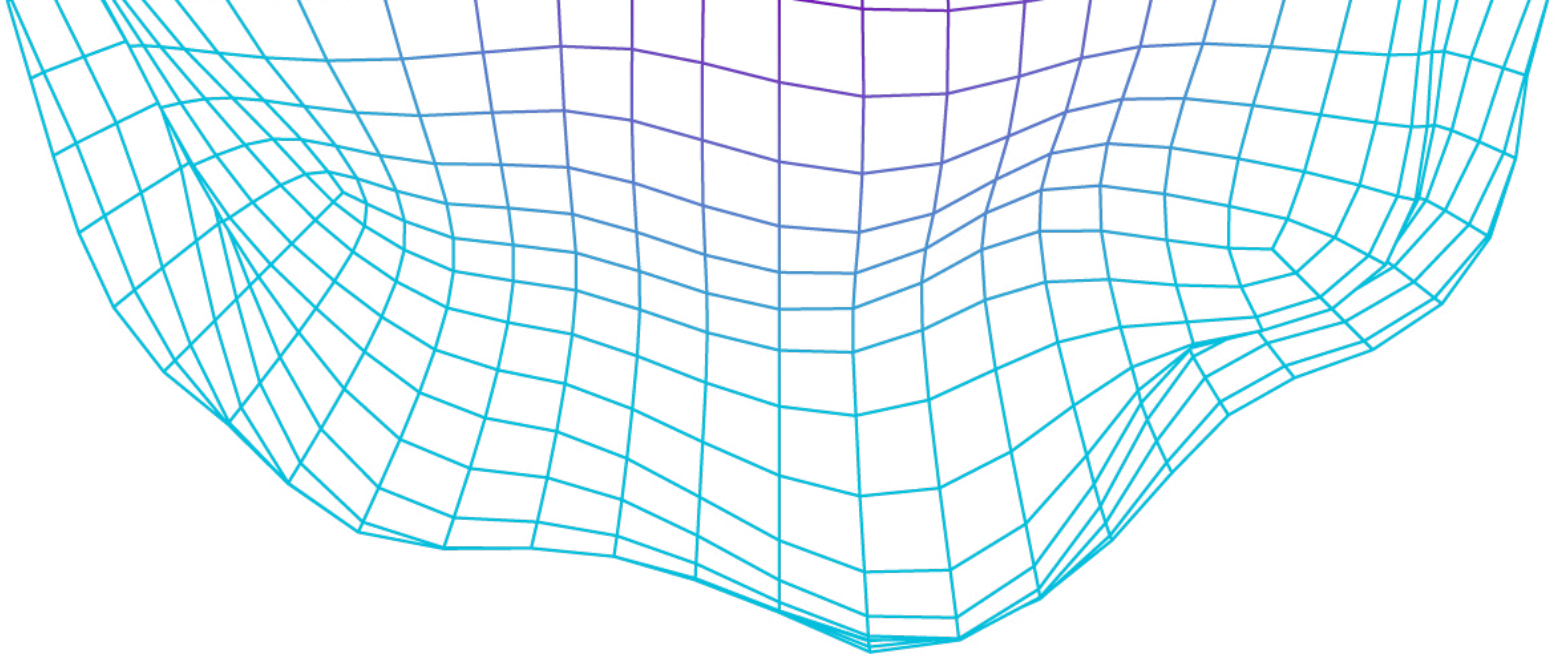


From AI to EVs: How APAC semiconductors drive the global innovation map

FedEx®



From AI to EVs:
How APAC semiconductors drive the global innovation map

Explore the report by clicking on the sections below.

1.0 Primary demand engines for the next era of innovation
Discover the key industries driving semiconductor demand, from AI and high-performance computing to electric vehicles. Understand the forces shaping the next wave of global innovation.

2.0 Inside the semiconductor supply engine
Get an inside look at how the semiconductor supply chain operates, from design to production. Learn how each stage works together to power the industry.

3.0 Semiconductor value chain and key APAC production hubs
Explore the full semiconductor value chain and where key activities are concentrated across APAC. See how regional hubs play a critical role in global supply.

4.0 Supply-chain complexity and risks
Understand the challenges of managing a highly interconnected and global supply chain. Explore the key risks and what they mean for semiconductor businesses.

5.0 The FedEx advantage: scaling your semiconductor business
See how FedEx supports semiconductor companies with reliable logistics and global connectivity. Learn how to scale operations with greater efficiency and visibility.

6.0 Driving forward: the next chapter of semiconductor growth
Look ahead at how the industry will evolve and what it takes to stay competitive. Discover the role of resilient supply chains in enabling future growth.

1.0 Primary demand engines for the next era of innovation

The global economy is currently navigating a transformative era, where innovation is defined by two major frontiers: the massive scale of Generative AI and the rapid electrification of transport. This dual surge has placed advanced semiconductors at the epicenter of global strategic demand from new applications and markets:

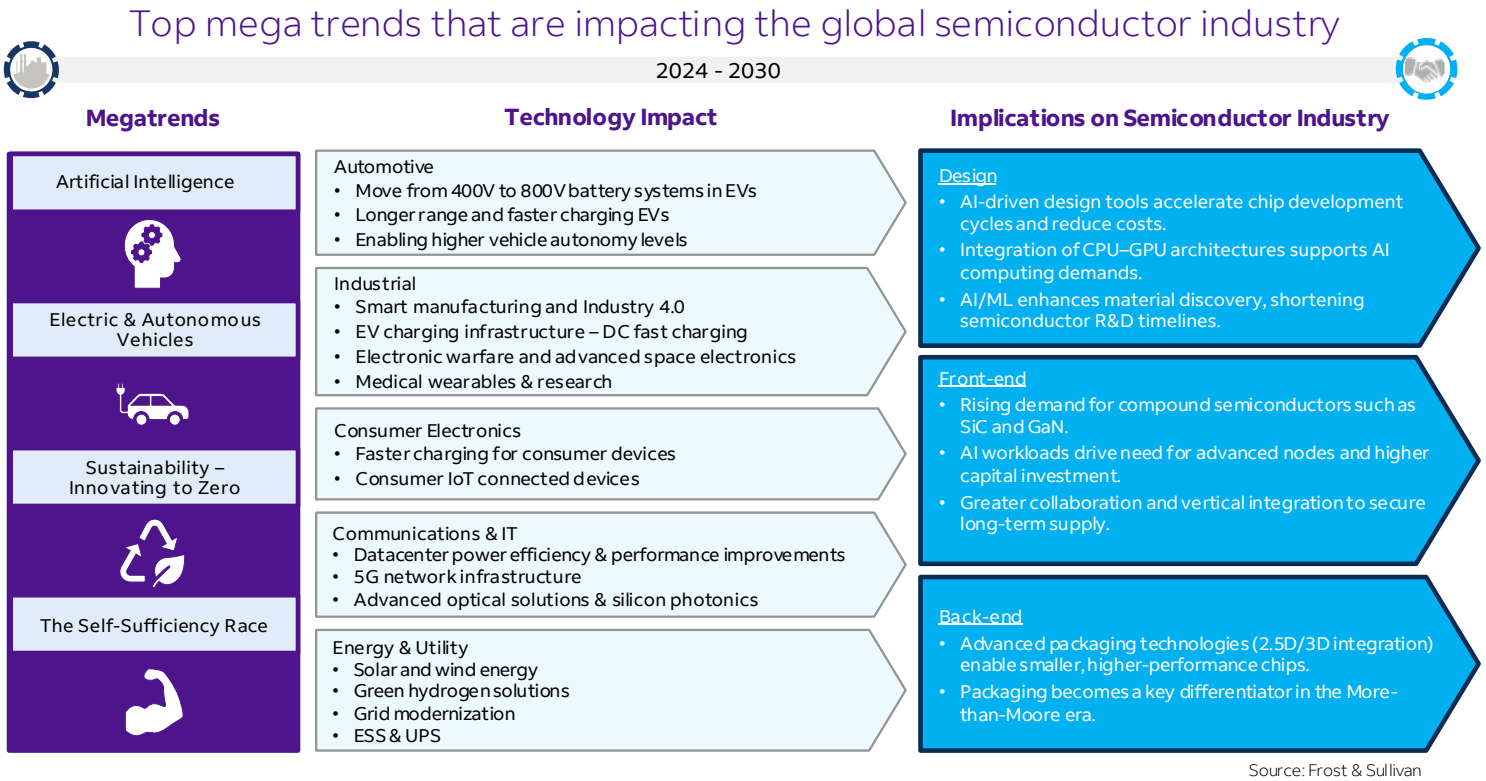
Artificial intelligence and data centers: AI and high-performance computing are the fastest growth drivers. AI accelerators (GPU/ASIC chips for AI) accounted for roughly 20% of total chip sales in 2024, a share set to rise further[1]. Large cloud providers (e.g., hyperscalers in the US and China) are building new data centers with next-gen chips (e.g., Nvidia's Blackwell GPUs). With more than 9,000 data centers worldwide, approximately 2,000 more are expected to be added between 2026 and 2035[2]. Beyond the chips themselves, there is a surging demand for the physical infrastructure to support them, specifically high-density server racks (often exceeding 100kW per unit), modular liquid-cooling systems, and large-scale power-generation hardware. This surge is global, and APAC chipmakers and logistics providers such as FedEx must handle unprecedented volumes of high-performance chips.

