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AUSSEN WIRTSCHAFT BRANCHENREPORT MALAYSIA

MALAYSIAN SEMICONDUCTOR INDUSTRY

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OVERVIEW

Malaysia has developed a robust semiconductor industry over the past five decades, becoming a key node in the global semiconductor value chain. Since the 1970s, when multinational pioneers like Intel and Texas Instruments set up in Penang, Malaysia's electrical and electronics (E&E) sector has grown exponentially. Today, the country is among the world's top semiconductor exporting nations, it was the 6th largest in 2021 and is especially renowned for back-end manufacturing (assembly, testing, packaging) which makes up the bulk of its semiconductor output. The E&E industry (including semiconductors) contributes roughly 5–7 % of Malaysia's GDP and about 37–40 % of its exports, underlining its strategic importance to the national economy. This report provides Austrian semiconductor companies (from SMEs to large firms) with an overview of Malaysia's semiconductor ecosystem, covering its global role, investment climate, talent pipeline, comparative advantages, and the risks and realities that inform foreign direct investment (FDI) and business expansion decisions.

~7%

E&E make up approximately 7% of Malaysia's GDP

MALAYSIA'S SEMICONDUCTOR LANDSCAPE

Malaysia's position in the global semiconductor industry must be understood within the broader context of its electrical and electronics (E&E) sector, which has long been a cornerstone of the national economy. E&E manufacturing remains Malaysia's largest export contributor and a key driver of industrial investment, consistently accounting for a substantial share of total approved manufacturing investments and merchandise exports. Even amid global economic uncertainty, Malaysia continues to attract sizeable E&E-related foreign direct investment (FDI), underscoring the sector's structural importance and the country's role as a major manufacturing base within global electronics supply chains. This location fares well thanks to still affordable prices for energy, labour and land despite some scarcities arising lately.

In 2024, the Malaysian Investment Development Authority (MIDA) reported approved (not yet realised) investments of RM 55.8 billion (1 EUR = 4.52 RM per March 19, 2026) in E&E manufacturing, following RM 85.4 billion in 2023, while total approved investments across all industries reached RM 378.5 billion. Electrical and electronics manufacturing remained among the leading contributors to this total. Crucially, Malaysia's E&E investment pipeline has demonstrated a high degree of execution credibility, more than 90% of E&E manufacturing projects approved in 2021–2022 have progressed to implementation, reinforcing investor confidence that announced projects translate into actual operating capacity rather than remaining aspirational commitments. This strong materialisation rate differentiates Malaysia from many competing locations and reflects institutional familiarity with large-scale, technically complex manufacturing projects. However, there might be some setbacks with commitments given by the Malaysian government at the investment decision, which potentially will not be granted at a later stage (therefore a fast securizing approach is advised in the light of possible political changes).

RM55.8 billion

in approved E&E investments in 2024

Within this broader E&E landscape, semiconductors represent the most globally integrated and technologically intensive segment. Malaysia plays a **critical role in the global semiconductor value chain**, **primarily through downstream assembly, testing, and packaging (ATP) activities**. The country accounts for approximately **13% of global outsourced ATP capacity**, positioning it as one of the world's major semiconductor back-end hubs and giving it **more than half of Southeast Asia's market share** in these segments. This scale confers systemic importance: Malaysia is not merely a participant in semiconductor supply chains, but a key throughput node whose operational stability directly affects global chip availability. Also Austrian companies are highly involved in this value chain with Malaysia - Infineon, amsOSRAM and AT&S on the forefront.

Malaysia's back-end dominance is reinforced by the presence of major global semiconductor players operating significant assembly and test facilities in the country. These include Intel, Texas Instruments,

Infineon, STMicroelectronics, ASE, and Amkor, among others. The long-standing concentration of such firms—particularly in Penang—has earned the state the moniker **"Silicon Valley of the East,"** reflecting the dense semiconductor and electronics cluster that has evolved since the 1970s. Penang's Semicon ecosystem is characterised by a mature network of local suppliers, precision tooling vendors, automation specialists, and logistics providers, enabling semiconductor operations to scale efficiently and operate with relatively low coordination and execution risk.

MALAYSIA'S ROLE IN THE SEMICONDUCTOR VALUE CHAIN

From a functional perspective, Malaysia's back-end specialisation carries significance beyond cost considerations. Assembly, testing, and packaging constitute a **hard gating function** in semiconductor production: even when wafers are fabricated elsewhere, chips cannot be shipped as reliable commercial components until they are packaged and validated through testing against stringent electrical, thermal, and reliability specifications. As demonstrated during pandemic-related supply disruptions, interruptions to Malaysian ATP operations can generate outsized downstream effects across global automotive, industrial, and consumer electronics supply chains, underscoring Malaysia's systemic relevance as a global back-end anchor.

