
Methodologically, the report integrates qualitative insights from industry interviews with quantitative data across policy, trade, and workforce indicators. This multi-layered approach allows for a comprehensive assessment of both direct outcomes, such as export growth and employment, and indirect effects such as capability development and ecosystem alignment.

Ultimately, the next chapter of Vietnam's semiconductor ambition depends on how effectively the country can coordinate its ecosystem to capture greater value, build domestic capabilities, and sustain long-term competitiveness in an increasingly fragmented global landscape.



Case Study: *Intel Products Vietnam and its Ecosystem-Building Roles as a Keystone Investor*

From a keystone investor perspective, Intel has played a foundational role in shaping Vietnam's semiconductor ecosystem beyond conventional FDI. Since 2006, Intel Products Vietnam (IPV) has played a pivotal role as a flagship foreign direct investment (FDI) anchor and trusted advisor, shaping Vietnam's semiconductor ecosystem through supplier capability development, policy engagement, and large-scale workforce enablement. Intel Vietnam's experience underscores a fundamental reality: semiconductor ecosystems are not accidental outcomes, but strategic constructs—intentionally built through anchor-led leadership and coordinated execution. By embedding global standards, investing in human capital, and fostering institutional linkages, Intel has helped align firms, universities, and government actors toward a shared value proposition and contributed to Vietnam's capability to translate externally anchored capabilities into innovation and value creation.



-  *Industry Infrastructure*
-  *Building*
-  *Knowledge & Human Capital Spillovers*
-  *International Competitiveness*



Ground-Laying Policy Frameworks and Ecosystem Development

Vietnam's emergence as a credible semiconductor destination resulted from two decades of layered, adaptive policymaking. The initial broad FDI-led industrialization strategy has progressed into a targeted, capability-building policy architecture positioning Vietnam in higher-value segments of the global semiconductor value chain.

This evolution can be framed in four distinct phases. The early 2000s were the “Global Integration” phase, anchored by the Vietnam–U.S. bilateral trade agreement and WTO accession, which established the institutional foundations for an export-oriented, FDI-friendly economy. During this period, Vietnam leveraged its core advantage of cost-competitive labor to attract anchor investors, exemplified by Intel’s entry in 2006. The subsequent “Export-Oriented Expansion” phase, from 2008 to 2019, saw Vietnam consolidating its role as a manufacturing hub for global electronics, supported by legislative milestones such as the Law on High Technology and the designation of semiconductors as a technology of national priority. However, value capture remained largely concentrated in assembly and testing, with limited domestic integration.



A structural shift occurred during the “Industrial Revolution 4.0 phase” since 2019, as policymakers began to pursue “trading up” strategies targeting IC design, advanced packaging, and R&D capabilities. This transition culminated in the 2024 National Semiconductor Strategy’s articulation of the “C = SET + 1” model, outlining a phased pathway from initial capability to full-scale semiconductor design, manufacturing, and innovation capacity by 2050.

Vietnam’s approach is distinguished by its aspirational targets, coupled with the political will underpinning implementation. A multi-tiered policy hierarchy, spanning Politburo resolutions, national legislation, ministerial decrees, and inter-ministerial implementation circulars down to strategies and implementation at the local levels, enables strategic coherence in operational flexibility. This “policy mosaic” allows Vietnam to continuously refine its approach while maintaining long-term directionality.



The results are increasingly visible. Vietnam has attracted significant commitments across the semiconductor value chain. In the last few years, it has attracted more than ATP (Intel and Samsung) toward advanced packaging (Amkor) and IC design (Marvell and Synopsys). Domestic firms, including Viettel, FPT, and CT group, are expanding into front-end fabrication and back-end packaging, signaling early-stage domestic capability formation.

Yet, the transition toward a fully integrated ecosystem remains open. Structural challenges in energy and infrastructure, bureaucratic frictions, a growing but still-developing high-skilled talent pool, and FDI “enclave dynamics” limit the depth of domestic spillovers. Furthermore, Vietnam’s strategy must navigate three interlocking tensions: balancing state direction with market efficiency, short-term FDI dependence with long-term domestic capability building, and global integration with geopolitical positioning.

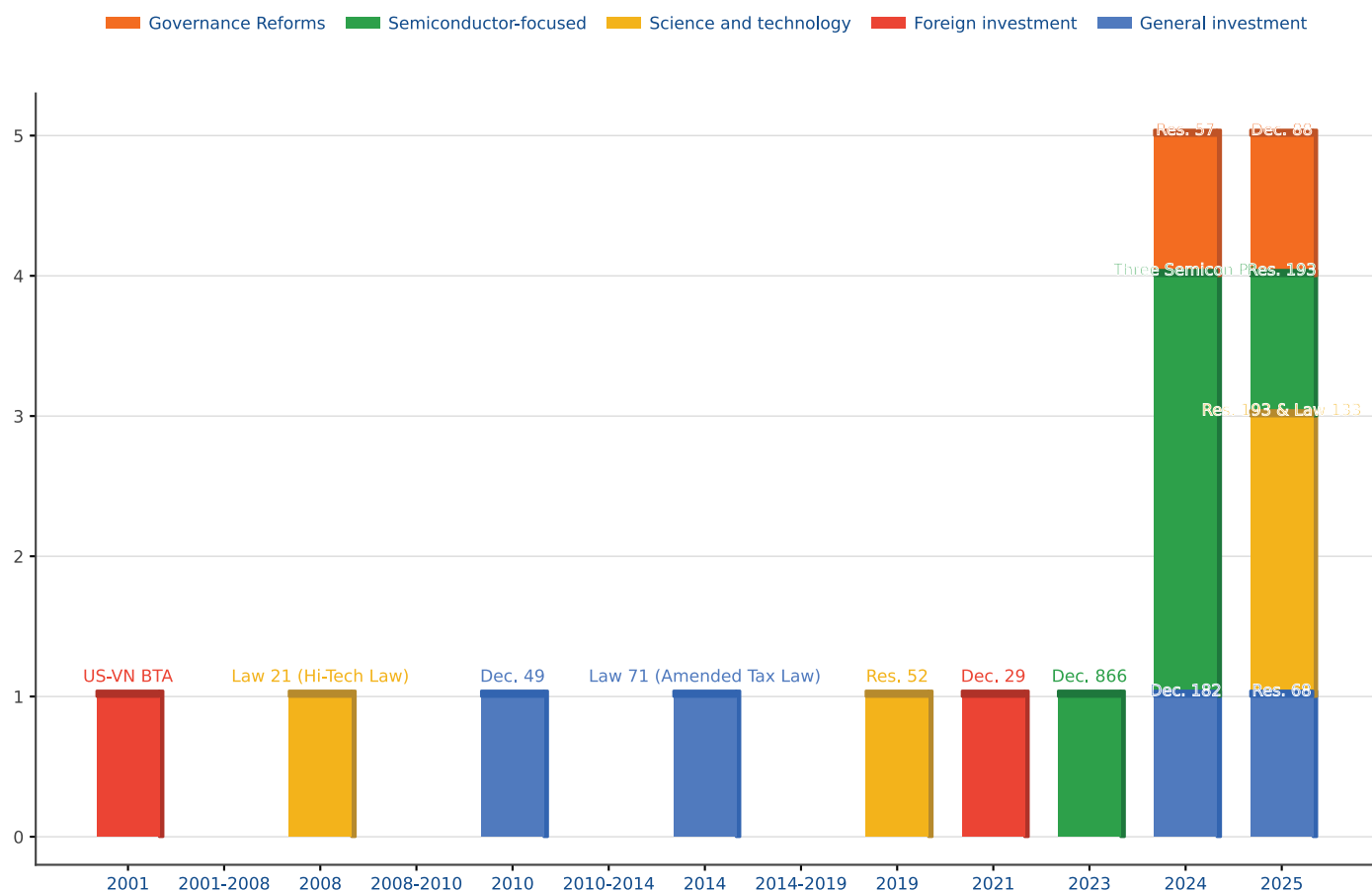
The success of Vietnam’s semiconductor ambitions requires both policy design and execution discipline, institutional coordination, and the ability to translate policy intent into firm-level capability upgrading.



Keystone Investor Role: *Institutional Sounding Board*



Intel Products Vietnam (IPV) illustrates how a keystone investor can accelerate policy reforms through operational feedback loops. As one of the earliest large-scale high-tech investors in Vietnam, Intel contributed to regulatory development in customs modernization (such as the Authorized Economic Operator - AEO framework), taxation, export-processing policies, and broader investment facilitation mechanisms. IPV functioned as both a system integrator and institutional counterpart, aligning its operational requirements with the evolving policy framework. Beyond the direct economic impacts (with IPV responsible for more than 50% of Intel's total production volume output and accumulating over 110 billion in exports), Intel's presence signaled to global investments and reinforced Vietnam's position in the global semiconductor value chains. Its continued engagement highlights the importance of sustained public-private coordination in translating policy ambition into ecosystem-level outcomes.



Note: Evolution of Vietnam's notable policies on high-tech investment, with a strong focus on semiconductor.

Source: Central Committee of the Communist Party of Vietnam; VCCI-IP; Vietnam Trade Portal; Government of Vietnam; Ministry of Information and Communications; National Assembly of Vietnam.

Table 2.2 Intel Vietnam: Key Milestones (Post-2021)

Year	Milestone
2021	3 billion cumulative chip units shipped
2022	Intel Products Vietnam wins its 2nd Intel Highest Internal Quality Award
2022	12th / 13th Generation CPU shipped from Vietnam
2023	Establishes IEEE Electronics Packaging Society (EPS) Vietnam Chapter
2024	AI PC 2nd Generation Lunar Lake – Product launched September 2024
2025	4 billion cumulative chip units shipped
2025	Intel transferred partial ATM operations from Costa Rica to Vietnam
2026	Cumulative export value surpasses \$110 billion
2026	AI PC 3rd generation - Intel Ultra Core Series 3 Panther Lake- Product launched January 2026
2026	Q1: 1 Million server units shipped by Q1'26

Source: Intel Products Vietnam

Attracting Investments

Vietnam's emergence as a leading FDI destination evolved from a simple calculation of low-cost labor arbitrage to a layered, evolving investment system compounded over nearly four decades. The Đổi Mới reforms (1986) and WTO accession (2007) shifted Vietnam into a globally integrated manufacturing platform, followed by the gradual construction of an ecosystem that aligns trade access, physical infrastructure, and firm-level operating conditions.

This ecosystem operates across three reinforcing mechanisms. First, trade policy architecture, anchored by a diverse range of Free Trade Agreements (FTAs) such as CPTPP, EVFTA, and RCEP, positions Vietnam as an exporting gateway into major consumer markets across North America, Europe, and Asia. Second, spatial platforms, including industrial parks (IPs), export processing zones (EPZs), and high-tech parks (HTPs), enable clustering and supplier co-location. Third, regulatory instruments, such as Export Processing Enterprise (EPE) and tax incentives, shape firm behavior toward export-focused, globally integrated production.