Automotive and EVs: Electric and autonomous vehicles are a huge growth area. Although automotive chip demand dipped after a pandemic build-up, it remains significant. Importantly, chip content per vehicle is rising. For example, EVs contain far more semiconductors (power management, sensors, AI chips) than internal-combustion cars. This means steady long-term growth; even mid-cycle downturns have not erased the trajectory toward more chips in cars. APAC is a major auto manufacturing region (with top OEMs in Japan, Korea, China, and now India), and local chip supply is critical.

5G and IoT connectivity: Continued rollout of 5G infrastructure and Internet-of-Things devices drives demand for specialized radio-frequency (RF) and mixed-signal chips. Telecommunications upgrades across Asia (e.g., India's 5G buildout) are driving strong semiconductor demand. These networks generate high shipments of both active components and passive modules.

Consumer electronics and others: Smartphones, PCs, wearables, and consumer IoT continue to require state-of-the-art chips. APAC consumers account for a large share of global electronics sales. Additionally, medical devices and industrial automation (big in Japan and China) are steadily adding chip content. Overall, demand patterns in APAC are becoming more diverse, and companies are shipping chips for many different end markets.

Figure 1: Global megatrends, including artificial intelligence, electric and autonomous vehicles, sustainability initiatives, and technology self-sufficiency, are accelerating semiconductor innovation across design, front-end fabrication, and advanced packaging.



Source: Frost & Sullivan

[1] *Manufacturing Asia, AI drives 20% of global semiconductor market as demand surges*

[2] *IEEE Spectrum - The Data Center Boom Is Concentrated in the U.S. But China's growth remains a mystery*

2.0 Inside the semiconductor supply engine

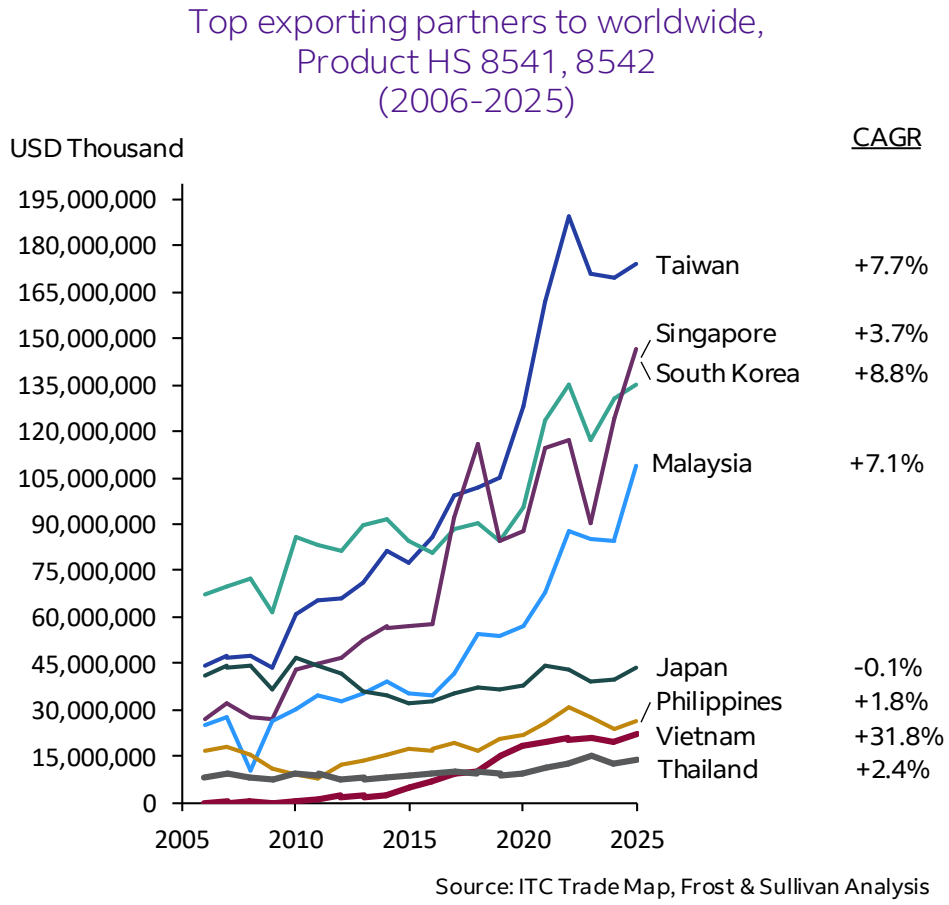
At the heart of this global semiconductor supply lies the Asia-Pacific (APAC) region, which accounts for most of global semiconductor output. In 2022, the APAC region accounted for about 57.6% of global semiconductor industry revenue[3]. China alone is the largest single market; it accounted for ~53% of APAC's market and nearly 29% of the global market in 2023[4]. The region's share has fluctuated slightly with market cycles (for example, APAC sales dipped in 2023), but long-term growth is expected to continue as key technologies drive demand.

2.1 The shifting geography of trade and production

The Worldwide Semiconductor Trade Statistics (WSTS) forecasts the global semiconductor market to reach ~ USD 975 billion by 2026[5]. This growth is increasingly focused within high-value markets that drive innovation. AI accelerators and High Bandwidth Memory (HBM) have now become the definitive backbones of AI, while the automotive industry's move to Silicon Carbide (SiC) and advanced ADAS logic is exponentially growing the amount of semiconductor content per vehicle, essentially making the EV the 'datacenter on wheels'. Notably, APAC includes four of the world's top 15 semiconductor companies and is home to leading chip equipment buyers (China is the largest single-country equipment market).

Market size and growth: APAC's chip market has surged in the last decade. Advanced markets (Taiwan, South Korea, Japan) lead in fab capacity, while emerging hubs (China, India, Southeast Asia) are growing. Government initiatives (e.g., national semiconductor missions) are attracting billions in new investments in fabs and RandD. Long-term forecasts remain positive: even after a 2022–23 correction, industry analysts expect demand to rebound as AI and 5G projects roll out[6].