This is a non-exhaustive list

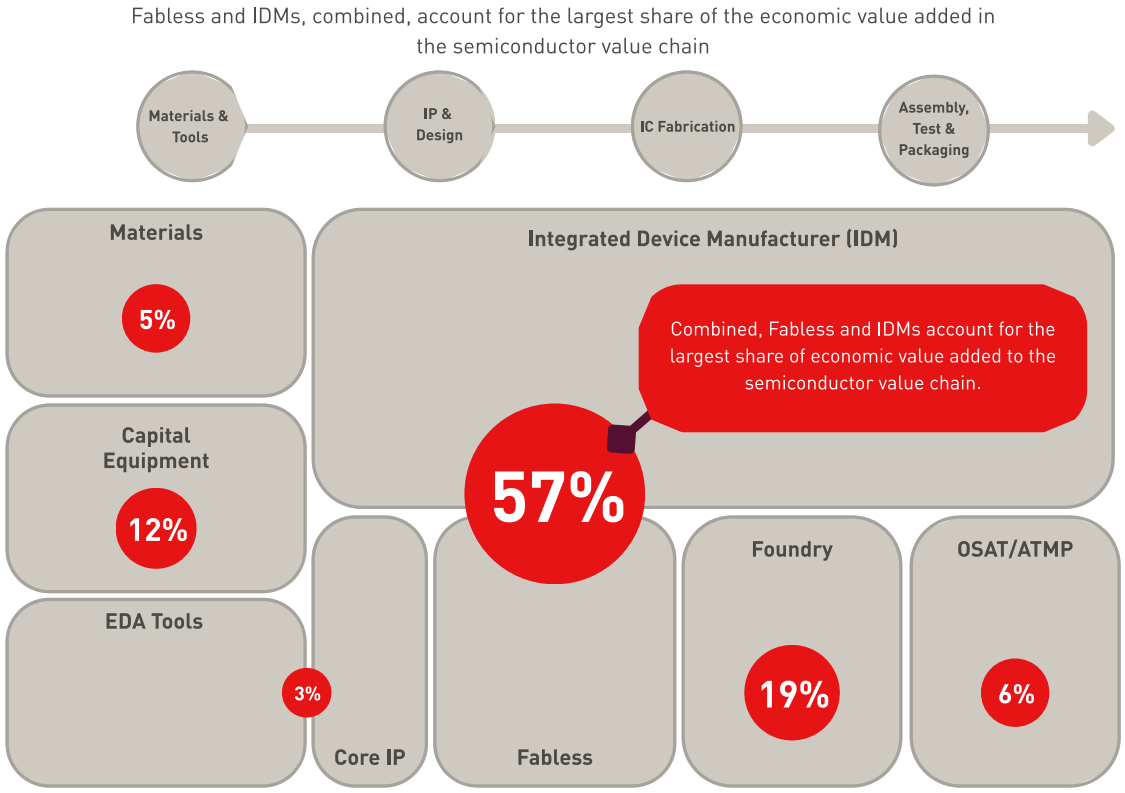
Check MSIA-Silicon Malaysia map for full details

By contrast, Malaysia's involvement in front-end semiconductor manufacturing—including wafer fabrication and advanced logic production—has historically been more limited. Unlike Taiwan or South Korea, Malaysia does not host leading-edge logic fabs or advanced-node foundries. However, the country does support several **niche and specialty wafer fabrication facilities** focused on mature and differentiated processes. These include Infineon's power semiconductor fabs in Melaka and its planned 8-inch silicon carbide (SiC) facility in Kulim, X-Fab's mixed-signal and specialty foundry in Sarawak, and SilTerra's analogue and MEMS production facility in Kulim.[10] amsOSRAM also operates an optoelectronics wafer fab in Kulim, supplying LED and sensor-related applications.[11] Collectively, these front-end activities concentrate on power devices, sensors, and opto-electronics rather than cutting-edge CPUs or advanced logic.

In parallel, Malaysia hosts a growing base of **design-related activities**, though these remain a relatively small component of total semiconductor value added. Local fabless firms such as Oppstar, SkyeChip, and Infinecs have emerged in IC design services, while multinational firms—including Intel, Broadcom, and Renesas—operate design and R&D centres in Malaysia. Despite this progress, front-end design and fabrication continue to account for a modest share of Malaysia's overall semiconductor value capture, reflecting the country's historical orientation toward downstream manufacturing.

***Figure 1**: Economic value added by segment of the semiconductor value chain. Fabless design firms and IDMs (integrated device manufacturers) together capture the largest share of value (~57 %), whereas outsourced assembly/test (OSAT/ATMP) contributes only around 6 %.[14] This underscore why moving upstream into design and front-end manufacturing is attractive for Malaysia.*
Source: ISIS Malaysia (Figure redesigned)

This structural positioning has implications for economic value capture. Global semiconductor value-chain analysis shows that outsourced assembly and test (OSAT/ATMP) activities account for only around **6 % of total value added**, while fabless design and integrated device manufacturing (IDM) together capture **57 %**, reflecting their higher margins and strategic control over intellectual property. Malaysia's current strengths therefore lie in a segment that is indispensable but yields relatively lower value per chip compared with upstream activities.



Economic Value Added is a measure of contribution of the sector to the overall economy (GDP).