Vietnam's FDI trajectory reflects a clear shift across four phases. The early 2000s prioritized volume attraction through basic EPZs and cost competitiveness. From 2008 to 2019, the model scaled into export manufacturing driven by IPs and EPE structures with limited domestic spillovers. From 2015 onward, a transition toward ecosystem development emerges, with higher-value manufacturing and supplier networks forming around key hubs. Since 2020, global supply chain disruptions have accelerated Vietnam's repositioning as an assembly base and supply chain reconfiguration.

That said, the country's manufacturing remains heavily concentrated in back-end activities, where value capture is inherently labor-intensive, and value is limited. The ecosystem is efficient at attracting FDI, but domestic supplier depth remains thin, technology transfer is inconsistent, and cluster effects are still shallow compared to established ecosystems like China or Malaysia.



Regulatory regimes reinforce this duality. EPE status has been highly effective in enabling export manufacturing, but it disincentivizes domestic linkages by isolating firms from the local economy. Similarly, incentives have historically prioritized firms' entrance over deepening while operating in Vietnam, rewarding capital inflows over capability formation.

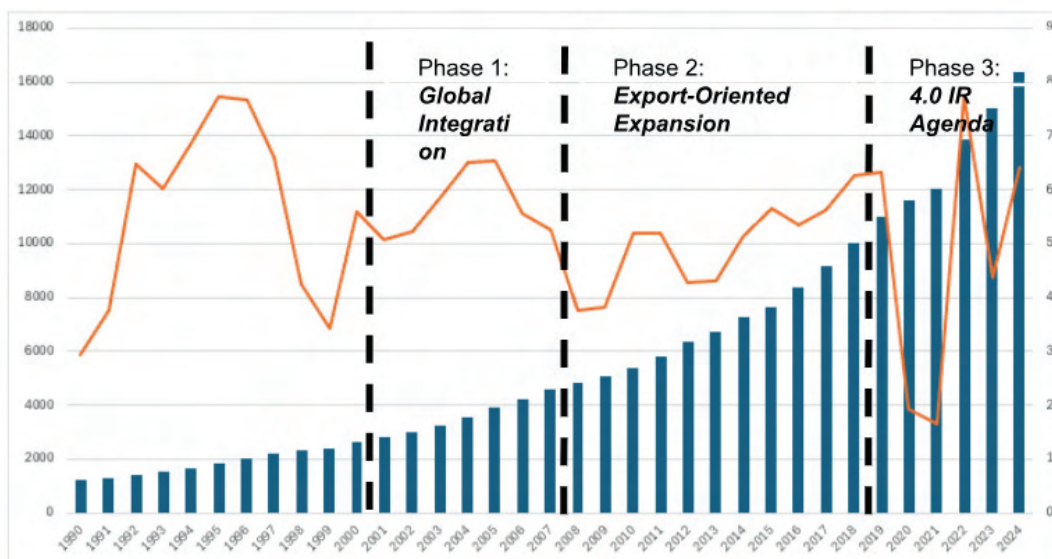
Vietnam, traditionally optimized for investment attraction, has increasingly differentiated itself through privileged market access and geopolitical positioning within global supply chains. These policy changes must be aided with the foster of dense supplier networks, knowledge spillovers, and true cluster formation, to move up the value chain.

Keystone Investor Perspective: Credibility Magnet



Intel's role in Vietnam is often described as a large investor. In reality, as a first mover, Intel stress-tested Vietnam's institutional capacity by highlighting areas for regulatory, policy, and infrastructure improvement. This role of "tester" catalyzed policy refinement, particularly around EPE implementation and high-tech parks. The presence of Intel signals credibility and reduces perceived country risk for Vietnam as an investment destination while setting a benchmark for execution in subsequent waves of high-technology FDI. This "magnet effect" attracted subsequent large-scale investments in the broader ecosystem of suppliers, service providers, and supporting industries. However, Intel's experience also highlights areas where improvement would be beneficial: the research team identified that addressing incentive unpredictability (e.g., Investment Support Fund and harmonization of OECD-compliant Qualified Refundable Tax Credits), as well enhanced export policy, and limited local supplier depth, underscoring that high-quality FDI requires systemic evolution, not incremental policy tuning.

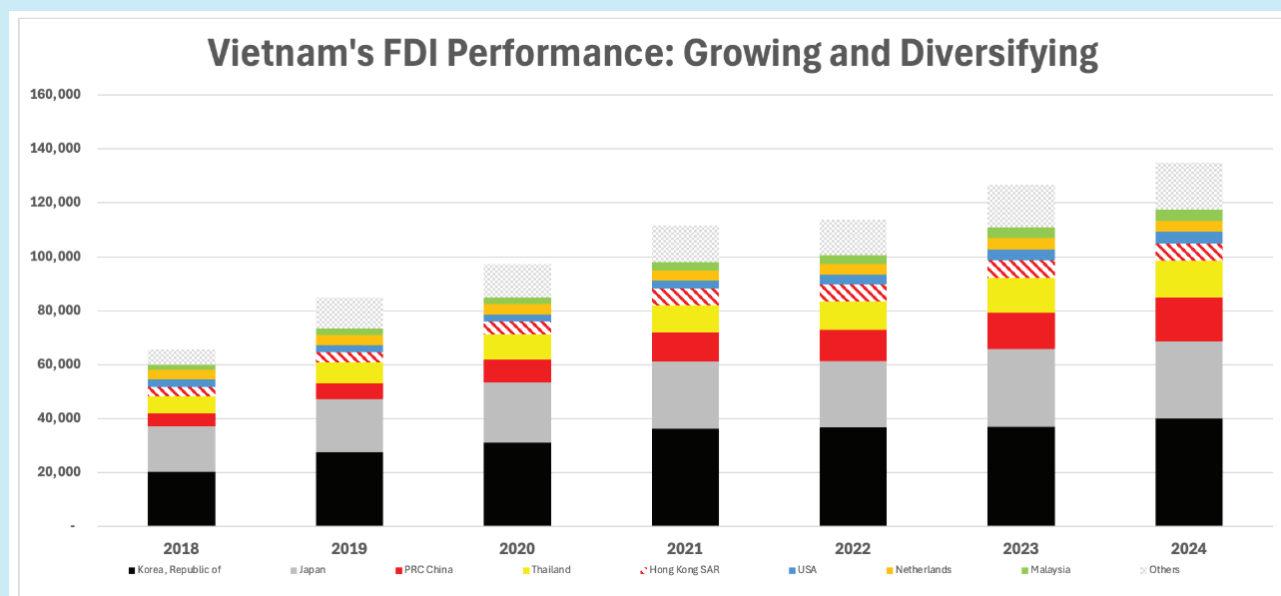
Figure 3.1: Vietnam's Economic Performance and Inward-FDI throughout three phases



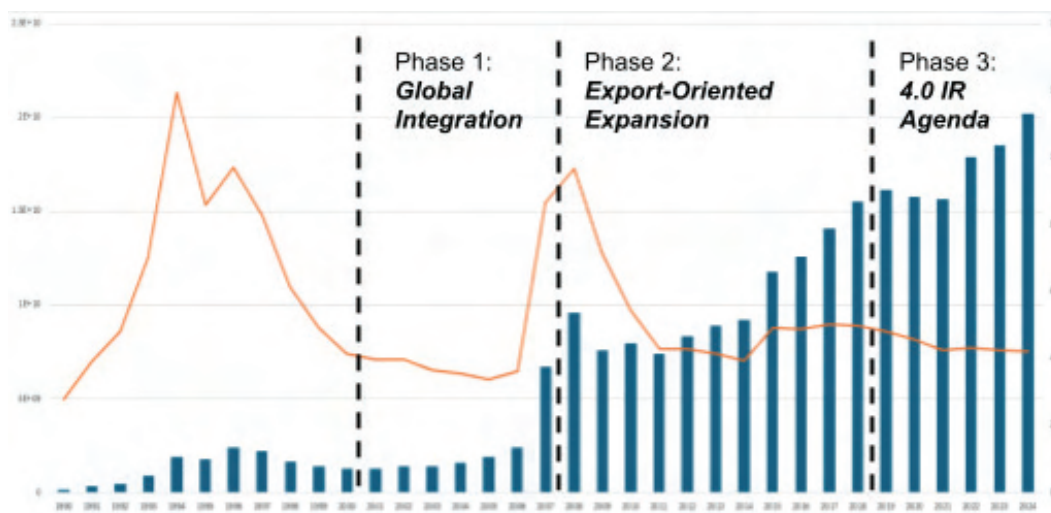
Note: The blue bars indicate GDP per capita on the left-hand axis; the red line indicates GDP growth per capita on the right-hand axis.

Source: World Bank

Figure 3.2: Vietnam's FDI stock in the last 7 years: growth and diversification



Source: IMF inward FDI data (2018-2019)



Note: The blue bars indicate the levels of inward FDI to Vietnam (in Bln USD) on the right-hand axis.

Source: World Bank

Chapter 4

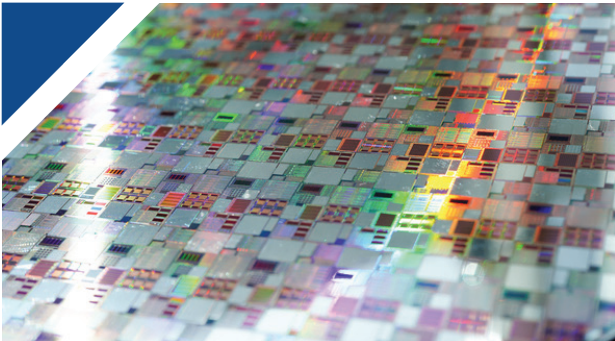
Building the Manufacturing Footprint



The global semiconductor industry is actively being restructured around resilience, geopolitics, and technological control. Traditional models such as the “flying geese” pattern – where production migrates sequentially to lower-cost locations – have broken down under U.S.-China tensions, export controls, and supply chain vulnerabilities exposed during COVID-19. More selective “re-shoring” to the homeland or “friend-shoring” and “Plus One” (+1) diversification strategies abroad have emerged, creating profound implications for how countries participate in the semiconductor value chain.

Rather than concentrated in a few advanced economies, the industry is currently distributed across highly specialized nodes: materials and equipment in the U.S., China, Japan, and Europe; fabrication concentrated in Taiwan and South Korea; and back-end assembly, testing, and packaging (ATP) across China and Southeast Asia. Each segment captures different levels of value, with design and fabrication having economic and strategic value. Within this reconfigured landscape, Vietnam has established a credible position. Its rise has been driven by foreign direct investment (FDI), anchoring the country firmly in the ATP segment. Investments from global players such as Intel, Samsung, and Amkor have transformed Vietnam into a meaningful back-end manufacturing hub, with the sector generating approximately \$18.7 billion in revenue by 2024. By 2032, Vietnam is positioned to capture up to 8–9% of global ATP capacity outside traditional ATP powerhouses by 2032. Current progress in IC design by Marvell, Synopsys, and Renesas signals potential for upstream capability.