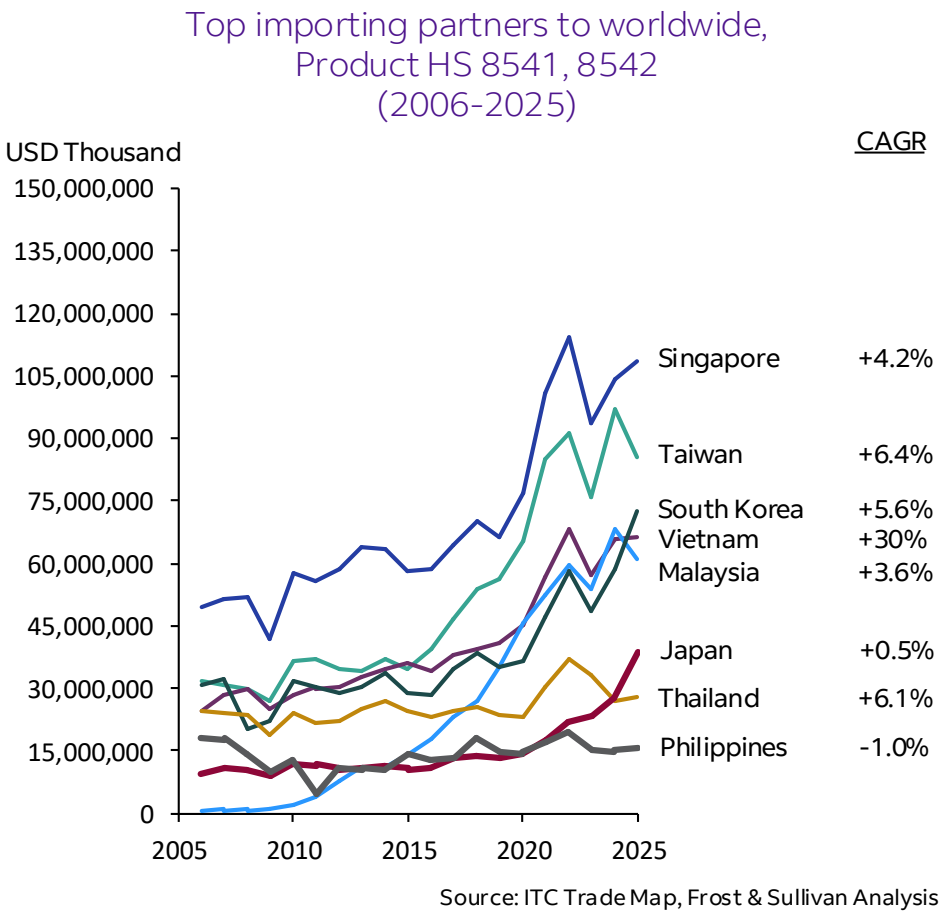
Figure 2: Taiwan continues to dominate global semiconductor exports (HS 8541, 8542), reaching nearly US$170 billion in 2025 with ~7.7% CAGR since 2006; emerging exporters such as Vietnam (+31.8%) are rapidly expanding from a smaller base.[7]



Source: ITC Trade Map, Frost & Sullivan Analysis

[3] GSA, APAC Semiconductor Industry Trends Report, 2024
[4] Semiconductor Industry Association (SIA), 2024 Factbook
[5] Worldwide Semiconductor Trade Statistics (WSTS)
[6] Manufacturing Asia, AI drives 20% of global semiconductor market as demand surges
[7] ITC Trade Map, List of exporters for (Product HS 8541, 8542)

Figure 3: Singapore has emerged as the largest semiconductor importer (HS 8541, 8542), exceeding US$105 billion in 2025 with ~4.2% CAGR since 2006, followed by Taiwan and South Korea; meanwhile, Vietnam (+30%) shows the fastest growth.[8]



Notes: HS 8541- Diodes, transistors, and similar semiconductor devices, photosensitive semiconductor devices (including photovoltaics), light-emitting diodes (LED), and mounted piezoelectric crystals; HS 8542- Electronic integrated circuits. Most semiconductors are classified under HS headings 8541 or 8542[9]

Global impact: APAC's dominance means regional disruptions affect everyone. For example, Taiwan's complex supply chain (with 60% of global foundry output[10]) supplies chips to companies worldwide. Similarly, Vietnam's growing chip exports ($32.4B in IC exports in 2023[11]) and Singapore's global distribution hubs connect APAC production to the rest of the world. In short, what happens in APAC matters everywhere.

Why APAC matters for semiconductor SMEs (Small and medium enterprises): SMEs provide essential support to the larger semiconductor industry. These companies act as Tier 2 and Tier 3 providers, supplying specialized chemicals, precision components, and testing services. Within the Asia-Pacific region, there is a high concentration of SMEs, particularly in the Design and OSAT (Outsourced Semiconductor Assembly and Test) sectors, where niche expertise and technical agility are paramount.

Changes in shipment patterns: Asia-Pacific's focus on production has shifted the industry to fragmented interdependence, with more small, customized shipments replacing bulk deliveries to meet regional needs. Since a single semiconductor often requires design, fabrication, and packaging in different hubs, there is increased cross-border movement of prototypes, test wafers, and high-value spares.

[8] ITC Trade Map, List of importers for (Product HS 8541, 8542)

[9] World Customs Organization, Semiconductors and the Future of the Harmonized System

[10] FedEx, How Semiconductor Supply Chains Are Strengthening Resilience

[11] The Business Times, Vietnam takes first leap into chip fabrication with Viettel-led fab

3.0 Semiconductor value chain and key APAC production hubs

The semiconductor ecosystem is often described in stages: chip design (including IP development and R&D), fabrication (front-end wafer manufacturing), adjacent manufacturing (equipment, materials, substrates), assembly and test (back-end packaging and OSAT), and deployment (logistics and final integration). Each stage includes firms of varying scales with the APAC semiconductor ecosystem being highly specialized by region:

- **Design and R&D**

  Large Multinational Corporation (MNC): Integrated Device Manufacturers (IDMs) and major fabless firms (e.g., industry leaders in logic and memory design) dominate innovation in leading-edge chip architectures.

  Mid-Tier: Regional chip design companies (such as those focused on analog, power management, or wireless chips) serve established markets.

  SME:

  Numerous smaller fabless startups and IP vendors have emerged in APAC's innovation hubs (notably Singapore, Malaysia, and Taiwan), focusing on niche markets like IoT, automotive sensors, or custom ASICs.

  In fact, Southeast Asian countries "are making strides in semiconductor design and intellectual property development."[12], signaling rising support for small design firms.

  Across APAC, SMEs play crucial roles in design, packaging, and component supply.

  APAC hubs:

  India stands out as a major design hub (fabless chips and IP) and is building up new fabs under its semiconductor mission. It has secured international partnerships, including a semiconductor MoU with Singapore[13].

  Singapore and Japan host significant R&D and design teams as do Chinese cities like Shanghai and Shenzhen. These centers are innovating next-gen architectures that leverage APAC's fabs.

- **Front-End fabrication**

  Large MNC: This stage is concentrated among a few massive players. For example, Taiwan's foundries alone account for roughly 60% of the global contract chipmaking market[14]. In addition to Taiwan's TSMC and South Korea's Samsung/ Hyundai fabs, China's SMIC and Japan's leading IDMs (such as Renesas and Sony for specialty chips) are significant.

  Mid-Tier: Companies such as UMC (Taiwan), Hua Hong Semiconductor (China), and GlobalFoundries (US, with APAC fabs) meet mid-volume demand.

  SME:

  The capital intensity of fab construction limits pure-play SMEs, but opportunities exist in specialized services.

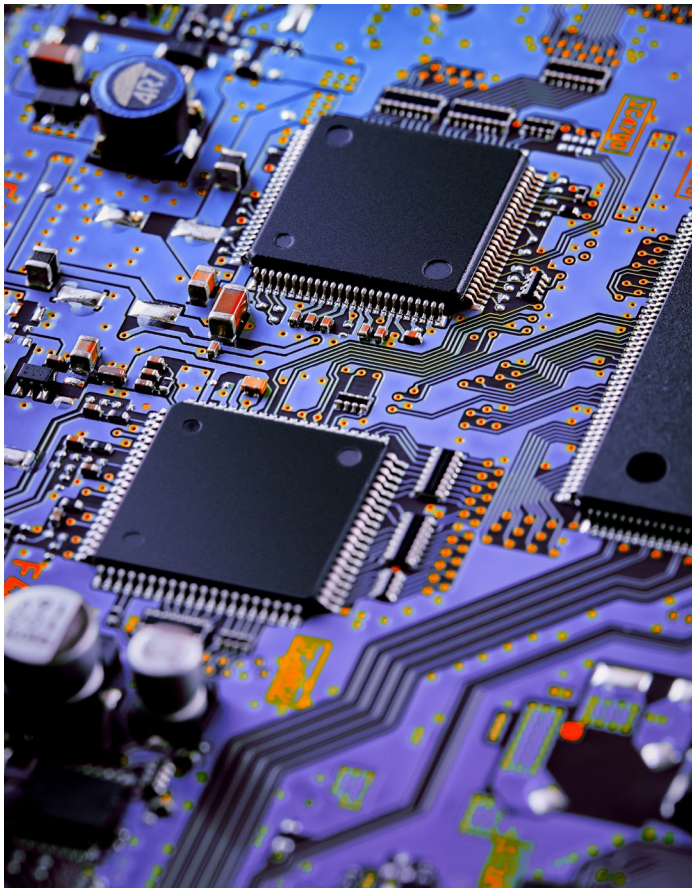
  These include smaller foundry nodes (e.g., mature node fabs in Southeast Asia), niche substrate and wafer producers, or local suppliers of critical materials and equipment parts.