Recognising this value gap, Malaysian policymakers and industry leaders have articulated a deliberate strategy to **move up the semiconductor value chain** without undermining the country's established manufacturing base. The National Semiconductor Strategy (NSS) and the New Industrial Master Plan 2030 (NIMP) outline ambitions to expand front-end capabilities, develop domestic IC design champions, and **increase Malaysia's share of global semiconductor trade from 7 % to 14 % by 2029**. In practical terms, this signals a gradual shift from a model centred on "*Made in Malaysia*" assembly toward one that increasingly incorporates "*Designed in Malaysia*" and higher-value manufacturing activities.

Within this upgrading trajectory, **advanced packaging** has been identified as an immediate and strategically coherent focus area. Advanced packaging builds directly on Malaysia's back-end strengths while enabling

higher-value applications such as artificial intelligence, high-performance computing, automotive electronics, and miniaturised devices. Globally, advanced packaging has grown rapidly as a share of total packaging value, rising from approximately 38 % in 2014 to about 47 % in 2023 and projected to reach around **50 % by 2025**. This trend underscores the economic rationale for Malaysia to deepen capabilities in advanced packaging as a near-term upgrading pathway.

Malaysia already has an established foothold in this segment. Intel's Penang facility is ramping up advanced 3D chip packaging, while ASE—a leading Taiwanese OSAT—is developing advanced packaging processes locally. Policymakers frame this as a **"vertical" upstream move**, whereby Malaysia deepens capabilities within its existing back-end niche to generate higher-value output. At the same time, the country is pursuing a **"horizontal" upstream strategy** by expanding into front-end design and selected fabrication activities, particularly in power semiconductors and optoelectronics.

Recent FDI trends reinforce this evolving role. Flagship investments such as Intel's USD 7 billion advanced packaging and testing facility in Penang called the Pelican Project, its first such plant outside the United States—are expected to create around 4,000 high-skilled jobs and begin producing 3D-packaged chips by the end of 2024. Infineon's EUR 5 billion expansion in Kulim, positioning the site as the world's largest 200mm silicon carbide wafer fab, further anchors Malaysia's role in next-generation power electronics. Additional investments, including TF AMD's RM1.5 billion expansion in Penang and X-FAB Sarawak's gallium nitride capacity upgrade, reinforce Malaysia's positioning across advanced packaging and specialty front-end manufacturing.

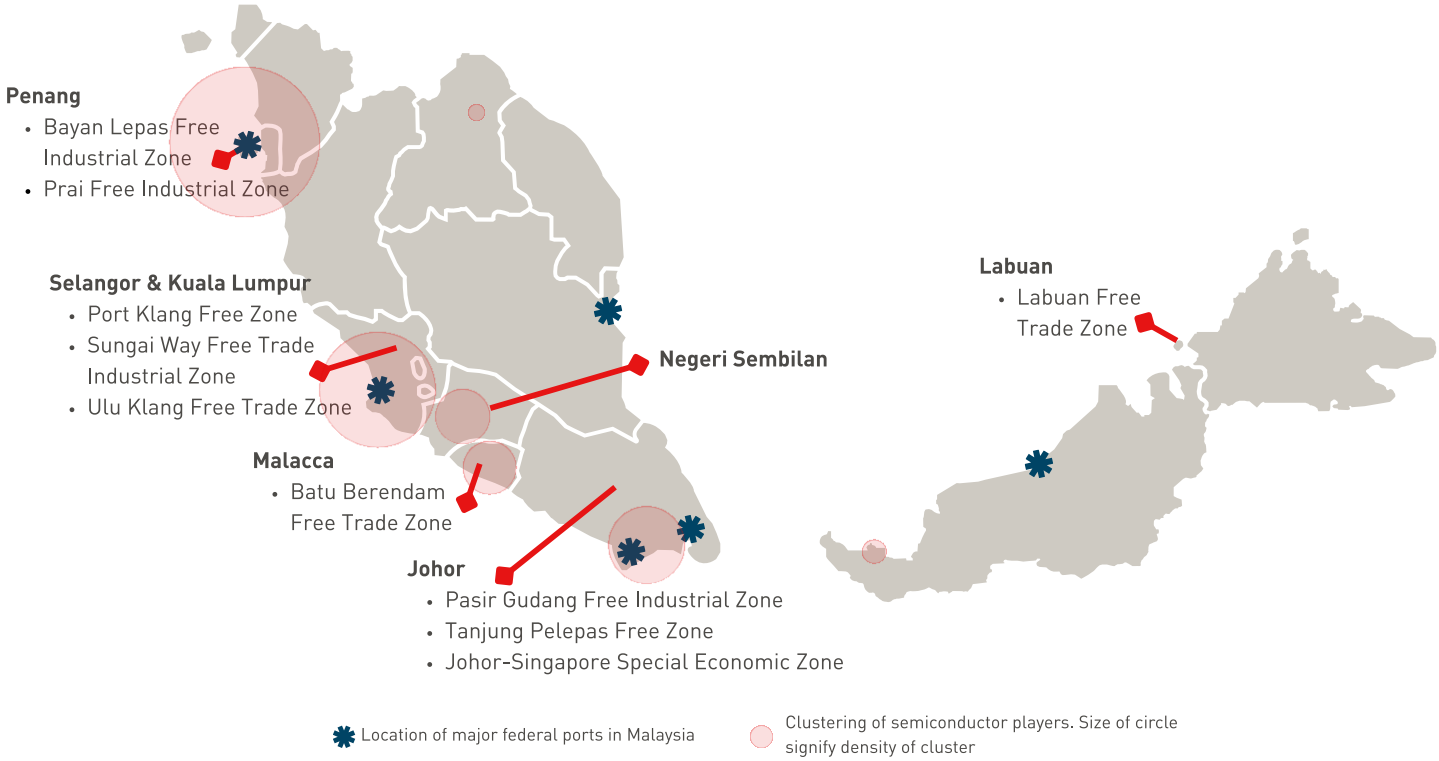
For European stakeholders, including Austrian semiconductor firms, these developments demonstrate that Malaysia's ecosystem is not limited to low-value manufacturing. AT&S's EUR 1 billion IC substrate facility in Kulim and ams OSRAM's long-standing and expanding optoelectronics operations illustrate Malaysia's capacity to host **sophisticated, capital-intensive, and automation-driven semiconductor activities** across multiple stages of the value chain.