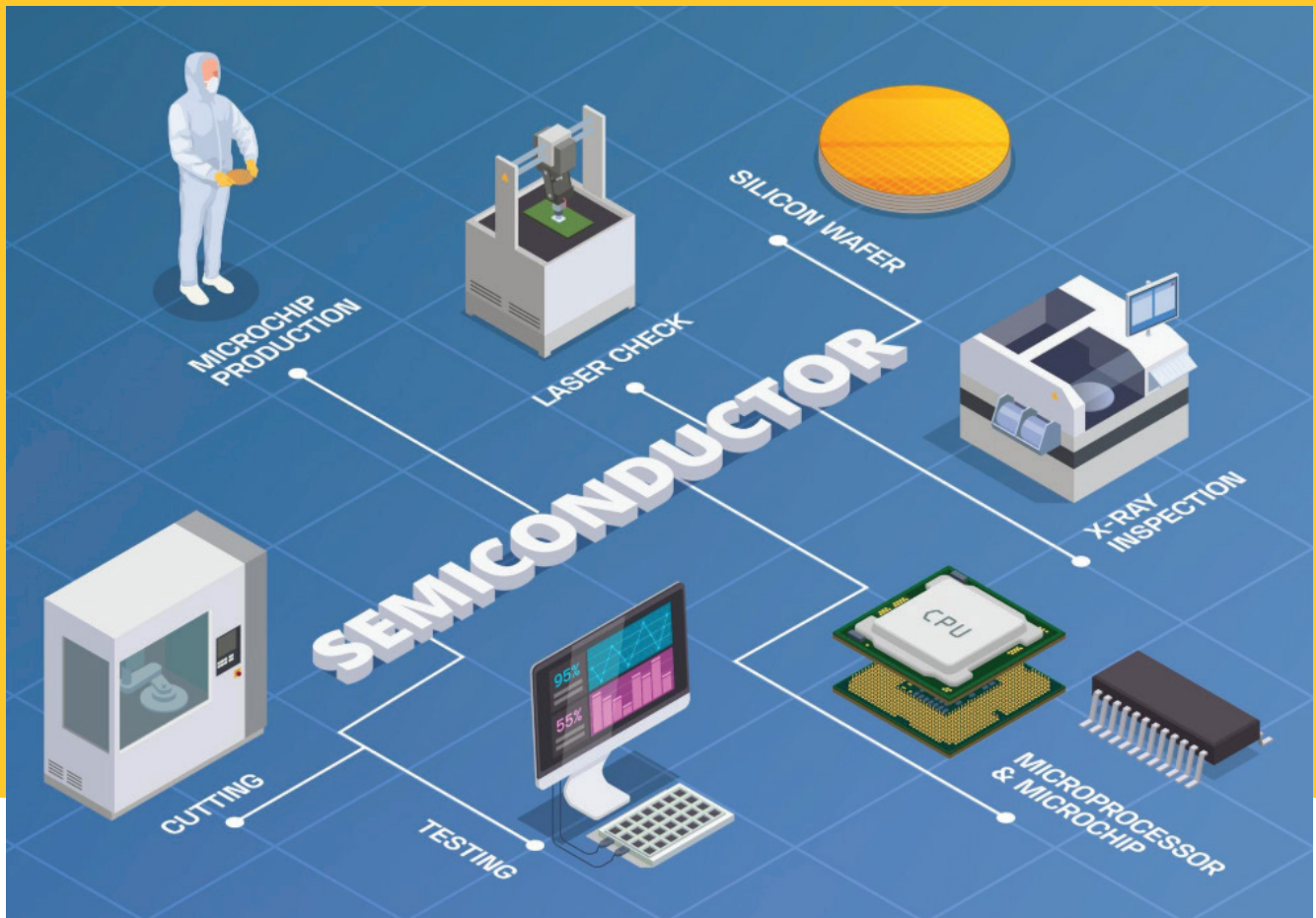




However, Vietnam's footprint remains structurally constrained. ATP, while increasingly sophisticated, is still downstream in value capture. Critical gaps persist in fabrication and advanced design, segments that define technological sovereignty and economic rents. More importantly, Vietnam's participation is still largely under development and operates in tandem with external actors: multinational firms are still essential in orienting technology, standards, and integration depth. The National Semiconductor Strategy reflects an awareness of these constraints, but its ambition risks outrunning execution capacity. ATP upgrading is the most realistic near-term lever, offering a pathway into advanced packaging and higher value-added activities. In contrast, fabrication remains economically precarious, with each fab facility requiring hundreds of millions USD in capital investment and, more critically, sustained demand in the electronics markets to avoid underutilization. Without anchor customers or guaranteed off-take, these investments risk becoming isolated assets rather than ecosystem catalysts. IC design presents the highest leverage opportunity but also exposes systemic bottlenecks, but as Chapters 5 and 6 discuss, talent shortages, high costs of EDA tools, and weak industry-academia linkages constrain scaling.

The underlying issue is structural: semiconductor ecosystems are demand-driven, not policy-driven. Taiwan and South Korea built ecosystems anchored by globally competitive firms that generated continuous demand for suppliers, talent, and innovation. Vietnam's trajectory is not one of linear upgrading but selective integration into a fragmented global system. The critical question is whether it can move from being a participant in supply chains to a shaper of them.





Keystone Investor Perspective: Infrastructure System Partner

Intel's manufacturing footprint in Vietnam has evolved from a cost-driven operation into a high-complexity, high-value node within its global network. Initially attracted by competitive labor and infrastructure, the facility focused on high-volume assembly and testing. Over time, it has transitioned into advanced assembly, test, and packaging (ATP), with increasingly complex processes, alongside more sophisticated equipment and quality systems. This shift has enabled production of more advanced, complex and higher-value products, expanding from a single chipset to a "megafactory" delivering billions of units across Intel's portfolio, including SoCs, desktop CPUs, IoT devices, modems, mobile CPUs, and data center. Scale and capability have reinforced each other: while the first billion units took nearly a decade, subsequent milestones accelerated rapidly, surpassing 4 billion units by 2025. Faster ramp-up times and adaptation to customized, customer-centric manufacturing further reflect growing maturity. Beyond production, Intel increasingly acts as a system partner, shaping infrastructure, supply chains, and demand, which highlights both Vietnam's progress and remaining structural constraints.

CHIP DESIGN ECOSYSTEM IN VIETNAM



Corporation	Invested in	Operations Begin	Investment (USD Million)	Location	Activities
Intel	2006	2010	1,000	HCMC	ATP
Samsung Electronics	2022	2022	920	Thai Nguyen	ATP
Amkor Technology	2021	2025	1,600	Bac Ninh	ATP; Advanced in Package (SiP)
Intel	2021	2021	475	HCMC	ATP; 2nd Tranch Investment
Hana Micron	2023	2025	1,000	Bac Giang	ATP & memory modules
VSAP Lab	2025	2026	72	Da Nang	Advanced ATP; model
FPT & CT	2026	2027	TBD	Bac Ninh	ATP
Marvell Technology	2013	2013	400-500	HCMC, Da Nang	IC Design
Cadence	2018	2021	Est. 10-20	HCMC	IC Design
Synopsys	2023	2023	20-30	HCMC, Danang	IC Design
Renesas	2011	2014	N/A	HCMC	IC Design
Viettel	2026	2030	Est. 500	Hanoi	Vietnam's first fab
Samsung	2026	TBD	TBD	Thai Nguyen	ATP; Legal entity March 2026

Source: Media reports and press releases from companies

Stimulating Innovation

Vietnam's innovation trajectory reflects an increasingly deliberate shift from efficiency-driven manufacturing toward capability-driven technological development. Measured in the World Intellectual Property Organization (WIPO)'s Global Innovation Index (GII), Vietnam consistently outperforms its income level and is ranked among the highest-performing lower-middle-income economies, demonstrating a persistent ability to convert limited inputs into strong innovation outputs. This "efficiency premium" came as the result of coordinated policy, sustained FDI inflows, and workforce upgrades.

However, Vietnam's innovation remains constrained by its input, where shortages of highly skilled engineers, limited postgraduate training capacity, and weak industry-academia linkages continue to cap its ability to move into higher-value segments. The fact that only a small fraction of the semiconductor workforce holds advanced degrees (4%, whereas leading nations' rate is approximately 30%); and that the majority of R&D personnel remain concentrated in public institutions (84%) rather than the private sector, reveals a system that generates outputs efficiently but lacks depth and scalability.



Within this context, the semiconductor industry reveals another perspective on how innovation is constructed. Unlike frontier economies where innovation is often design-led, Vietnam's back-end assembly, testing, and packaging (ATP) industry is rooted in manufacturing-led innovation. Here, innovation means process improvement: increasing yield, reducing defects, shortening cycle times, and managing ever-greater production complexity. These incremental gains compound into meaningful competitive advantage, enabling firms to move up the value curve without fundamentally shifting in the global hierarchy. This distinction is critical to understanding a realistic pathway for Vietnam's innovation. It has yet to reach a position to replicate the R&D intensity of Taiwan or the United States, but it can deepen capabilities within existing comparative advantages while selectively expanding upstream into IC design. Challenges to this pathway include limited access to costly Multi-Project Wafer (MPW) and Electronic Design Automation (EDA) tools, which restrict design capabilities; gaps in infrastructure, especially power stability, pure water, and specialized logistics, which pose risks to high-precision manufacturing; and legal complexities that constrain intensive technological transfer.