  APAC hubs:

  Taiwan and South Korea lead advanced chip production (logic and memory) at sub-5nm nodes.

  China is rapidly building capacity (e.g., new fabs in Beijing and Shanghai).

  Japan contributes through specialty fabs (chipsets and materials). Japan leads in semiconductor equipment and materials (occupying ~30% of the global equipment market). Together, these facilities perform the most capital-intensive stages of production.



[12] *Chia-Nan Wang, Assessing Southeast Asia countries' potential in the semiconductor supply chain: an objectively weighting multi-criteria decision-making approach*

[13] *Outlook Business, India a future design, innovation hub in semiconductor industry: Singapore business chief*

[14] *FedEx, How Semiconductor Supply Chains Are Strengthening Resilience*

- **Assembly and test (OSAT)**

Large MNC: Assembly and testing are dominated by major OSAT providers. The top companies (e.g., ASE, Amkor, Powertech) together account for a large majority of the market, mostly concentrated in Taiwan and China[15].

Mid-Tier: Regional OSAT firms in APAC (such as JCET, UTAC, ChipMOS, or SPIL) serve automotive, industrial, and consumer segments with specialized packaging services.

SME:

Many small contract assemblers and test labs operate throughout APAC. For instance, Malaysia, the Philippines, Vietnam, and Indonesia host numerous smaller packaging houses and test facilities that handle chip-level testing, module assembly, or subsystem integration.

These SMEs often focus on high-mix or niche processes, such as advanced wafer-level packaging or MEMS integration.

APAC hubs:

Southeast Asia (Malaysia, Vietnam, the Philippines, Thailand, and, to some extent, Indonesia) is the back-end hub. Thousands of chips are shipped into these countries for packaging and testing, then exported as finished ICs.

For example, Vietnam exported $32.4B in integrated circuits in 2023 . This OSAT network complements APAC's foundries by handling volume, advanced packaging (2.5D/3D), and quick-turn projects.

- **Deployment and distribution**

Large MNC: Large electronics manufacturers and system companies (e.g. major OEMs in mobile, computing, or automotive) integrate semiconductors into final products and manage global distribution.

Mid-Tier: Regional electronics companies and contract manufacturers source chips for products in specific markets.

SME:

Logistics firms, smaller distributors, and component brokers in APAC help move semiconductors into local supply chains.

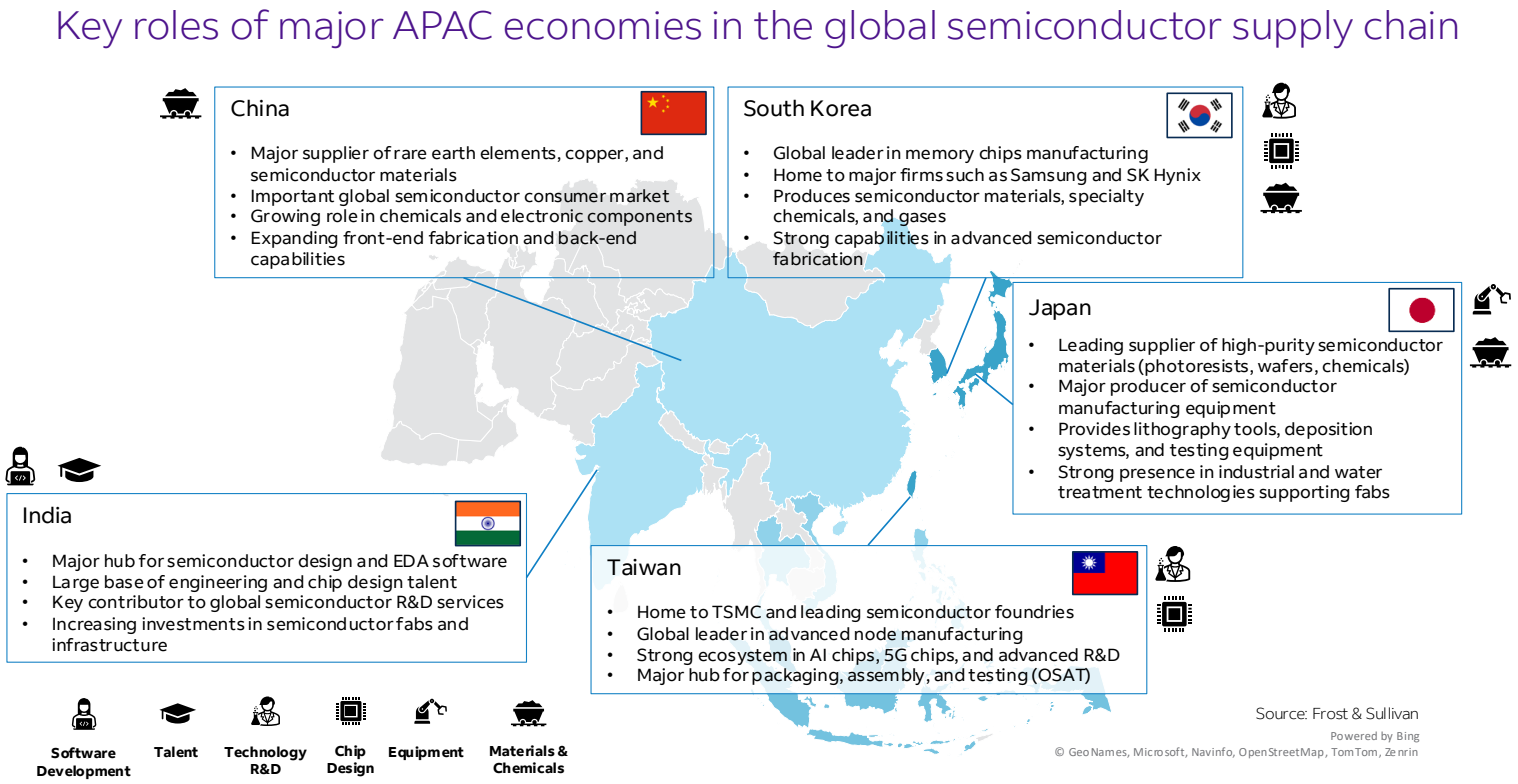
SMEs in this segment may specialize in value-added distribution or serve niche customer segments in developing markets. (Note: FedEx and other global logistics providers connect all tiers by delivering semiconductors to factories and markets across the network.)

APAC hubs:

Singapore, Hong Kong, and Tokyo have large cargo hubs that dispatch semiconductors worldwide. Modern supply chains rely on these nodes for inventory buffering and quick deployment.

They connect APAC manufacturers to markets in North America, Europe, and other regions. These hubs also provide specialized handling, temperature-control options, secure custody, and visibility required for high-value semiconductor and AI infrastructure logistics.