Looking ahead, Malaysia's semiconductor investment pipeline remains robust. Under the NSS, the government has set a target to **attract RM 500 billion** (approx. **EUR 105 billion**) **in semiconductor investments**, spanning **IC design centres, advanced packaging, semiconductor equipment manufacturing, and at least one new wafer fab**. Early pipeline developments—such as ARM Holdings anchoring an IC design hub in Selangor alongside Phison Electronics and SkyeChip, and increased activity linked to "China+1" diversification point to an ecosystem that is actively evolving rather than static.

Taken together, Malaysia's role in the global semiconductor value chain is best characterised as **structurally indispensable at the back end and increasingly strategic in adjacent higher-value segments**. The country's challenge and opportunity lies not in abandoning its established strengths, but in leveraging them to capture greater value through advanced packaging, design enablement, and selective front-end expansion, thereby ensuring continued relevance and competitiveness in a rapidly reconfiguring global semiconductor landscape.

INFRASTRUCTURE AND LOGISTICS

Malaysia's semiconductor ecosystem is supported by well-developed industrial infrastructure. Key clusters such as the Bayan Lepas Free Industrial Zone in Penang and the Kulim Hi-Tech Park in Kedah at the border to Penang offer reliable utilities, clean water supply, efficient logistics, and in some cases on-site customs facilities. Companies reported stable electricity, access to industrial gases and chemicals, and compliant waste treatment systems. Penang's mature supplier base covering tooling, materials, PCB assembly, and equipment maintenance reduces downtime and operating costs compared with less developed greenfield locations.



Check MSIA-Silicon Malaysia map for full details

*Map is not to scale

Malaysia is well positioned logistically, with major container ports on both coasts and strong air cargo capacity at Kuala Lumpur and Penang international airports. Given the high value and low weight of semiconductors, air freight is critical, and Penang Airport plays a key role in electronics exports with rapid connectivity to regional hubs. Efficient customs procedures, regional flight connectivity, and Malaysia's ASEAN membership which enables tariff free access to neighboring markets further strengthen its attractiveness as a manufacturing and distribution base.

Malaysia continues to upgrade its logistics and industrial infrastructure to support semiconductor growth. In Penang, container terminal expansion is underway to handle higher throughput, while road connectivity between the island and mainland is being enhanced through new highway and proposed rail projects. Government-backed initiatives such as the Penang Automation Cluster strengthen local precision manufacturing and just-in-time supply chains. In parallel, nationwide rollout of 5G and high-speed broadband supports smart manufacturing and factory connectivity across key semiconductor clusters.

Taken together, Malaysia's combination of targeted incentives, institutional support, and robust infrastructure creates **a highly conducive environment for semiconductor investment**. Despite intense regional competition, the country continues to attract major projects. Policymakers have described the current semiconductor cycle as a "once-in-a-generation" opportunity, underpinned by political will, an end-to-end supply chain, a skilled multilingual workforce, and world-class industrial parks. Malaysia's neutral

geopolitical stance — maintaining strong ties with Western and Eastern economies—further strengthens its position as a leader in the industry.

NATIONAL SEMICONDUCTOR STRATEGY (NSS)

Malaysia's **National Semiconductor Strategy (NSS)**, announced in 2024, represents a qualitative shift in how the country approaches semiconductor development. Prior to the NSS, Malaysia's semiconductor sector benefited from broad-based manufacturing incentives, export facilitation, and skills development programs embedded within wider industrial policy. While effective in sustaining growth, this approach lacked a unifying framework to coordinate capability upgrading across institutions, firms, and stages of the value chain.