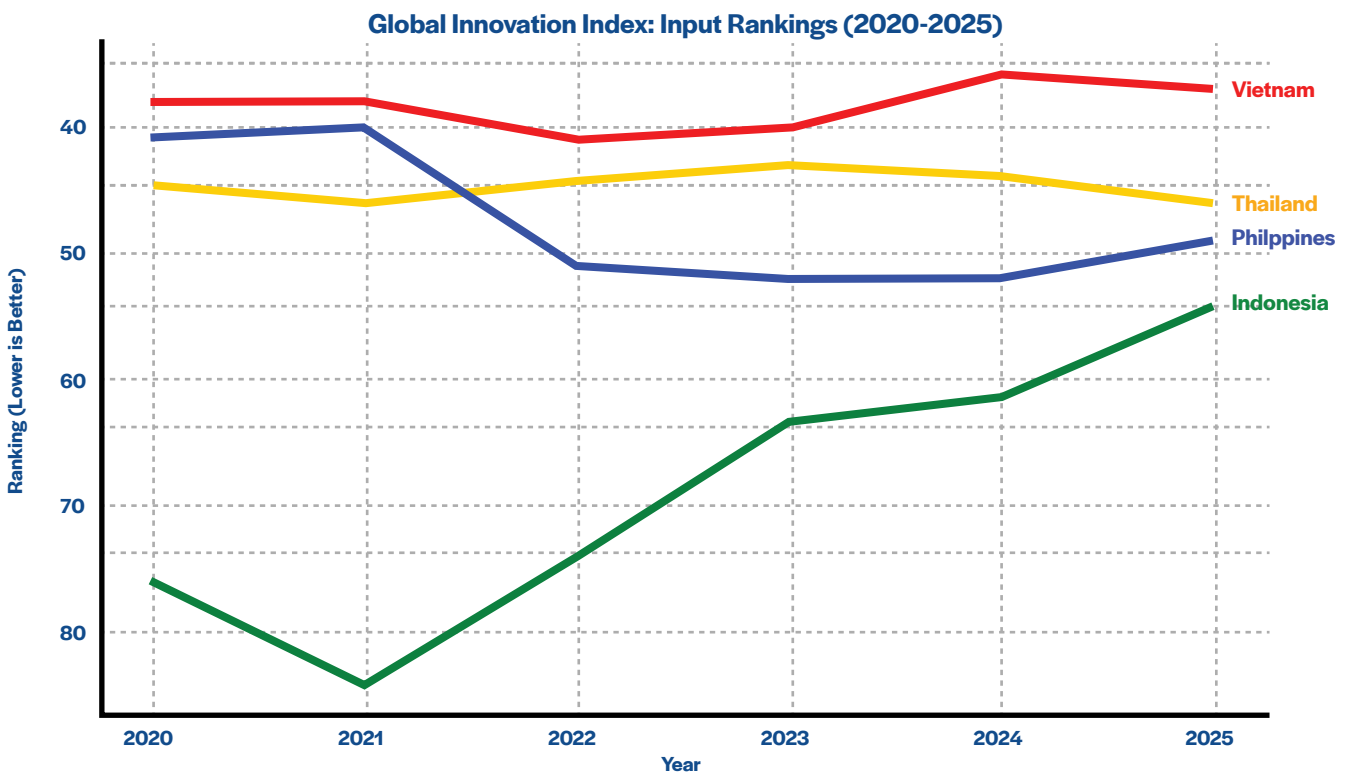
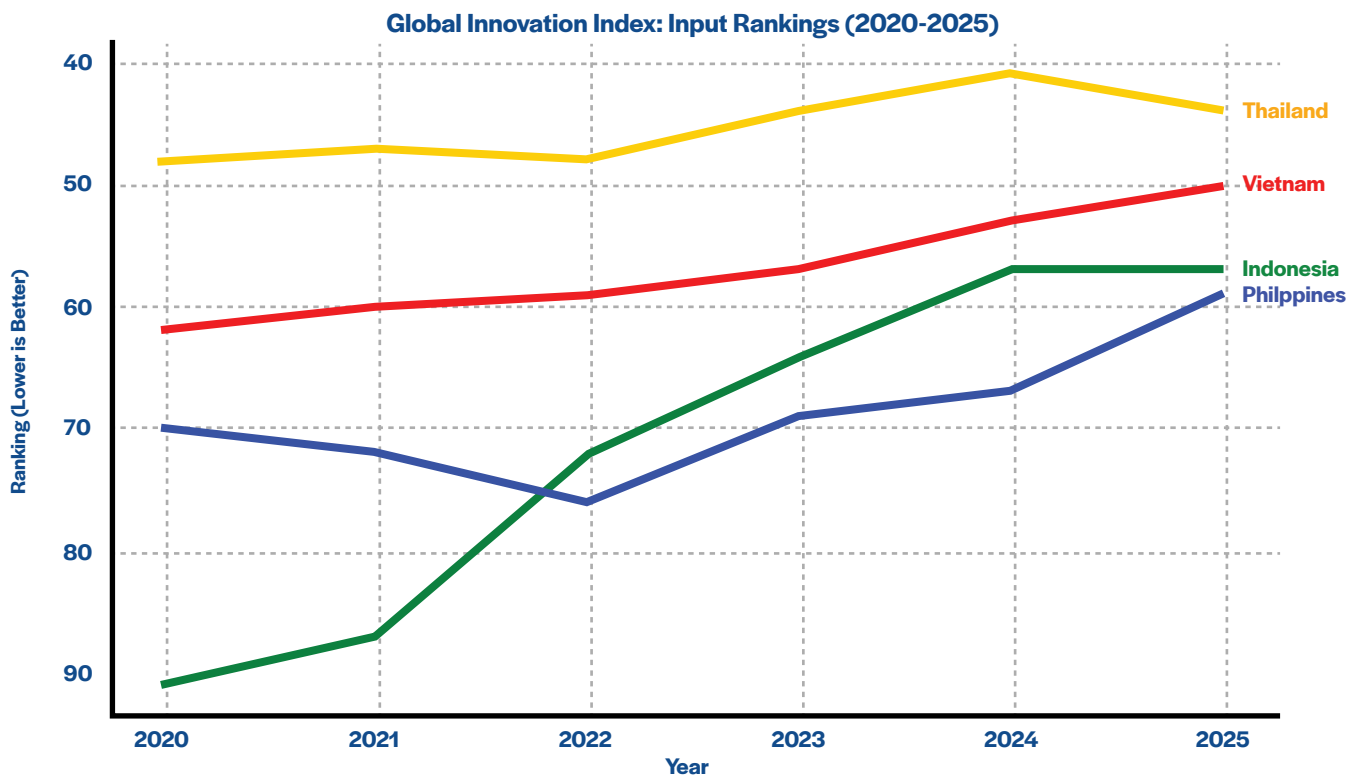
The contemporary policy momentum on innovation is strong and increasingly sophisticated. Recent frameworks signal a shift from pure investment attraction toward innovation enablement, including financial and tax incentives for R&D, workforce development, and greater tolerance for experimentation and failure. The use of MPW and EDA can be shared between startups, universities, and research institutes to foster research and ensure ecosystem alignment at a shared cost. However, policy ambition can outpace institutional capacity. Targets such as training tens of thousands of semiconductor engineers or achieving ecosystem self-reliance risk becoming symbolic without parallel improvements in education quality, industry absorption capacity, and demand-side pull.

Ultimately, Vietnam's innovation model remains externally anchored, manufacturing-centric. Vietnam's transition to an innovation system where global value chain-linked firms - both domestic and multinational- generate, collaborate, and scale innovation will depend on resolving structural bottlenecks in talent, infrastructure, and institutional coordination. Without this shift, Vietnam risks plateauing as an "efficient executor" rather than a true innovation hub.



Keystone Investor Perspective: *Knowledge Incubator*

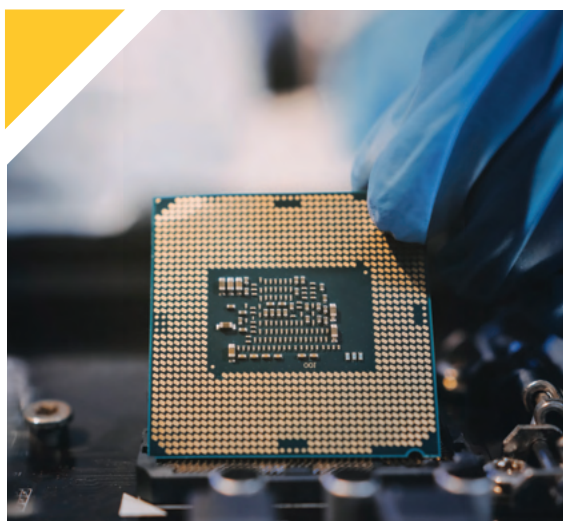
Intel's role in Vietnam's innovation illustrates a staged, capability-driven development. Through its early days' "copy exactly" approach, Intel initially enabled the establishment of baseline manufacturing competence. This evolved into capability building, where local engineers adapted processes and accumulated operational expertise, and ultimately into localized development, with Vietnamese R&D teams contributing directly to process development, equipment selection, and customer engagement. Beyond internal advancement, Intel functions as an ecosystem catalyst. Its internal training, dual career tracks allowing engineers to advance either in senior engineering or management roles, and a culture of innovation, where engineers collaborate on new solutions for quality control, cost, process margin, and product integration, have produced tangible achievements, such as 10 U.S. patents and over 40 trade secrets. Intel's experience shows how individual firms can sustain innovation as a part of overarching ecosystem development.



Sources: For overviews of Vietnam's performance in the GII from 2020 to 2025, please refer to: WIPO GII Report 2020, p. 342; Report 2021, p.170; Report 2022, p. 220; Report 2023, p. 209; Report 2024, p. 246; Report 2025, p. 233

Developing Hi-Tech Workforce

Vietnam's semiconductor ambitions also translate to increasing demands for deepening, improving, and coordinating its investments in human capital. The country's demographic dividend, once a core pillar of its FDI attractiveness, is narrowing. While Vietnam continues to produce over 500,000 university graduates annually, including more than 130,000 in STEM fields, the challenge has shifted from quantity to quality.



Deepening and improving the investment in high-tech human capital requires coordination at a systematic level. Even though there is a large STEM higher education pipeline, it does not translate into a large number of graduates entering semiconductor-relevant studies, which subsequently influences the pool of STEM graduates with industry-ready skills. The result is an inefficient talent pipeline with high output at the education level, yet low conversion into productive industry participation. This gap is compounded by limited postgraduate depth, weak industry-academia linkages, and the concentration of R&D talent within public institutions, which limits private-sector innovation.

Vietnam's response targeting 50,000 semiconductor engineers by 2030 reflects the policy urgency. However, scaling talent supply through university expansion alone is insufficient. Semiconductor manufacturing is inherently skill-intensive and experiential, which requires hands-on exposure to advanced tools, cleanroom environments, and real production systems beyond classroom-based learning. Without the necessary training aids, the policy risks producing graduates who are technically qualified on paper but unprepared for real-world operations.





There is also the risk of overshooting, as aggressive talent expansion not matched by industry absorption capacity could lead to skill mismatches and underemployment. The lesson is clear: talent strategy must be anchored in realistic market demands, and students must be equipped with transferable technical and soft skills development to ensure workforce adaptability.

Ultimately, Vietnam's semiconductor outlook will be determined less by how many engineers it produces and more by building a coherent talent ecosystem –one that integrates education, industry, and innovation into a self-reinforcing cycle. Without this alignment, the country risks remaining locked in lower-value segments despite ambitious targets.