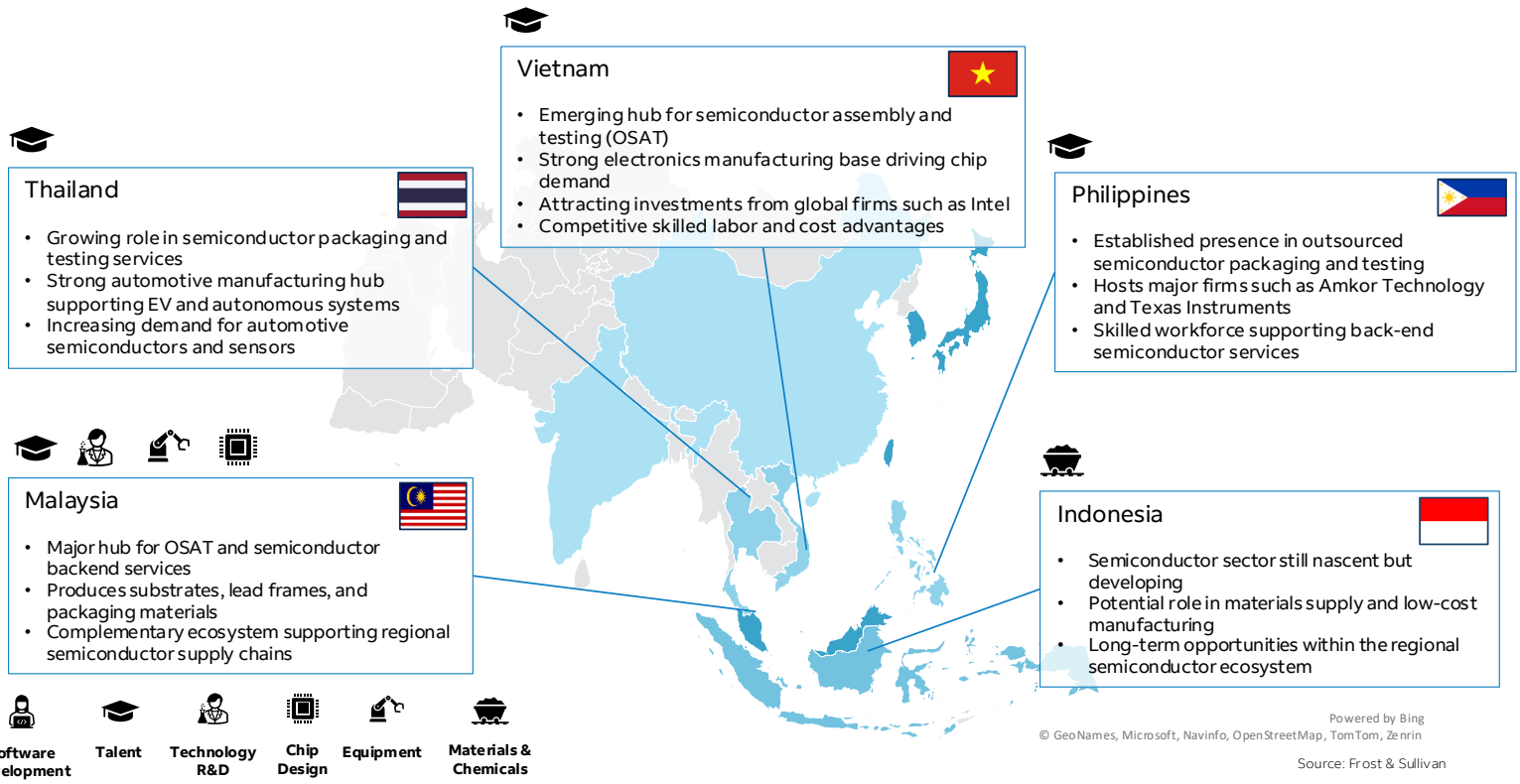
Figure 4: The APAC semiconductor ecosystem is highly specialized, with Taiwan and South Korea leading advanced manufacturing, Japan dominating materials and equipment, China is a major materials supplier and consumer market, while India emerges as a semiconductor design hub.



[15] 3DInCites, Asia May Still Be the Hottest Spot for Advanced Packaging

Figure 5: Southeast Asia is strengthening its semiconductor supply chain role, with Malaysia and the Philippines leading OSAT services, Vietnam emerging in assembly and testing, Thailand supporting automotive chips, and Indonesia offering long-term materials potential.

Roles of major sea economies in the global semiconductor supply chain



Source: Frost & Sullivan

Since so many pieces are distributed, APAC's supply chain is highly interconnected. Chips and materials may cross multiple borders before final assembly. Any incidents, weather events in Malaysia, port delays in China, or export-control changes can ripple through the network. For example, a major 2024 earthquake in Taiwan (home to leading fabs) temporarily halted production, creating a "short-term hiccup" in chip output that affected downstream factories in APAC and beyond. Express players such as FedEx go the extra mile to keep goods moving; for instance, FedEx reroutes shipments dynamically when routes change, helping customers avoid idle assembly lines.

Each segment of the chain is supported by its adjacent industries (equipment makers, materials, software tools). Here, too, APAC hosts major players (e.g., lithography and chip-making equipment firms in Japan/Korea) and many smaller suppliers (e.g., specialty chemicals producers, equipment parts manufacturers). In summary, the APAC semiconductor value chain is a layered ecosystem: a handful of global giants anchor each segment, while mid-sized local firms and numerous SMEs fill specialized roles and adapt to local industry needs.

Figure 6: APAC's semiconductor value chain is not concentrated in a single market but is distributed across specialized hubs, making speed, visibility, and reliable cross-border execution essential, especially for SMEs operating in design, packaging, testing, and support services.

APAC semiconductor value chain overview and SME participation across key segments

Value-chain segment	What happens in this stage	APAC role / key hubs	Where SMEs typically participate
1. Materials and Specialty Inputs	Supply of wafers, chemicals, gases, substrates, photoresists, and ceramics, before fabrication begins.	**Japan** is strong in materials and equipment; **China** is a major materials supplier and demand center	Specialty chemicals, precision parts, consumables, niche process materials, engineering support.
2. Design, IP and EDA	Chip architecture, circuit design, verification, simulation, tape-out preparation, and design enablement.	**India** is a major design and EDA-support hub; **Singapore, China, and Japan** also host strong design and RandD capabilities.	Fabless design houses, IP firms, verification specialists, prototype board developers, and EDA-support service
3. Wafer Fabrication / Foundries	Front-end manufacturing of chips on silicon wafers using highly capital-intensive fabs.	**Taiwan and South Korea** lead advanced nodes; **China** continues expanding capacity.	Limited direct SME participation; more common in ancillary engineering, maintenance and process support
4. Semiconductor Equipment and Tooling	Provision of lithography, etching, deposition, metrology, automation, cleanroom, and other systems.	**Japan** is especially strong in semiconductor equipment; broader APAC supports installation, servicing, and spares.	Precision engineering firms, tooling suppliers, component refurbishers, spare-parts providers, service partners.
5. Assembly, Packaging and Testing (OSAT)	Wafer dicing, packaging, burn-in, testing, advanced packaging, and final chip readiness for integration.	**Malaysia, Vietnam, the Philippines, and Thailand** are major OSAT hubs with high SME presence.	Packaging specialists, test service firms, substrate suppliers, engineering support, niche advanced-packaging players.
6. Systems Integration and End-Market Deployment	Chips are embedded into servers, AI systems, industrial electronics, automotive systems and devices.	APAC supports integration across **China, Japan, South Korea, Singapore, and Southeast Asian** manufacturing bases.	System integrators, module assemblers, board-level specialists, niche industrial and automotive suppliers.
7. Distribution, Buffering and Global Fulfilment	Inventory positioning, transshipment, regional coordination, and global dispatch to customers and production nodes.	**Singapore, Hong Kong, Japan, and South Korea** function as key logistics and distribution hubs.	Regional distributors, specialized freight coordinators, aftermarket support providers, reverse-logistics partners.

3.1 SME opportunities in each value chain segment

Across this value chain, small and mid-sized enterprises (SMEs) have opportunities in specialty niches and high-growth sub-sectors. Key examples include:

Design and IP (fabless) opportunities: The move toward heterogeneous chip architectures (e.g., AI accelerators and automotive SoCs) creates opportunities for SMEs with specialized expertise. Many APAC countries now encourage fabless startups. For example, Singapore and Malaysia have begun incubating chip design firms, and India offers incentives for semiconductor RandD. SMEs can develop analog/mixed-signal chips for medical devices, IoT sensors, or machine-learning accelerators, or license IP blocks (e.g., for 5G modems or security). The Design Linked Incentive (DLI) schemes in India, for instance, fund Micro, Small, and Medium Enterprises (MSME) chip designers[16]. Similarly, specialized EDA (electronic design automation) software vendors and IP middleware providers, often small firms, can capture a share by enabling local design houses.

Equipment and materials opportunities: Fab construction and scaling create demand for many supporting components. SMEs can produce niche equipment (e.g., inspection tools, cleaning systems) or supply specialty chemicals and substrates. For example, after Taiwan's TSMC announced new fabs, dozens of smaller precision toolmakers and semiconductor chemical companies in Taiwan and Japan ramped up production. In APAC, some SMEs focus on wafer polishing, photolithography consumables, or cleanroom equipment, areas less dominated by the largest global OEMs. As Southeast Asian fabs expand (e.g., Malaysia's new chip plants), local SMEs can supply region-specific equipment or maintenance services.