The NSS addresses this coordination gap. Rather than functioning as a prescriptive industrial blueprint, it operates as an **economic framework** aligning fiscal incentives, talent development, research infrastructure, and ecosystem governance around clearly articulated capability objectives. This framing reflects a recognition that semiconductor upgrading is not achieved through isolated investments, but through **system level coherence** across multiple policy and market actors.

Crucially, the NSS does not seek to redefine Malaysia's role. Instead, it explicitly builds on Malaysia's existing position as a global back-end anchor, using this position as the base from which higher value activities can be developed. This approach distinguishes Malaysia's strategy from more aggressive, state-led semiconductor programs elsewhere, which often prioritize headline fabrication capacity over ecosystem readiness.

ADVANCED PACKAGING AS UPGRADING VECTOR

Advanced packaging occupies a central position in Malaysia's NSS as practical upgrading pathway that builds directly on Malaysia's strength in assembly, testing, and packaging (ATP). Malaysia already operates at global scale in back-end activities, and the NSS signals a shift from a "volume ATP" model towards a "capability ATP" model where the country's plants and supplier ecosystem increasingly support higher-complexity packaging formats, tighter reliability requirements, and greater integration with system-level design considerations.

This strategic direction is aligned with global industry evolution. Across the semiconductor sector, performance improvements increasingly depend on system-level integration approaches such as heterogeneous integration, chiplets, and 2.5D/3D packaging rather than transistor scaling alone. In practice, packaging has moved from being treated as a downstream manufacturing step to a core performance enabler for AI accelerators, high-performance computing, and advanced automotive electronics. Malaysia's upgrading ambition is to anchor this shift locally by developing advanced packaging capabilities inside an ecosystem that already possesses the scale, discipline, and industrial infrastructure to run high reliability back-end production.

Recent developments in Penang provide a tangible view of how Malaysia's packaging base is being deepened. A key marker is ASE's expansion in Bayan Lepas. In February 2025, ASE officially launched its fifth plant in Penang, describing the facility as an expansion that will improve manufacturing capability for advanced packaging technologies and support next-generation applications such as GenAI. ASE also stated that the expansion plan grows its Malaysia footprint substantially from about 1.0 million sq ft to 3.4 million sq ft of floor space indicating that Malaysia remains a major execution site for new capacity rather than just a legacy operating base.

From an ecosystem standpoint, the significance of ASE's move is not limited to a new building. It is a signal that an OSAT leader is continuing to place **scale and capability in Malaysia**, reinforcing Penang's role as a platform for next generation packaging and test operations. This contributes to the NSS storyline in a

measurable way, advanced packaging is not positioned as a future aspiration alone. It is already reflected in footprint decisions by major OSATs.

Intel's trajectory in Malaysia also supports the interpretation that advanced packaging capacity deepening is underway and remains strategically relevant. In December 2025, Intel would invest an additional RM 860 million (USD 208 million) to boost its assembly and testing operations in Malaysia. This additional investment was described as building on Intel's earlier commitment to a major advanced packaging facility announced in 2021, signalling continued commitment to Malaysia's role in Intel's back-end network.

Advanced packaging is not only an OSAT story, substrates and enabling inputs are also locating in Malaysia.

A mature advanced packaging ecosystem extends beyond OSAT plants and test lines. It requires enabling inputs, particularly substrates, materials handling, automation, and precision process support. Austria's AT&S provides a high-signal example of this shift. In January 2024, AT&S announced the opening of its first plant in Kulim Hi-Tech Park, describing it as producing IC substrates for next-generation microchips used in high-performance computing, data centres, and AI applications.

On the policy side, NSS implementation is increasingly connected to packaging capability narratives. MIDA similarly position advanced packaging as a key part of Malaysia's pathway to move up the value chain, supported by fiscal allocation. Ecosystem signalling is also appearing through research and capability support mechanisms. Bernama reported in July 2025 the launch of a RM 90 million matching fund for Malysian firms framed around positioning Malaysia as an advanced semiconductor packaging hub under the Malaysia Science Endownment. While this is not direct capex, it reflects an attempt to strengthen upstream technology development and applied capability building that typically underpins sustained movement into advanced packaging niches. Most fundings for MNCs however are linked to production, less to R&D.

DESIGN ECOSYSTEM DEVELOPMENT

While advanced packaging represents the most immediate upgrading pathway under the NSS, semiconductor design is positioned as the longer-term lever for deeper value capture, technology ownership, and strategic resilience. The NSS explicitly identifies the development of globally competitive Malaysian semiconductor design firms and a coherent national design ecosystem as a core element of its phased trajectory. Malaysia's policy ambition is not incremental project accumulation, but the gradual integration of higher-margin, knowledge-intensive functions into the national industrial base.

A structured capability building rather than leapfrogging

Malaysia's design strategy is characterised by deliberate sequencing. NSS focuses on **capability scaffolding,** addressing the structural bottlenecks that typically prevent design ecosystems from scaling, rather than attempting to position Malaysia as an immediate design leader.