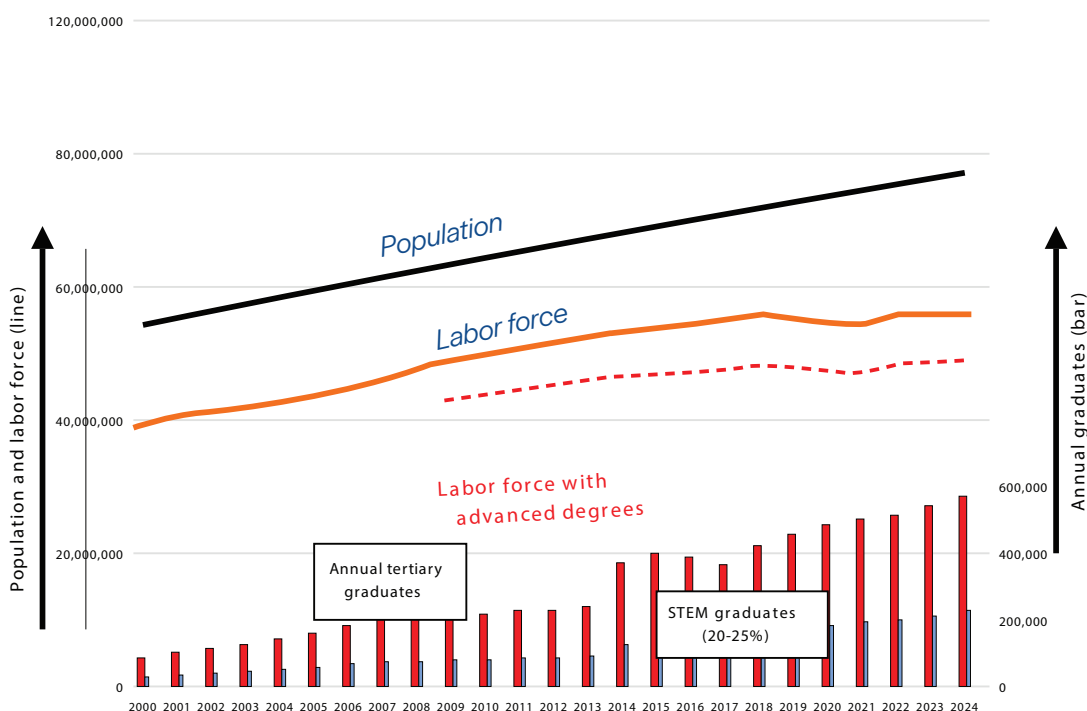
Recognizing this, Vietnam is moving toward a multi-pathway talent model. Higher education remains the foundational pipeline, with expanded enrollment in semiconductor-focused (such as IC design, semiconductor materials, or nanotechnology) programs and major investment in software, training equipment, and laboratories at 18 major public universities. Parallel to this, upskilling and reskilling programs convert adjacent engineers, particularly from the large number of electronics and telecommunications engineers (estimated at 700,000), into semiconductor professionals. This dual-track approach is promising, but it requires systematic coordination between education, R&D, and industry demand. Vietnam's current model remains fragmented: universities lack access to industry-grade equipment, firms report gaps in practical skills, and training programs are not consistently aligned with evolving technological needs. Initiatives such as shared laboratories, EDA access platforms, and "triple helix" collaborations are steps in the right direction, but remain early-stage.



Keystone Investor Perspective: A “Semiconductor ATP University”

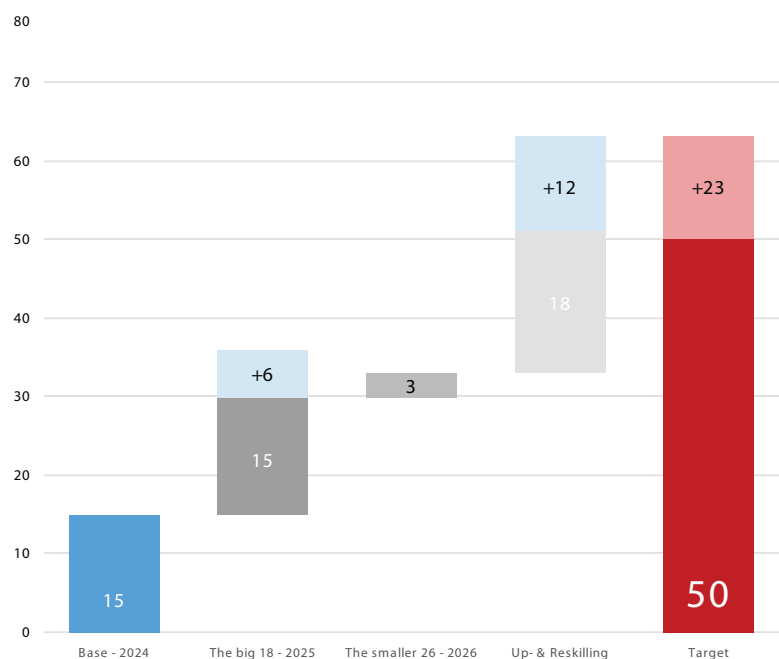
Intel’s role in Vietnam’s talent ecosystem extends beyond workforce development. Affectionately called “Vietnam’s semiconductor university” by staff, Intel institutionalized on-the-job training, learning, and industry-aligned skill development. Through structured internships and continuous upskilling, Intel contributes to three critical dimensions: expanding supply, deepening capabilities, and enabling integration across education and industry. Its workforce model – combining technical depth with operational discipline – has become an informal benchmark for talent quality in Vietnam’s semiconductor sector. Intel is building a deep strategic partnership with public institutions and leading universities through sustained technical collaboration, workforce engagement, and targeted investments in education infrastructure. From a strategic standpoint, Intel’s donation of industry-standard semiconductor equipment to the Ho Chi Minh City’s SHTP Training Center and Vietnam National University-Hanoi reflects a long-term commitment to strengthening Vietnam’s semiconductor ecosystem. These contributions, together with joint training programs and internship opportunities (so far had hired over 100 across 20 universities in HCMC), enable universities to align curricula with real-world manufacturing environments and help bridge the gap between theoretical instruction and the high-cost, high-complexity realities of modern semiconductor production. Intel’s spillover of its trained engineers across the industry demonstrates how firm-led solutions are necessary in larger ecosystem-wide alignment.

Figure 6.1: The Macro Perspective: Vietnam’s Population, Labor Force, and Yearly Cohorts of Tertiary Education Graduates



Sources: World Bank data, UNESCO; ILO; Education and Mismatch Indicators database (EMI), International Labour Organization (ILO), ILOSTAT

Figure 6.2 Talent Target Overshooting Strategy: breakdown per talent source



Source: calculations by authors based on recently published and announced university admission quotas and other statements in the press.

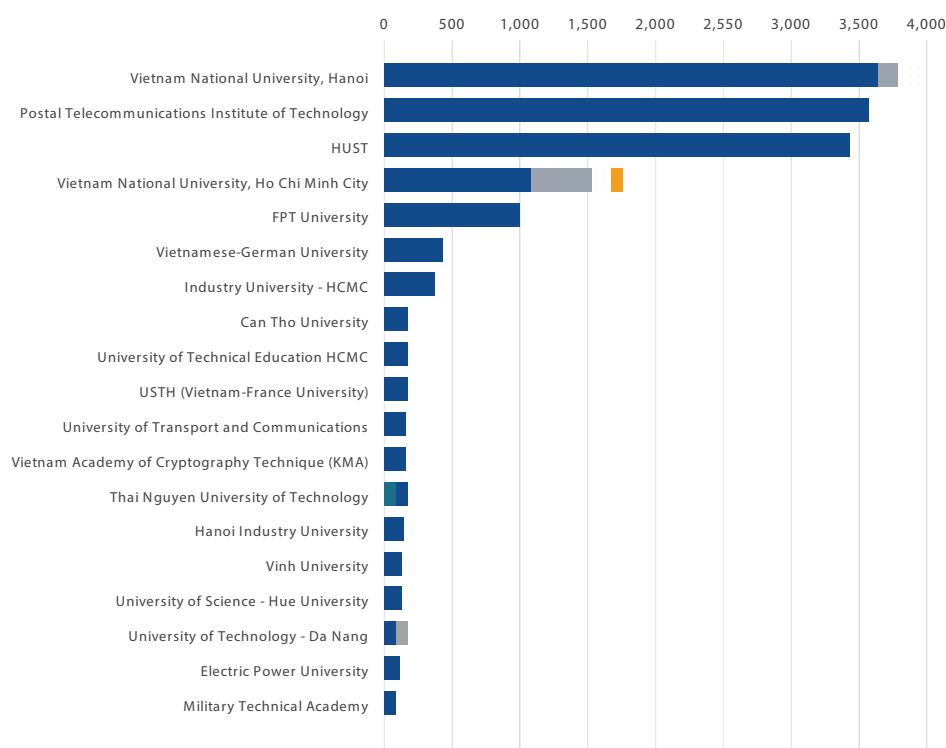
Base - 2024: Number of semiconductor-focused graduates based on pre-2026 intake data.
The Big 18 - 2025: projected number of semiconductor-focused graduates at 18 universities after increased 2026 intake numbers as a result of priority government support.

The Smaller 26 - 2026: projected number of semiconductor-focused graduates at 26 universities that will add this major from the 2026-2027 academic year.

Up & Reskilling: Estimated retraining/advanced training for the industry.

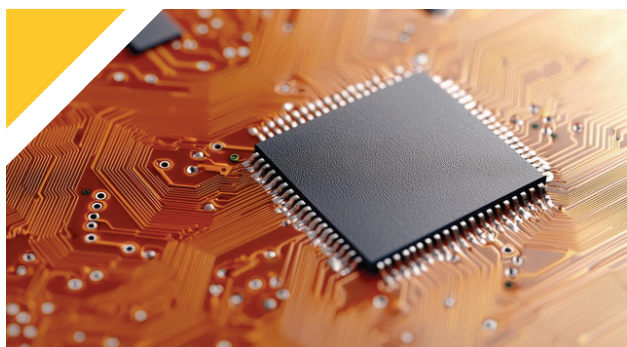
Target: Target of 50,000 semiconductor engineers.

Figure 6.3: Estimated number of semiconductor graduates at 18 public universities, plus FPT University - a private institution with a long history of semiconductor training. VNU-Hanoi and VNU-HCM estimations are based on constituent members.



Source: Calculations by authors based on recently published and announced university admission quotas, public records documents, and press statements. Units are counted as students.

Enabling Local Suppliers



Vietnam's semiconductor supply chain has evolved into an increasingly structured but still incomplete industrial ecosystem. The country today participates in the global value chain but remains concentrated in downstream assembly, testing, and packaging (ATP), with limited penetration into higher-value upstream inputs. The core issue is not participation, but depth of integration.

At a structural level, Vietnam's electronics and semiconductor landscape is organized into two major clusters: a southern hub centered around Saigon Hi-Tech Park, anchored by Intel, and a northern manufacturing corridor driven by large-scale consumer electronics production by Foxconn, LG, and Samsung. While these clusters generate substantial export value, they remain heavily dependent on imported inputs for critical components. This dependence exposes a fundamental limitation: Vietnam is embedded in global supply chains but not yet anchoring them. Many local firms, while upgraded in management practices, still operate below the technological frontier of foreign-invested enterprises and take a long time to compete internationally and for business with the FDI-invested firms. Recognizing this schism in economic fabric, the new Resolution 68 aims to connect the two tracks of globally competitive "export enclaves" with domestic suppliers and have them grown in tandem.



A structural challenge is a coordination mismatch. Domestic firms initially could not meet FDI firms' global standards without heavy upgrades and investments, yet they cannot access contracts without first meeting those standards. FDI firms, facing time and quality pressures, rationally default to Vietnamese subsidiaries of established international suppliers. The result is a self-reinforcing equilibrium where local firms remain locked out of high-value segments such as substrates, advanced materials, and precision components—the very areas where most value is captured.

Despite this, progress is visible. Over the past decade, Vietnam's supplier base has expanded from basic services—logistics, catering, and maintenance—into more technical domains, including precision parts, tooling, and electronic components. The number of local suppliers participating in high-tech ecosystems has grown significantly, and their capabilities have improved incrementally. However, this evolution remains largely confined to indirect materials and supporting services. The localization ratio for core semiconductor inputs remains extremely low, underscoring the persistence of structural bottlenecks.



Strategically, Vietnam faces a choice: continue optimizing within its current position, or deliberately invest to break into higher-value supply segments. The latter requires coordinated action across multiple fronts. First, increasing demand density—through expanded ATP, secured legacy chip fab, and OSAT capacity—is essential to make local supplier investment economically viable. Supply chains follow market demands, aided by policy mandates. Second, institutional coordination must improve. The absence of a unified industry body limits alignment across firms, academia, and policymakers. Third, incentive structures must shift from attracting FDI to embedding it, explicitly supporting second- and third-tier supplier upgrading.