Assembly/Test (OSAT) opportunities: Advanced packaging drives demand for innovative assembly solutions. While the largest OSATs dominate volume, SMEs can excel in specialized packaging niches. For instance, smaller firms in Malaysia, Singapore, or Vietnam may offer advanced packaging techniques (like fan-out wafer-level packaging or 3D chip stacking) tailored for mid-volume customers. SMEs can also cater to high-reliability segments (such as medical and aerospace) that require custom testing and assembly. In the back-end, there is also room for SMEs to provide testing equipment, calibration services, or precision sockets and probes.

Distribution/deployment opportunities: On the logistics side, SMEs can partner as last-mile distributors and system integrators. Smaller freight and logistics companies often work with local manufacturers to ensure the timely delivery of sensitive components. In APAC's diverse markets, regional courier and freight forwarding SMEs help connect factories with overseas customers. Additionally, packaging and repackaging services can be offered by SMEs that prepare semiconductors for local regulatory compliance or integrate chips into subsystems before shipment.

Throughout the APAC ecosystem, SMEs are supported by government programs and industry clusters that recognize their role. For example, Malaysia's Penang Skills Development Centre trains workers for OSAT SMEs[17], and Vietnam's first local fabs (e.g., Viettel's upcoming plant) are catalyzing a new wave of local suppliers and startups. By focusing on agility and niche expertise, SMEs in design, equipment, packaging, and logistics can thrive alongside the giants.

Figure 7: SMEs play a critical role in the semiconductor ecosystem by supporting specialized engineering, materials, packaging, and integration services across the value chain.

Value Chain Segment	Role of SMEs in the Ecosystem	Key Opportunity Areas for SMEs	Logistics & Supply Chain Implication
1.Design and ip development	SMEs often operate as niche chip designers, IP developers, or design verification specialists	AI accelerators, automotive semiconductors, IoT chipsets, custom ASICs for industrial applications.	Frequent small-batch shipments of prototypes, development boards, and test chips (design centers-fabrication).
2.Design enablement and engineering services	SMEs support through simulation, software development, and EDA tool customization.	Outsourced design services, verification engineering, chip architecture optimization, embedded software.	High-value prototype shipments and samples require secure and rapid delivery between global R&D locations.
3.Materials and specialty components	SMEs supply materials, specialty chemicals, substrates, and precision components required for fabrication.	Advanced substrates, specialty gases, semiconductor-grade chemicals, wafer handling equipment.	Regular cross-border movement of sensitive materials requiring secure handling and regulatory compliance.
4. Equipment components and maintenance	SMEs provide critical support services such as spare parts, component refurbishment and system upgrades.	Precision engineering parts, refurbishment services, calibration tools, cleanroom equipment components.	Time-critical shipments of spare parts and repair components to minimize fabrication downtime.
5. Assembly, packaging and testing (osat)	SMEs play a strong role in semiconductor packaging, specialized testing, and advanced packaging.	Chiplet packaging, wafer-level packaging, automotive chip testing, specialized reliability testing.	High-frequency movement of wafers and chips between fabs and packaging facilities across multiple APAC locations.
6.Systems integration and electronics	SMEs integrate semiconductors into industrial equipment, automotive modules, IoT devices, and electronics.	Industrial automation systems, automotive electronics, edge AI devices, specialized electronics modules.	Mixed shipment profiles including semiconductor components, circuit boards, and electronic assemblies.
7. Distribution, aftermarket and supply chain	SMEs participate in distribution, inventory management, aftermarket repair, and technical support services.	Regional semiconductor distribution, component resale, reverse logistics, lifecycle support.	Time-sensitive deliveries to maintain production schedules and support distributed electronics manufacturing.

[16] Design Linked Incentive (DLI) Scheme

[17] Penang Skills Development Centre (PSDC)

4.0 Supply-Chain complexity and risks

APAC's chip supply chain involves many specialized steps and stakeholders:

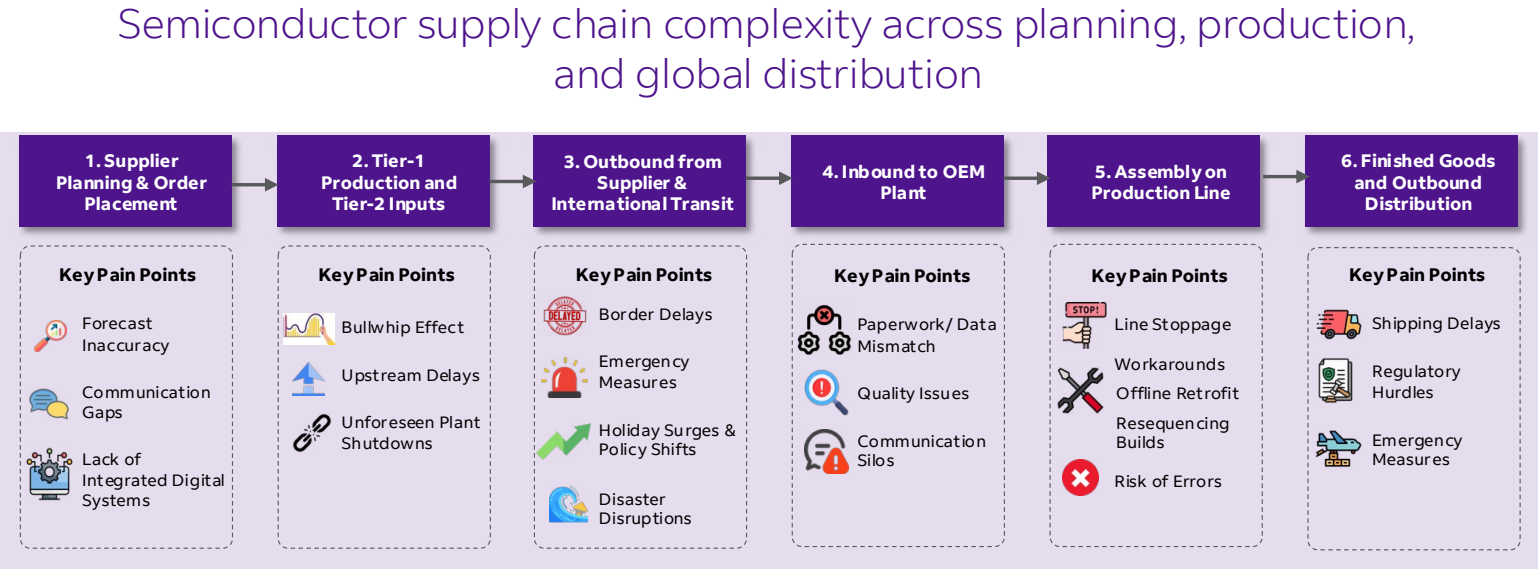
Multi-tier dependencies: A single semiconductor can involve dozens of suppliers: semiconductor equipment and materials (often from the US, Japan, EU), wafer fabrication (in Taiwan/SK/China), outsourced packaging (in SEA), then final assembly (e.g., device assembly in China or Malaysia), and finally global shipping. This creates a logistics environment that must support both fragile inputs, including wafers that may require shock protection and controlled handling, and high-value finished semiconductors that demand secure transportation.

Just-in-time constraints: Historically, semiconductor fabrication and assembly used just-in-time inventory to optimize costs, where even short shipment delays could disrupt downstream operations and affect production schedules. This pursuit of lean efficiency left global leaders vulnerable to disruptions. In an era where components travel over 25,000 miles and cross more than 70 borders before completion, even minor shipment delays can halt production for high-value AI and Automotive sectors. The traditional pursuit of lean efficiency is being replaced by a Just-in-Case supply chain model through geographic diversification and the creation of inventory buffers, ensuring regional resilience over pure cost-optimization.

Regulatory complexity: High-tech goods often move through markets with different import, export, classification, and documentation requirements. Errors in customs data or product classification can create avoidable delays, especially for time-sensitive shipments. In this environment, digital tools, customs support, and clear trade documentation are increasingly important in helping shippers manage compliance more efficiently.

Geopolitical and environmental risks: Geopolitical tensions, export controls, tariffs, natural disasters, and public health disruptions have reinforced the need for more diversified semiconductor supply chains. Many manufacturers are responding by expanding production footprints and adopting multi-location operating models to reduce concentration risk. For logistics providers, this means supporting a broader network of trade lanes while helping businesses maintain visibility, flexibility, and continuity across a more distributed supply chain.