The government backed development of an IC Design Park (IC Design Park 2 launched in Nov. 2025) exemplifies this approach. MIDA announced Malaysia's intention to establish what it describes as Southeast Asia's largest IC design park, anchored by partnerships involving ARM Limited, Phison Malaysia, SkyeChip, and the Shenzhen Semiconductor Industry Association.[9] Subsequent reporting clarified that the park is structured around shared design infrastructure, including EDA access, high-performance servers, IP libraries, MPW pathways, and coordinated training programmes.[10] [11] Concentrating these inputs within a single platform lowers entry barriers for domestic firms and accelerates learning cycles, particularly for smaller design houses and engineering teams transitioning from services into more complex design work.

The ARM partnership as a platform enabler

Within this scaffolding framework, the partnership with ARM Limited functions as a platform-level intervention. MIDA framed the arrangement as a mechanism to strengthen Malaysia's semiconductor design

capability and expand the domestic talent pool.[12] ARM based ecosystems are widely recognised as effective entry points for emerging design communities, particularly where firms prioritise application specific integration and system optimisation over proprietary instruction-set development.

From an analytical standpoint, the ARM partnership is best understood as an enabling layer rather than a guarantee of commercial success. Malaysia's approach gains credibility from the way platform access is paired with physical infrastructure, anchor partners, and a growing pool of domestic firms, creating conditions for capability accumulation rather than isolated projects.[9] [10] [11] [12]

Domestic momentum on design capability

Malaysia's design ambitions are underpinned by a base of domestic design firms and front-end services providers. These firms form an important substrate for NSS initiatives, absorbing trained engineers and translating capability building into commercial activity.

Oppstar Technology remains the most visible example. Its 2023 listing on Bursa Malaysia marked the country's first public listing of a full IC design services firm. Oppstar serves as a milestone for Malaysia's design sector, noting its engagement across analogue, mixed-signal, and digital design services for international customers.[14]
Beyond Oppstar, Penang has emerged as a focal point for domestic design activity. SkyeChip, has positioned itself as a specialist in automotive and industrial IC design, embedded systems, and SoC development. Infinecs Systems offers IC design services, and system integration, supporting automotive, industrial, and IoT applications. Experior Technology contributes to the ecosystem through specialised services in physical design, verification, and EDA-related workflows. Although less visible publicly, these companies perform critical functions in design enablement and talent development, often acting as subcontractors or specialist partners to multinational design teams. Collectively, this group of firms indicates that Malaysia's design ecosystem already possesses a functioning services layer, which NSS initiatives aim to deepen and extend rather than create from scratch.

HUMAN CAPITAL DEVELOPMENT

Talent development is a central pillar of Malaysia's National Semiconductor Strategy (NSS), reflecting the industry's shift toward higher-value, engineering-intensive activities. Malaysia has a sizeable engineering base, with an estimated 650,000 engineers nationwide and approximately 600,000 employed across the broader electrical and electronics (E&E) sector. [57] However, the pace and direction of semiconductor expansion have created acute shortages in specialised roles, particularly in advanced packaging, IC design, and process engineering. Government estimates indicate that the semiconductor industry will require an additional 50,000 skilled engineers over the coming years, while domestic universities currently produce only about 5,000 E&E graduates annually, resulting in a persistent structural gap. [58]

This imbalance has intensified competition for experienced engineers at a regional and global level. The president of the Malaysian Semiconductor Industry Association (MSIA), Datuk Seri Wong Siew Hai, has characterised the situation as a "war on talent," underscoring the strategic importance of human capital in sustaining Malaysia's semiconductor ambitions.[59] Malaysia also continues to face outward talent mobility, with an estimated 15 % of its semiconductor workforce leaving annually, influenced in part by wage differentials with neighbouring markets such as Singapore and by global demand for experienced engineers.[60]

Training and upskilling as an institutional response

Malaysia's response to these constraints is multi-layered and increasingly institutionalised. The NSS frames talent development as an ecosystem-wide responsibility rather than an obligation borne solely by individual firms, recognising that workforce mobility across companies generates positive externalities for the broader ecosystem. This perspective underpins the expansion of coordinated training, upskilling, and certification programmes led by industry bodies, public research institutions, and government agencies.

Organisations such as the Collaborative Research in Engineering, Science and Technology (CREST) play a key role in aligning engineering education with industry requirements, while national research institutions such as MIMOS have assumed a more prominent function in applied semiconductor training. Recent initiatives include semiconductor focused training academies, industry-linked certification schemes, and collaborative research platforms designed to expose engineers to real-world manufacturing and design challenges. These programmes aim to shorten the transition from graduation to productive contribution, while also supporting mid-career upskilling in areas such as process integration, IC design, and AI-enabled systems.