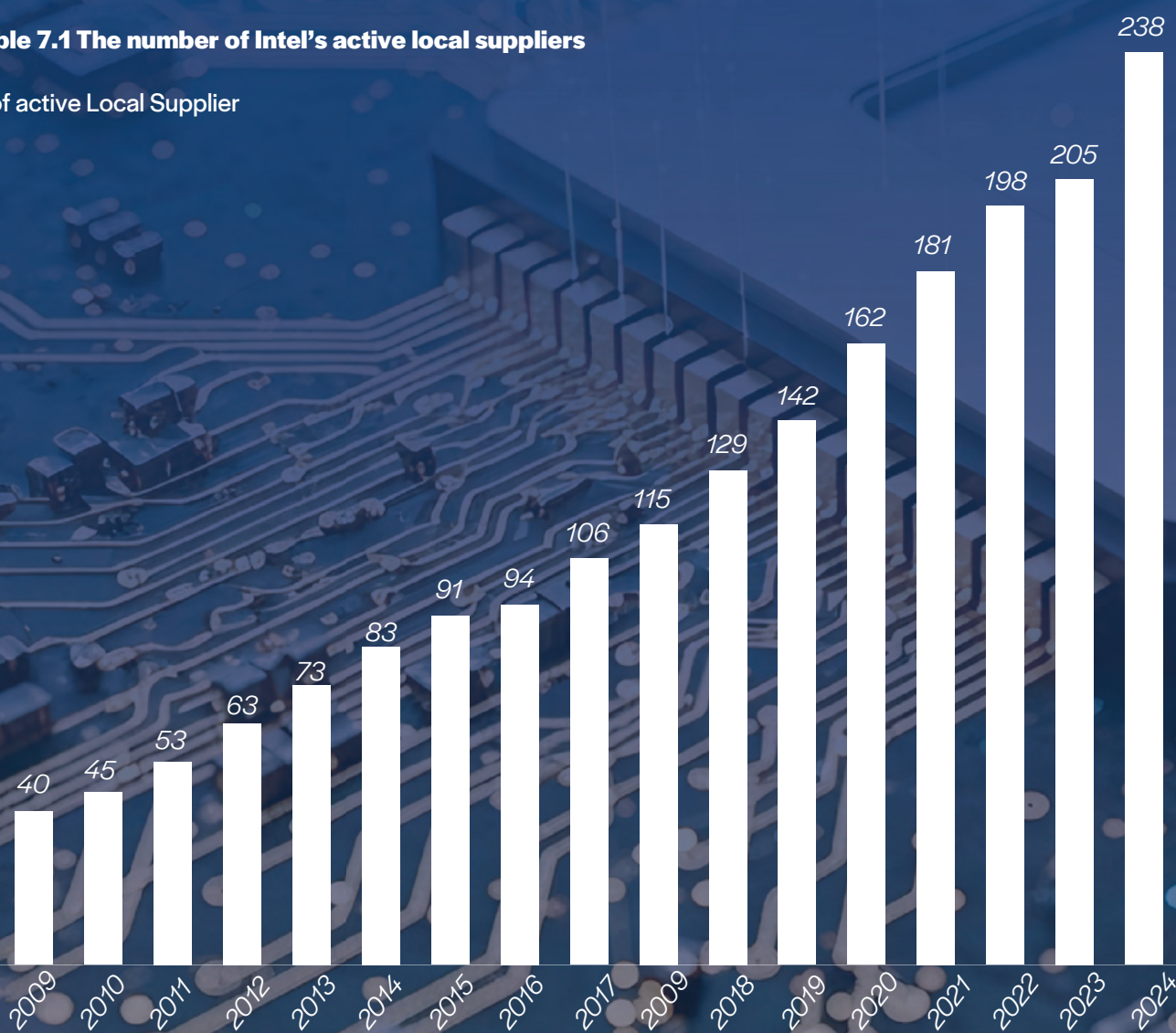
The uncomfortable reality is that Vietnam's supply chain challenge is not about capability in isolation but about *ecosystem economics*. Without sufficient scale, coordination, and demand pull, domestic firms will remain structurally excluded from the segments that matter most.

Keystone Investor Perspective: *Global Standards Mentor*

Intel's role in Vietnam's supply chain shifted from passive sourcing to active ecosystem orchestration. Through standards-driven qualification (e.g., compliance with Intel Corporation and the Responsible Business Alliance's standards), IPV transforms global requirements from barriers into capability-building pathways by co-developing solutions, supporting iterative testing, and embedding engineers alongside suppliers. This moves firms from basic qualification to access both Intel's Vietnam and global operations. In 2025, IPV reported a network of approximately 600 local partners in Vietnam, with around 200 active in the preceding year. While this growth overall has been positive, we observe that Vietnam's direct material supply gap remains and must be sourced from regional leaders, principally Japan and Taiwan. As firm-level interventions cannot fully localize high-value supplies, domestic capability requires a stronger ecosystem coordination between a sectoral, unified representative body and government actors.

Table 7.1 The number of Intel's active local suppliers

of active Local Supplier



Source: Intel records

Case 1: Saigon Fabrication



Founded in the early 2000s as a small, family-run prototype business, Saigon Fabrication remained a specialized company for over a decade. The inflection point came through engagement with Intel. Initially performing basic repair services, Saigon Fabrication scaled its capabilities from handling some motherboards to servicing thousands within 18 months. Driven by Intel's demand, technical validation, and access to equipment, Saigon Fabrication gained troubleshooting expertise, machine transfers, and operational know-how, effectively acting as both customer and capability builder.

Now grown into an operation employing 400 engineers, Saigon Fabrication has restructured into a "one-stop" EMS provider (PCB, PCBA, box-build, and refurbishment) and invested in in-house training pipelines sourcing from 24 universities. The firm's embedded standards and management practices were driven by the leadership's extensive Silicon Valley backgrounds. The company now supplies products and conducts services for Intel, providing comprehensive solutions from prototype to circuit card, electromechanical subassembly, and full system. This allows them to serve OEM, ODM, and CEM customers.

In 2025, Saigon Fabrication expanded operations globally with a new plant in Malaysia, primarily servicing the Intel ATP factory over there. In addition to their capable talent and well-managed governance, the company leadership credits success in part to anchor customers like Intel, whose name association helped them access a wider customer base.

Source: Interview with Saigon Fabrication leadership

Case 2: Huỳnh Đức Inc.



Huỳnh Đức offers a second example of progressive upgrading. Huỳnh Đức's relationship with Intel began around 2011–2013, following an initial qualification phase that lasted 6–12 months. Initially produced basic items like lockers, they gradually moved up toward cleanroom-compatible and eventually to CNC-manufactured equipment.

Intel engineers played a direct role in development, setting standards for products not previously manufactured in Vietnam. Pham Ngoc Duy, the CEO of Huỳnh Đức attributes its ability to absorb this knowledge to a young, energetic engineering team willing to take on new challenges. Over time, the company combined technical learning from Intel with management practices picked up from other FDI customers, evolving its product lineup and organizational management practices.

One distinctive feature is Huỳnh Đức's collaborative working model with Intel, where Huỳnh Đức places 3–7 staff within Intel's factory (including at least one engineer) for specialized technical support. Two years ago, when Intel decided to outsource maintenance of carts, Huỳnh Đức's engineers caught up with the initiative, studied Intel's manufacturing and tracking processes, and built a new workflow from scratch. Within 3–4 months, the model and its seed funding became operational, highlighting Huỳnh Đức's shift from pure manufacturing into service integration.

Source: Interview with Huỳnh Đức Inc. leadership

Harnessing Global Value Chain Connectivity and Resilience

Vietnam's integration into global value chains (GVCs) represents one of the most rapid and far-reaching transformations among emerging economies. Since its accession to the WTO in 2007, the country has evolved into a deeply embedded node within global production networks, with exports exceeding USD 400 billion and a GVC participation rate well above the global average of 45 percent. Electronics, particularly semiconductors, have been central to this integration, driven predominantly by multinational corporations' FDI.

However, beneath this strong connectivity lies a structural imbalance. Vietnam's GVC participation is high in volume but limited in value capture. Foreign-invested enterprises account for 70–85 percent of electronics exports, while domestic firms remain concentrated in low-value, labor-intensive activities such as assembly, testing, and packaging (ATP). High-value segments, including design, advanced manufacturing, and intellectual property generation, continue to reside largely outside the country. This asymmetry reflects a broader pattern: national-level integration does not automatically translate into ecosystem deepening or technological upgrading.

Four structural constraints define Vietnam's current GVC position. First, the dominance of FDI limits domestic spillovers, as linkages between multinational firms and local suppliers remain shallow. Second, local value added is low, constraining income growth and technological learning. Third, the services component of exports—particularly knowledge-intensive services such as engineering and digital logistics—remains underdeveloped, accounting for only around 12 percent of total exports. Fourth, export-led growth has increased environmental pressures, raising questions about the long-term sustainability of the current model.





At the same time, global conditions are shifting. Rising geopolitical fragmentation and economic volatility—captured by indices such as the World Uncertainty Index—are reshaping how firms configure their supply chains. Three strategic responses have emerged globally: diversification (e.g., “China+1”), regionalization (“friend-shoring”), and redundancy through parallel supply chains. Vietnam has benefited from these shifts, positioning itself as an attractive alternative manufacturing base alongside economies such as India and Malaysia.⁸

Yet resilience is becoming as important as cost competitiveness. The ability to maintain production continuity, adapt to shocks, and coordinate across complex supplier networks is now a core determinant of GVC positioning. Vietnam’s experience during recent global disruptions highlights both its strengths—political stability, operational discipline, and export agility—and its limitations, including regulatory frictions, infrastructure constraints, and dependence on external decision-making within multinational production hierarchies.

The strategic implication is clear: Vietnam’s next phase of development must shift from connectivity to capability. This requires strengthening domestic firm participation, deepening supplier linkages, expanding into higher-value segments, and embedding knowledge-intensive services within manufacturing exports. Without such upgrading, Vietnam risks remaining locked into the lower tiers of global value chains despite its impressive scale of integration

Keystone Investor Perspective: *GVC Integrator*

Intel exemplifies both the strength and the structural limits of Vietnam's GVC integration model. IPV has emerged as a critical node within Intel's global manufacturing network, with exports exceeding USD 12 billion annually and, at peak disruption during COVID-19, contributing up to 50–60 percent of the company's global assembly and test output. This underscores Vietnam's role as a resilient manufacturing anchor within diversified global supply chains. However, IPV's experience also reflects the hierarchical nature of GVCs, where strategic decisions—product allocation, design ownership, and technology development—remain centralized outside Vietnam. Intel's role thus extends beyond production scale toward ecosystem orchestration: strengthening supplier coordination, enabling regulatory alignment, and advocating for infrastructure and policy agility. As a keystone investor, Intel highlights a critical transition for Vietnam—from being a reliable execution hub to becoming an integrated, higher-value partner within global semiconductor value chains.