Figure 8: Semiconductor production depends on tightly synchronized, cross-border supply chains. Disruptions at any stage—from supplier planning to final distribution can cascade through the system, highlighting the importance of coordination, visibility, and resilient logistics networks.



Source: Frost & Sullivan Analysis

4.1 Logistics demands and service expectations

In this fast-moving market, APAC semiconductor customers expect more than basic freight:

High frequency of small shipments: Modern fabs and fabless designers send many frequent shipments (e.g., prototype wafers, samples, test kits) rather than large bulk orders. This requires a logistics partner with flexible scheduling. FedEx provides frequent flight schedules and priority pickup for small, urgent shipments, ensuring quick transit time.

End-to-end visibility: Semiconductor stakeholders (designers, chip companies, OEMs) demand real-time tracking of every package. FedEx digital tools and sensor-enabled visibility solutions, including SenseAware® ID and FedEx Surround®, provide near-real-time shipment visibility, predictive disruption alerts, and proactive intervention support. Where required, temperature-controlled and specialized handling options can be configured for sensitive semiconductor shipments

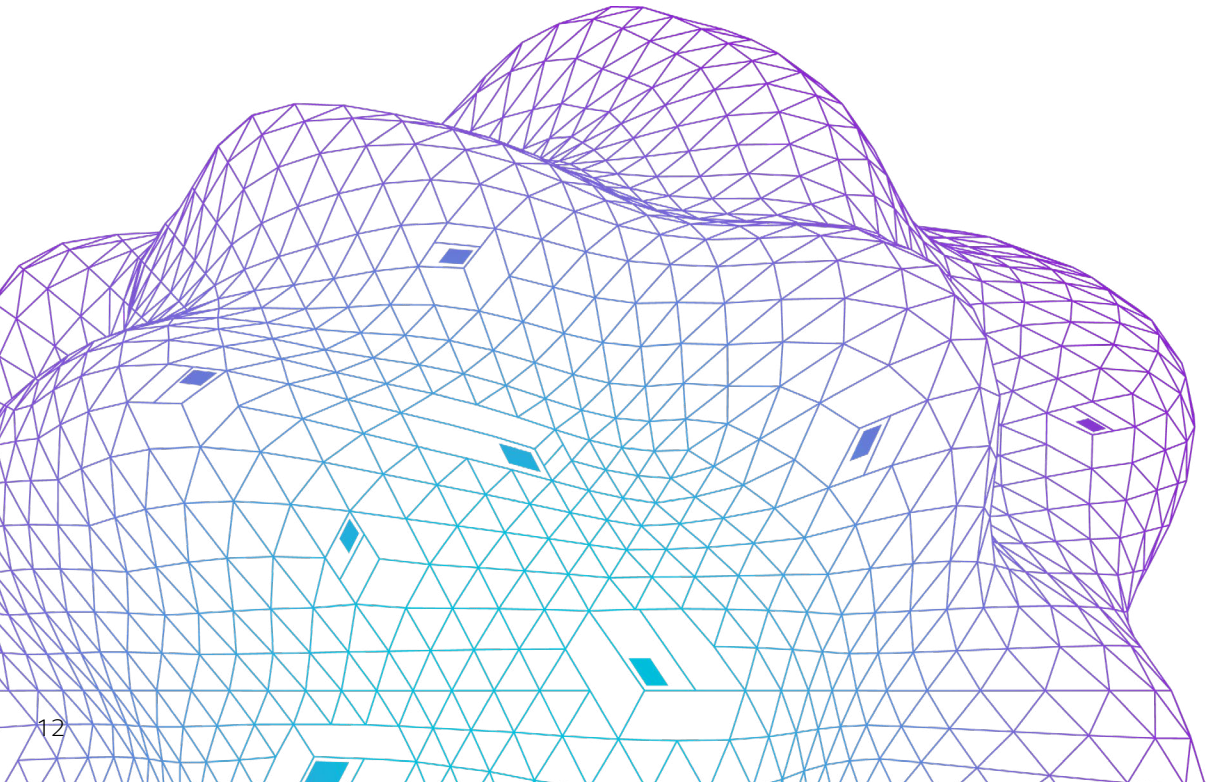
Digital and collaboration tools: As FedEx notes, today's APAC supply chains need seamless digital coordination. FedEx offers online portals, EDI integration, and collaboration platforms so customers can manage shipments in the same workflows as their production systems. For instance, FedEx APIs can automatically generate customs documents and shipping labels integrated with a customer's ERP.

Customized handling: Semiconductor shipments are valuable and sometimes delicate. FedEx offers services like FedEx Custom Critical (for urgent, high-value freight), temperature-controlled transport, and white-glove handling. These ensure that wafers or chips arrive in optimal condition.

Logistics providers play a critical role in helping semiconductor companies navigate increasingly complex supply chain requirements. Companies such as FedEx support this ecosystem by developing tailored logistics solutions that align with semiconductor manufacturing workflows, including multimodal transportation options and integrated logistics programs designed to improve coordination, reliability, and supply chain visibility.

5.0 The FedEx advantage: scaling your semiconductor business

The semiconductor industry operates with highly synchronized production cycles, complex international supplier networks, and extremely high-value cargo. Even small logistics disruptions can halt production lines or delay product launches. As semiconductor supply chains continue to expand across multiple markets in the Asia Pacific, reliable cross-border transportation, secure handling, and digital visibility have become critical operational requirements.



5.1 FedEx capabilities and value

Logistics providers, therefore, play an important enabling role in maintaining the speed and reliability of semiconductor supply chains. FedEx supports semiconductor and AI infrastructure supply chains through integrated transportation networks, digital trade solutions, and specialized services designed for high-value, time-critical shipments. These capabilities align with four critical execution areas: speed and agility, reliability and quality, security and integrity, and intelligence and visibility. In practice, this includes time-definite FedEx International Priority® Express and Freight, FedEx® Customized Freight for urgent or complex shipments, charter options for large-scale deployment surges, specialized handling for wafers, chips, racks, and equipment, and digital tools such as FedEx Ship Manager, FedEx API, FedEx® Electronic Trade Documents, Global Trade Manager, SenseAware® ID, and FedEx Surround® monitoring and intervention.

In APAC, FedEx's logistics network aligns closely with the region's major semiconductor manufacturing clusters, including Singapore, Penang (Malaysia), Hsinchu (Taiwan), and Seoul (South Korea). These locations serve as critical hubs for wafer fabrication, assembly and testing, semiconductor equipment production, and advanced packaging. By connecting these industrial clusters to global markets, logistics providers can support faster movement of wafers, semiconductor equipment, and finished chips across the supply chain. This network alignment is further strengthened by dedicated air and ground capacity, enabling more consistent transit times even during peak demand cycles and large-scale technology deployments. Beyond wafers and finished chips, FedEx also supports the AI infrastructure ecosystem by helping move GPU servers, racks, optics, power units, networking products, and oversize semiconductor equipment that require precision handling, visibility, and secure custody.

Digitalization is also becoming increasingly important in semiconductor logistics. As semiconductor companies move toward more data-driven supply chains, logistics platforms that integrate shipping, customs, and real-time tracking help improve visibility and reduce operational risks. Solutions such as AI-powered tracking and predictive monitoring allow logistics providers to detect potential disruptions early and intervene proactively, helping maintain shipment timelines for high-value semiconductor cargo. FedEx provides a comprehensive toolkit for semiconductor logistics.

The table below illustrates how logistics capabilities can support key stages of the semiconductor supply chain.

Figure 9: Illustrates how FedEx logistics capabilities can support key stages of the semiconductor supply chain.