MIMOS, as Malaysia's applied R&D centre for semiconductors and advanced electronics, anchors several of these efforts. In 2023, the Ministry of Science, Technology and Innovation (MOSTI) launched a Semiconductor Research Consortium (ITIC) facilitated by MIMOS, alongside the establishment of the Advanced Semiconductor Academy of Malaysia (ASEM). ASEM coordinates specialised training modules and international exchange programmes, including partnerships with leading Taiwanese universities that provide Malaysian students and researchers access to advanced fabrication courses and laboratory facilities. Complementary national and global semiconductor exchange programmes further extend overseas exposure, enabling participants to return with advanced technical expertise and practical insight into frontier manufacturing environments.

Compensation dynamics and productivity considerations

The tightening talent market has triggered a structural adjustment in Malaysia's semiconductor labour dynamics. Rising demand for specialised engineers has exerted upward pressure on wages, particularly in advanced packaging, design, and process engineering roles. While this moderates Malaysia's historical cost advantage relative to lower-income manufacturing locations, it also reflects the country's transition towards higher-value activities. From an economic standpoint, the relevant metric is increasingly cost-adjusted productivity rather than absolute wage levels. As semiconductor manufacturing becomes more automation-intensive and engineering-driven, yield stability, process reliability, and engineering productivity carry greater weight in investment decisions than labour cost alone.

Policy instruments under the NSS explicitly acknowledge this shift. Newly launched IC Design Parks offer starting salaries of approximately RM 5,000–6,000 (ca. EUR 1,050–1,250) per month for fresh graduates, with higher compensation for postgraduate qualifications, narrowing regional wage gaps and improving retention prospects for early-career engineers. Industry associations and major employers are also placing greater emphasis on non-monetary factors, including structured career progression, exposure to complex projects, and work culture. Multinational firms such as Intel, Infineon, and AT&S support overseas training assignments and cross-site rotations, enabling Malaysian engineers to gain advanced skills while strengthening long-term retention and organisational commitment.

Academia–industry linkages and talent pipeline alignment

Collaboration between industry and higher education institutions constitutes a core pillar of Malaysia's semiconductor talent strategy under the NSS, reflecting the need to align academic output more closely with industry-relevant skills and applied problem-solving. As semiconductor activities move towards higher-value functions such as advanced packaging, design, and system integration, the traditional separation between academic training and industrial practice has become a constraint. Malaysia's response has been to promote structured, institutionalised linkages that shorten the transition from education to productive employment.

Leading multinational semiconductor firms have deepened direct engagement with Malaysian universities to co-develop curricula, research agendas, and talent pipelines. In 2024, NXP Semiconductors signed a memorandum of understanding with Universiti Malaya (UM) to co-develop coursework in chip design and embedded systems, alongside workshops and elective modules, while also establishing a joint research laboratory with Universiti Putra Malaysia (UPM) to support direct recruitment. Such initiatives improve graduate job readiness, create clearer internship and hiring pathways, and strengthen feedback loops between academia and industry.

Beyond bilateral university–company collaborations, Malaysia has developed intermediary institutions that operate at the intersection of academia, industry, and government. The Penang Skills Development Centre (PSDC) plays a distinctive role in this landscape. Established as an industry led institution involving the Penang state government, multinational firms, and academic partners, PSDC has long functioned as a bridge between education systems and industrial skill requirements within Penang's semiconductor cluster. In recent years, PSDC has expanded its role to include more semiconductor-specific programmes, working alongside universities to deliver applied training in areas such as semiconductor manufacturing processes, test engineering, automation, and increasingly, IC design-related competencies.

Initiatives such as the Penang Chip Design Academy, supported by PSDC in collaboration with industry and state agencies, illustrate how intermediary platforms complement university-based education. Rather than duplicating academic curricula, such programmes focus on applied skill development namely design verification, physical design fundamentals, and system-level understanding aimed at accelerating graduates readiness for semiconductor roles. This layered approach allows universities to focus on foundational knowledge while institutions like PSDC provide industry-calibrated training that reflects current technology and operational practices.

Taken together, Malaysia's approach to talent pipeline alignment reflects an ecosystem-level strategy rather than isolated interventions. Industry associations play a central coordinating role in Malaysia's talent strategy. MSIA conducts regular workforce surveys to assess skills demand and collaborates with government agencies on targeted training initiatives, while advocating stronger alignment between education and industry requirements, including expanded internships and increased enrolment in electronics engineering programmes. Complementing these efforts, cross-industry initiatives such as the Bintang Semiconductor Impact Fund (BSIF I), launched in 2024, combine investment objectives with human capital development priorities, including training support, sustainability skills, and increased female participation.

Outlook on talent development

The country benefits from a solid engineering education base, producing graduates with strong technical fundamentals and high English proficiency. Sustaining the industry's upgrading trajectory will require continued scaling of training, compensation, and ecosystem-level coordination. For foreign investors, including Austrian semiconductor firms, Malaysia offers access to a young, motivated engineering workforce, coupled with an institutional environment that actively supports training partnerships and skills development. The long-standing success of multinational firms such as Intel in Malaysia illustrates that, with sustained engagement in talent development, the country can support a durable and competitive semiconductor workforce aligned with NSS objectives.