Figure 8.1 Vietnam's Export Performance Growth Compared to the World's. To compare both, we use 2007 as the index year, because it is the year of Vietnam's accession to the World Trade Organization (WTO).

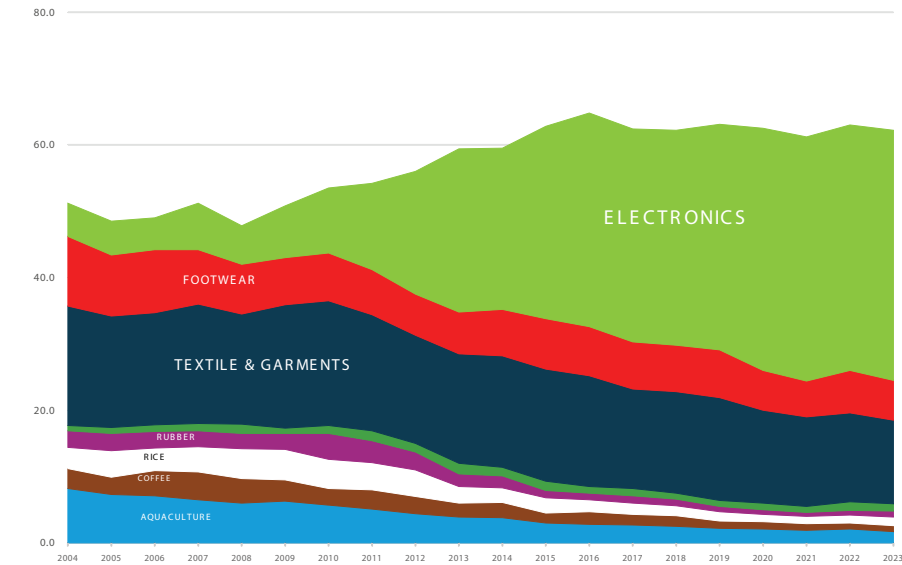
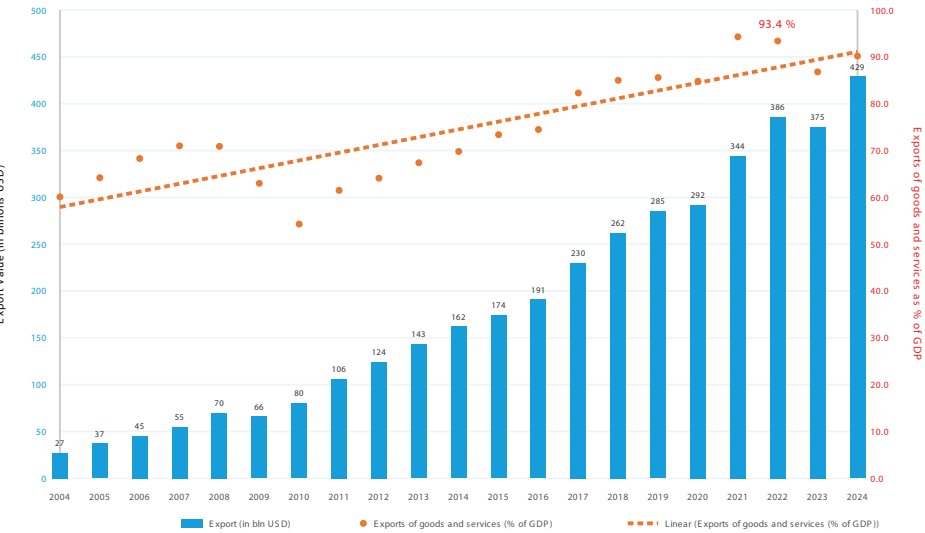
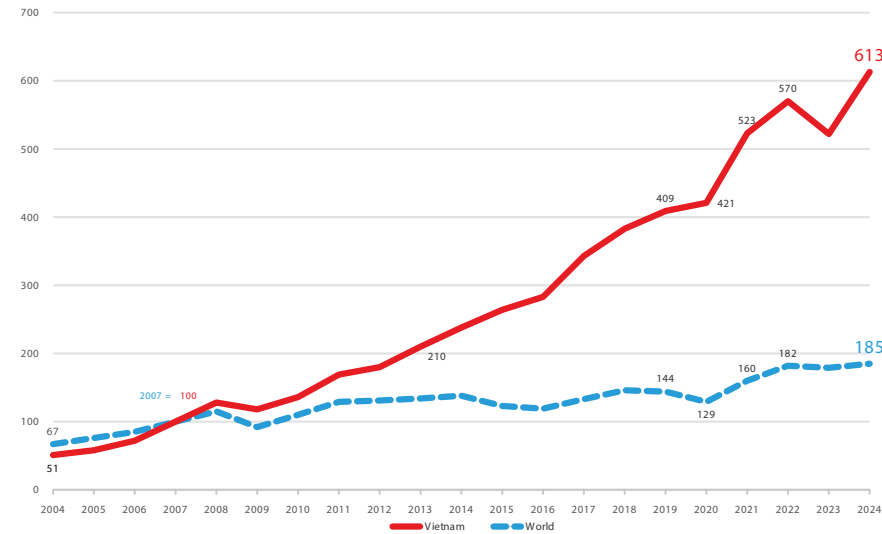
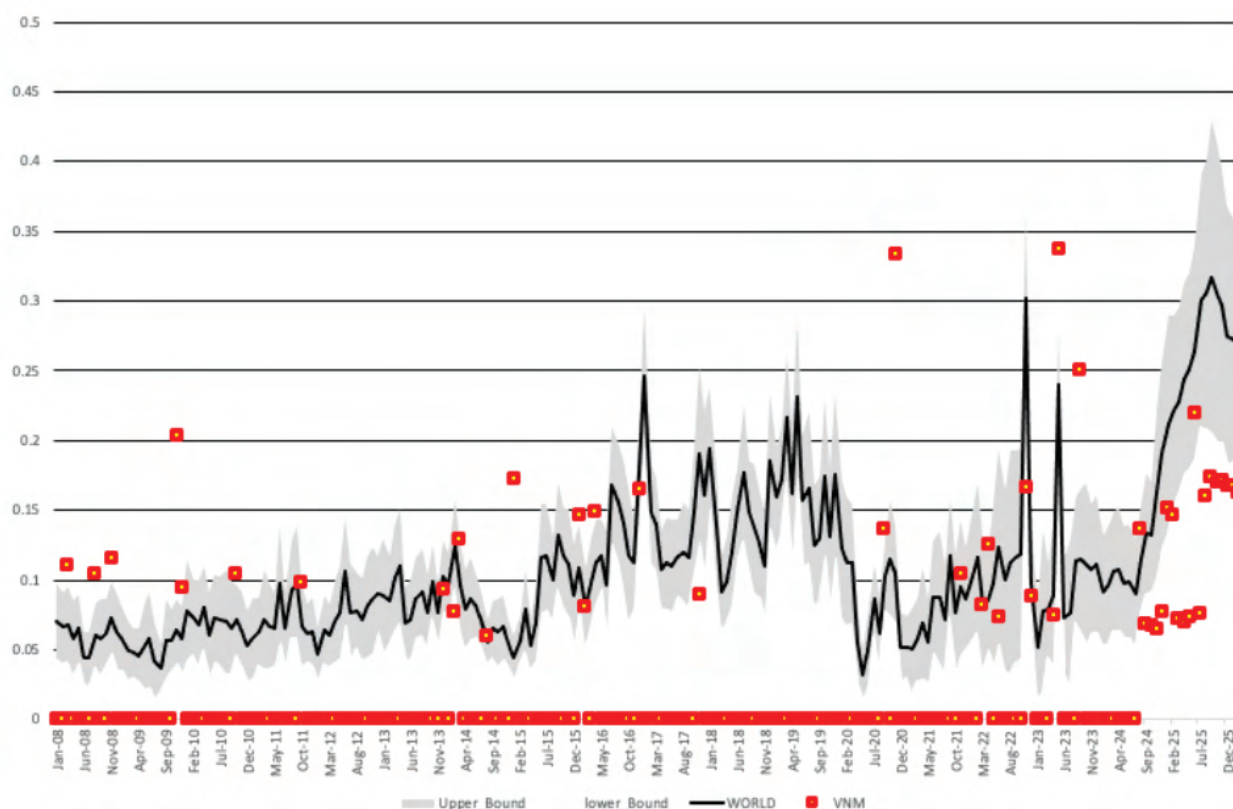


Figure 8.2 Uncertainty in the world across nations compared to that of Vietnam



Source: The World Uncertainty Index (WUI)

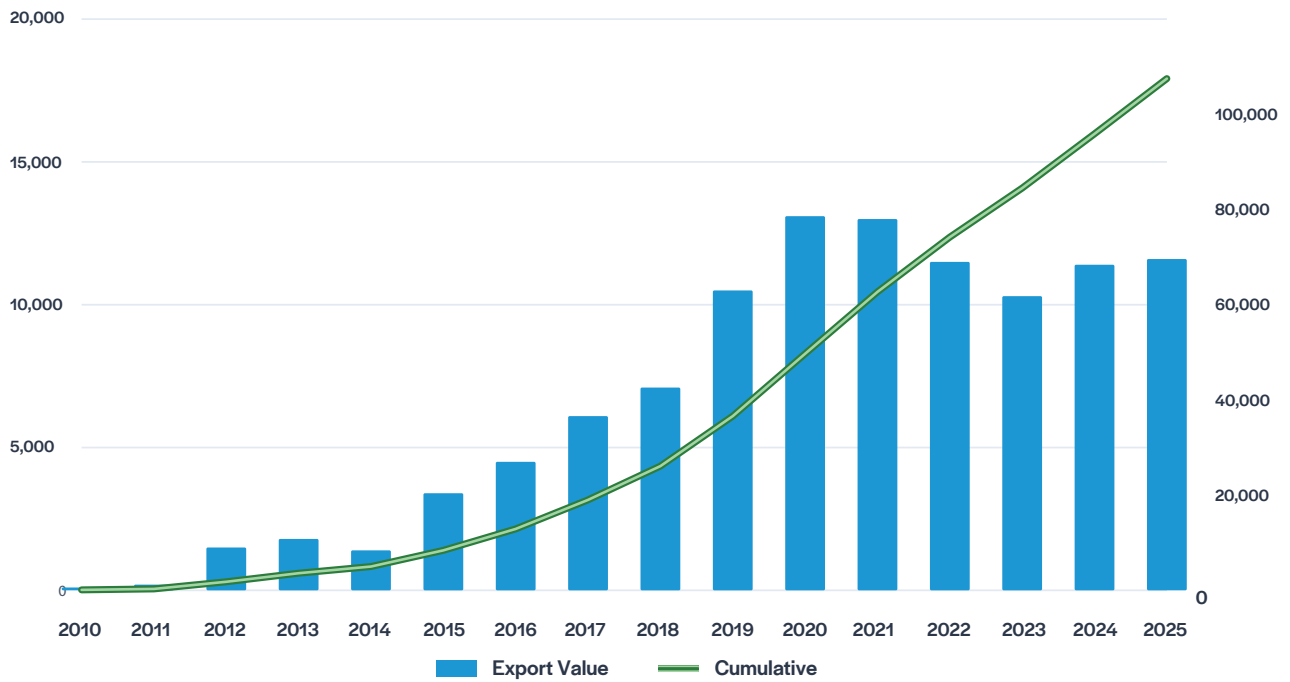
Table 8.1 Export and Import Value of Electronics, Computers, and Components (2016–2025)