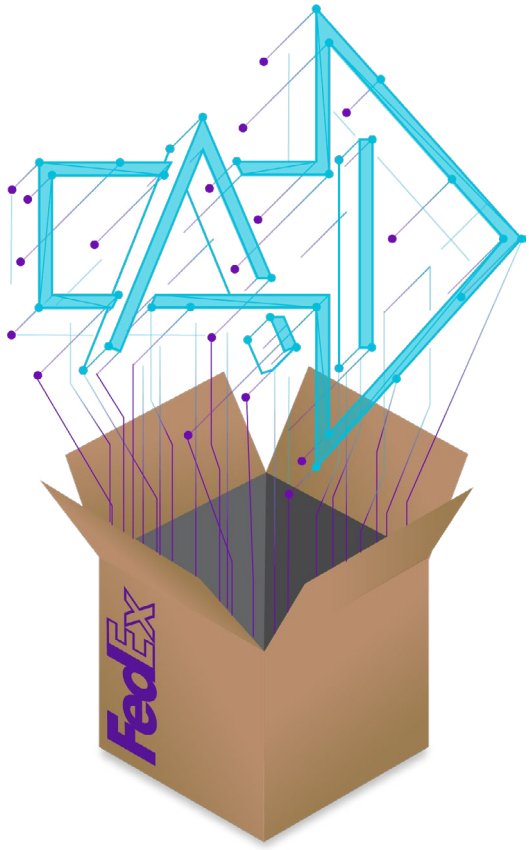
Value Chain Segment	Typical Logistics Needs	Example Logistics Support and Solutions
Design and R&D	Fast movement of prototypes, development boards, and small-batch semiconductor samples between design centers and fabs.	Express air transport services such as FedEx International Priority® support rapid prototype transfers and time-definite delivery for development cycles.
Front-end fabrication (foundries)	Secure transport of wafers, photolithography equipment, chemicals, and spare parts across fabrication networks.	International Priority Freight® and Economy Freight® enable movement of high-value semiconductor materials and equipment with reliable transit and customs coordination.
Adjacent manufacturing (equipment and materials)	Frequent cross-border shipments of sensitive equipment components and specialty materials.	Logistics networks support secure handling, regulatory compliance, and rapid delivery of critical manufacturing inputs and spare components.
Assembly, packaging and testing (osat)	High-frequency shipment flows between fabs and OSAT facilities across multiple APAC countries.	Time-definite international services combined with trade documentation support help facilitate efficient cross-border shipment of high-value semiconductor components.
System integration and electronics manufacturing	Coordinated supply chain flows from semiconductor manufacturing hubs to electronics production facilities.	Integrated logistics networks help connect semiconductor suppliers with electronics manufacturers through regional and global distribution routes.
Distribution, buffering and global fulfillment	Reliable, time-sensitive deliveries and visibility across multiple markets.	Digital logistics platforms, shipment tracking tools, and integrated shipping systems help coordinate global semiconductor distribution and inventory flows.
Digital supply chain collaboration and visibility	Near real-time monitoring, predictive visibility, and proactive intervention for critical shipments.	Digital tools such as FedEx Ship Manager®, FedEx APIs, SenseAware®, and FedEx Surround® provide shipment tracking, predictive risk monitoring, and automated documentation.

In the semiconductor industry, even minor logistics disruptions can halt production lines, making reliability and proactive risk management essential. Logistics providers such as FedEx help address these challenges by offering specialized trade solutions, digital tools that streamline customs processes, and flexible route planning to respond to unexpected disruptions.

Beyond transportation services, companies like FedEx also support semiconductor manufacturers with advisory resources and industry engagement initiatives, helping businesses stay informed about evolving trade regulations and supply chain requirements across APAC.

5.2 Digital Integration and AI-Driven Logistics

Digital transformation is reshaping how semiconductor companies manage their global supply chains. The ability to synchronize logistics data, shipping documentation, and real-time tracking across multiple stakeholders has become increasingly important for maintaining operational continuity. Digital logistics platforms, such as FedEx Ship Manager™ and FedEx APIs, are helping semiconductor companies manage complex documentation requirements while enabling faster cross-border shipments. Unified digital portals allow companies to process electronic trade documents, manage shipping data, and coordinate supply chain activities through a single interface. This approach ensures that critical information moves as quickly as physical cargo.



Predictive analytics and machine learning are also being applied to logistics operations. Predictive analytics and machine learning are also being applied to logistics operations. Monitoring systems such as FedEx Surround® can analyze shipment data, detect potential delays, and trigger proactive interventions before disruptions occur. These capabilities are particularly important for semiconductor shipments, which often involve high-value components and strict production timelines, which often involve high-value components, strict production timelines, and limited tolerance for delays across multi-node supply chains.

5.3 Global-to-Local Semiconductor Logistics Expertise

The geographic concentration of semiconductor manufacturing in the Asia Pacific requires logistics providers to maintain strong regional networks that align with semiconductor production hubs. Major semiconductor clusters in Singapore, Penang, Hsinchu, and Seoul play critical roles in wafer fabrication, semiconductor equipment production, and advanced packaging activities.

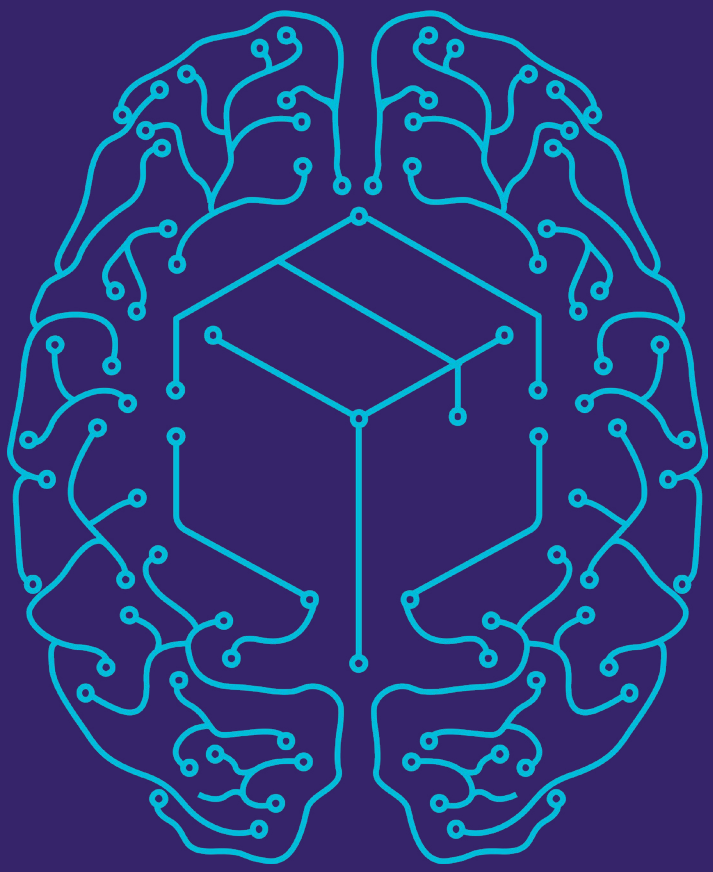
By connecting these regional clusters with global transportation networks, logistics providers such as FedEx can support the efficient movement of semiconductor materials and finished products between Asia, North America, and Europe. This global-to-local approach helps semiconductor companies maintain operational continuity while managing complex cross-border supply chains. At the same time, integrated network design and end-to-end shipment visibility help reduce fragmentation risks and improve coordination across multiple supply chain nodes, particularly for high-value, time-critical shipments tied to production and deployment schedules.

6.0 Driving Forward: The Next Chapter of Semiconductor Growth

The Asia-Pacific semiconductor industry will remain a critical engine of global technology growth, driven by rising demand from artificial intelligence, high-performance computing, electric vehicles, and advanced communications infrastructure. To support this expansion, semiconductor companies are building more distributed and resilient manufacturing networks across major regional hubs such as Taiwan, South Korea, China, Singapore, Malaysia, and emerging Southeast Asian markets, reflecting China's continued role in assembly and testing, semiconductor equipment and materials, advanced electronics manufacturing, and downstream customer demand. This shift reflects the industry's need to balance capacity expansion with supply chain resilience while maintaining close coordination across design, fabrication, packaging, and device integration stages.

As semiconductor production becomes increasingly interconnected, the movement of high-value materials, wafers, AI chips, finished semiconductors, semiconductor equipment, and advanced electronics components across borders requires reliable logistics execution and strong supply chain visibility. Logistics providers such as FedEx support this ecosystem through global transportation networks, digital logistics platforms, and integrated trade management capabilities that help streamline cross-border operations. By connecting key semiconductor clusters in APAC with global manufacturing and technology markets, logistics partners help semiconductor companies maintain operational continuity, strengthen supply chain resilience, and respond more effectively to evolving market demands.





From AI to EVs: How APAC semiconductors drive the global innovation map

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