Year	Export in USD	Import in USD	Total Trade Value	Growth Rate (%)	Key Notes
2016	18.5	27.8	46.3	19.3	Start of rapid growth driven by FDI (Samsung, LG, Intel)
2018	29.4	38.6	68.0	6.2	Expansion of production in Bắc Ninh, Thái Nguyên, Hải Phòng
2020	44.6	64.0	108.6	23.5	Growth despite COVID-19 pandemic
2022	55.5	81.9	137.4	8.9	Strong export growth to the US and EU
2023	57.3	88.0	145.3	5.8	Slower growth due to weakening global consumer demand
2024	72.6	107.1	179.7	23.7	Imports exceed USD 100 billion for the first time
2025 (first 9 months)	77.5	110.0	187.5	41.8	Electronics has become the leading export-import category

Source:

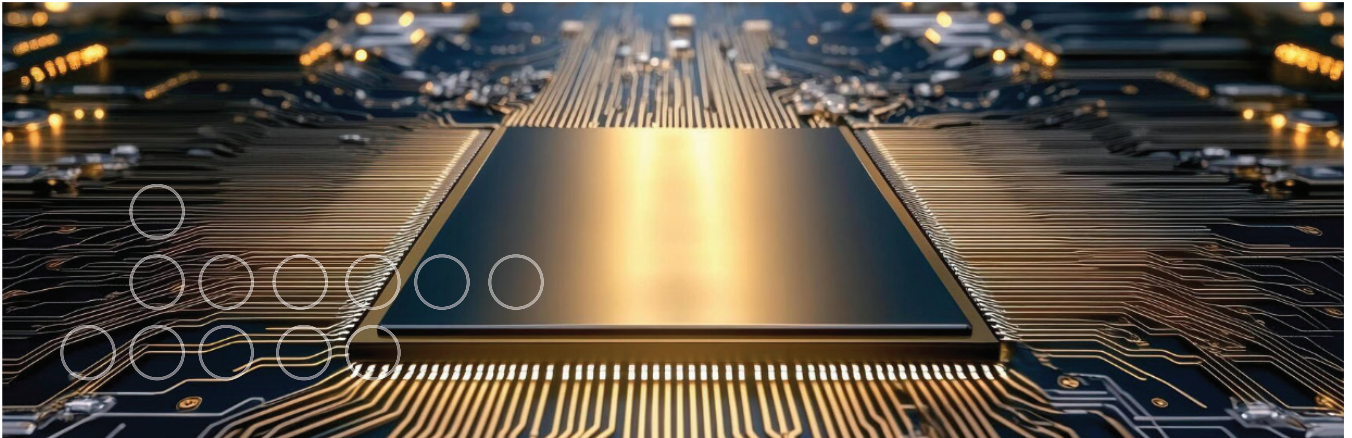
National Statistics Office. Import and export of electronics, computers, and components – Drivers of Vietnam's export growth in the period 2016-2025.

Figure: 8.3 Intel Vietnam's export performance (in USD millions)



Source: company data

Strategic Pathways for Vietnam's Semiconductor Ecosystem



Vietnam's semiconductor trajectory has transitioned from marginal participation to meaningful integration within global value chains, but the next phase of strategic positioning will require a fundamentally different playbook. Across the report, seven ecosystem-building activities have emerged as the foundation of Vietnam's rise: policy architecture, FDI attraction, global value chain integration, innovation capacity, human capital development, supply chain deepening, and value chain resilience.



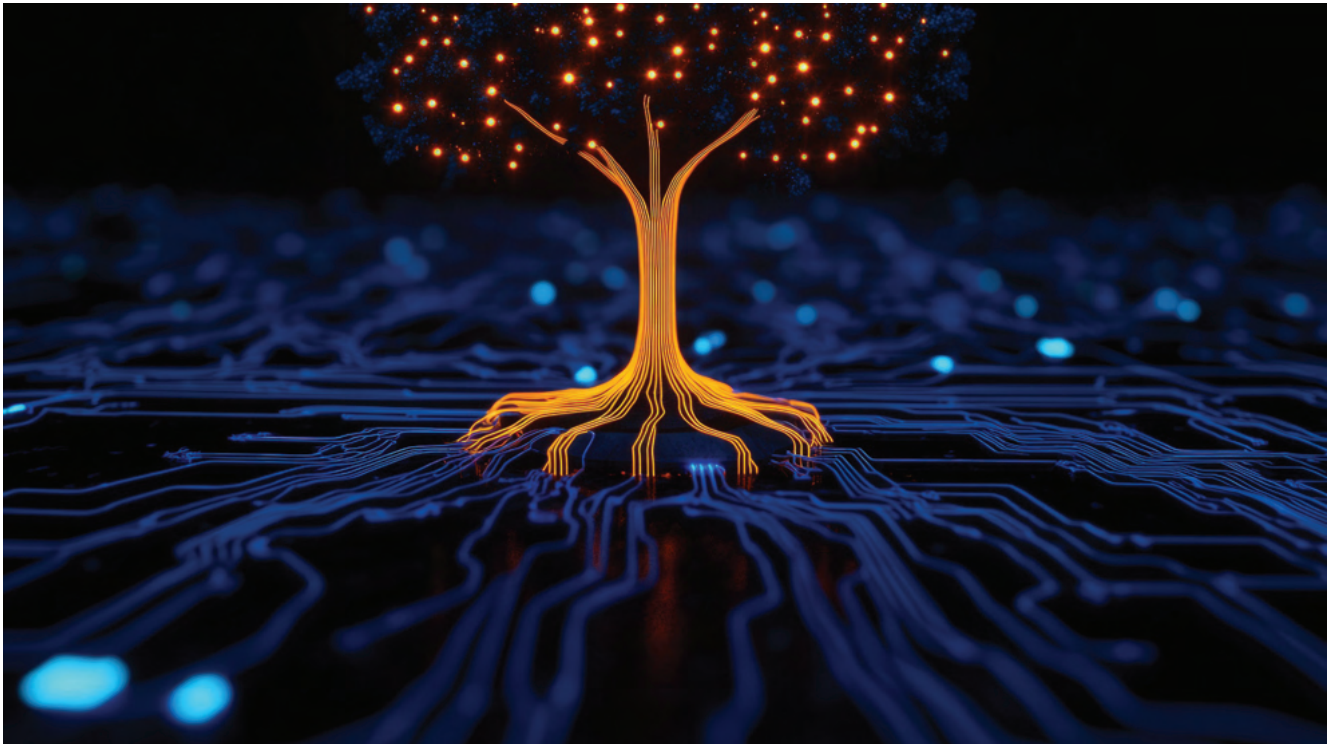
Chapters 2 and 3 show how Vietnam's policy framework, anchored in a layered system of resolutions, laws, and decrees, has proven effective in attracting anchor investors such as Intel, Samsung, and Amkor Technology. However, this success has created structural tensions that must be actively managed. First, the balance between a state-led development model and market-driven efficiency remains unresolved. Second, heavy reliance on foreign direct investment continues to limit domestic capability formation. Third, deeper integration into global value chains must be reconciled with the need for strategic autonomy in an increasingly fragmented geopolitical environment.

As Chapter 4 discussed on the industry level, Vietnam has established a strong foothold in assembly, testing, and packaging (ATP) but remains concentrated in mid- to lower-value segments. Critical gaps persist in wafer fabrication and IC design, which hold most value in the semiconductor chain. The experience of regional peers suggests that upgrading requires sustained demand from anchor firms willing to localize higher-value activities. Innovation reflects a similar duality, as highlighted in Chapter 5. Vietnam outperforms peers in converting inputs into outputs, yet this efficiency masks fragility. Chapter 6 extends this idea toward human capital, which is both Vietnam's greatest asset and its most binding constraint. The target of 50,000 semiconductor engineers by 2030 is directionally sound but risks becoming a quantitative exercise unless matched by quality and industry alignment. With only 4% of the semiconductor workforce holding postgraduate degrees and the majority of R&D concentrated in public institutions, the system

lacks the depth required for sustained technological leadership. Limited access to laboratories, MPW opportunities, and professional EDA further constrains the pipeline of industry-ready talent. Without strong integration between universities and firms, expanded enrollment may exacerbate skill mismatches rather than resolve them. In Chapter 7, supply chain development represents a clear structural bottleneck. Despite nearly two decades of FDI-led growth, domestic firms remain largely excluded from high-value segments, particularly in direct manufacturing. This reflects a classic coordination failure: firms cannot upgrade without demand and cannot secure demand without upgrading. Finally, Chapter 8 analyzes how Vietnam's GVC participation remains low, with limited domestic value added, limited service integration, and rising environmental costs. The path forward requires a shift from fragmented progress to coordinated ecosystem design. Vietnam must move beyond participation toward deliberate positioning—targeting specific segments, aligning policy and industry incentives, and building the institutional capacity to sustain long-term upgrading.



We realize that this study has three main limitations. First, the nature of the report is mainly descriptive; our efforts concentrated on describing the ecosystem without applying a normative stance. Second, given the recent acceleration of ecosystem participation from investors and government agencies, we are aware that our primary focus on describing the perspective of the first keystone investor is another limitation. Further research could expand the focus to include describing the contributions of other anchor investors joining the ecosystem since the 2020s. Third, the report has not fully addressed the landscape of the larger electronics industry, which is the market for semiconductors, especially if Vietnam wants to climb up the value chain to get the Application-specific integrated circuits (ASICs)



Multiple Roles of Keystone Investors Moving Forward

Across the seven ecosystem-building activities, Intel Products Vietnam as the Keystone Investor took on multiple roles: as institutional sounding board for ground-laying policy frameworks, as a credibility magnet for attracting investments, as an infrastructure system partner, as a knowledge incubator for stimulating innovation, as Vietnam's first "Semiconductor ATP University" for hi-tech workforce development, as a global standards mentor for enabling local suppliers, and as an integrator for connecting Vietnam to global value chains. Together, these roles highlight both the opportunities and structural challenges of Vietnam's current development model. Intel's long-term presence helped validate Vietnam as a globally competitive semiconductor manufacturing location while accelerating workforce development, supplier upgrading,

operational standards, and ecosystem coordination. At the same time, the case demonstrates that participation in global value chains does not automatically translate into control over higher-value activities. Although IPV has evolved from "copy exactly" execution toward more advanced engineering participation and partial co-development, strategic decisions related to product design, frontier technologies, and product allocation remain externally governed. Intel's role is therefore increasingly evolving toward that of an ecosystem co-development partner: supporting talent formation, supplier capability upgrading, and policy dialogue alongside government and industry stakeholders. Effectively leveraging such anchor investors will be critical if Vietnam aims to deepen its semiconductor position beyond manufacturing scale toward higher-value innovation capabilities.