ECOSYSTEM GOVERNANCE AND COORDINATION

Aligning institutions, incentives, and execution

One of the NSS's distinguishing features is its emphasis on coordination across institutions. Semiconductor ecosystems span multiple policy domains such as investment promotion, education, infrastructure, trade, and research.

The NSS seeks to reduce fragmentation by clarifying institutional roles and aligning incentives with strategic objectives. Investment incentives are increasingly targeted towards activities that contribute to capability deepening, such as advanced packaging, R&D, and design-related functions. Training programs are linked to industry demand signals, while infrastructure planning is informed by anticipated technological requirements. This coordinated approach reflects lessons learned from earlier industrial initiatives, where gaps between policy intent and execution limited effectiveness. By embedding semiconductor upgrading

within a broader national industrial framework, the NSS aims to sustain momentum beyond individual investment cycles.

Managing risk through selective ambition

A defining characteristic of Malaysia's NSS is its **selective ambition**. Rather than attempting to compete directly with global leaders in every segment of the value chain, Malaysia focuses on areas where it has a realistic pathway to competitiveness. This risk-managed approach contrasts with more aggressive strategies elsewhere, which rely on subsidies to attract capital-intensive projects without sufficient ecosystem depth.

Selective ambition does not imply limited impact. On the contrary, by concentrating resources on adjacent capabilities with strong complementarities, Malaysia increases the likelihood that upgrading efforts will yield durable outcomes. Advanced packaging and design ecosystem development, if successfully executed, can generate spillovers across materials, automation, and system integration domains.

The National Semiconductor Strategy as a catalyst for ecosystem evolution

NSS represents a maturation of Malaysia's approach to semiconductor development. It acknowledges the country's entrenched role in back-end manufacturing, while articulating a credible pathway for capability deepening through advanced packaging, design ecosystem scaffolding, and talent scaling. Importantly, the NSS reframes semiconductor upgrading as an **evolutionary process** rather than a disruptive leap. By sequencing investments, aligning institutions, and managing risk through selective ambition, Malaysia positions itself to enhance value capture without undermining the stability of its existing ecosystem.

Government Incentives and Policies

Malaysia's investment appeal is underpinned by a long-established framework of pro-business policies and incentives developed to attract E&E firms. Since the 1970s, instruments such as Pioneer Status (income tax exemption) and the Investment Tax Allowance have offered qualifying companies multi-year tax exemptions and reductions. [40] [41] These incentives have since evolved to remain competitive, with current schemes extending beyond manufacturing to cover R&D, design, and Industry 4.0 adoption, including potential 0 % income tax periods or generous capital allowances for high-technology activities. [40] [42]

Recent federal budgets have extended targeted tax incentives for E&E firms relocating operations to Malaysia, particularly those diversifying from China, with measures currently extended through 2024. [43] In addition, state-level incentives, such as fast-track licensing, discounted land leases, and duty or stamp exemptions are offered by Penang, Kedah, and regional economic corridors to support strategic technology investments. [44] [45]

Beyond tax incentives, Malaysia offers customs and operational advantages critical to semiconductor operations. Many firms operate in Free Industrial or Free Trade Zones, enabling duty-free import of components and re-export of finished goods—an important benefit in globally integrated supply chains. Companies investing in automation and digitalisation can access schemes such as the Automation Capital Allowance and Industry4WRD grants, while innovation is supported through matching grants for Centres of Excellence and collaborative R&D. Under the NSS, RM 25 billion (ca. EUR 5 billion) has been allocated over the next decade to fund targeted incentives spanning design startups, talent development, and infrastructure. [46] [47] Together with measures such as training subsidies, duty exemptions, and visa fee waivers for specialised talent, Malaysia's incentive framework demonstrates strong responsiveness to industry needs.

Strategic Focus

Advanced packaging is Malaysia's fastest moving NSS pillar, directly aligning with European strengths in substrates, materials, and precision equipment.

Malaysia's **policy consistency and openness** reinforce investor confidence. The country permits **100 % foreign ownership** in manufacturing and maintains relatively streamlined business setup procedures, previously

Initiatives to Support the National Semiconductor Strategy (NSS)			
Initiative	**Est. Amount (RM bn)**	**Duration (Years)**	**Implementing Ministry / Agency**
Capital Grants			
Capital Grants	10	10–16 (2023–2038)	MOF / KE / MIDA
Target: Training and R&D Hub			
Human Resources Development Fund (HRDF) – for the semiconductor sector	1.25	6 (2025–2030)	KESUMA
High Impact Fund for Semiconductors (MNC)	1	5 (2025–2030)	MIDA
Domestic Strategic Investment Fund for Semiconductors (Locally owned companies)	1	6 (2025–2030)	MIDA
Target: 60,000 Highly Skilled Local Engineers by 2030			
Estimated average cost of RM20,000 per engineer (utilising existing funds)	1.2	6 (2025–2030)	MOHE / KESUMA
Target: Establish 100+ Local Companies with Revenue of RM 1 Billion and Above			
MyChipStart IC Programme – Development of local IC design industry and companies into global champions under NIMP CoSIF	1	5 (2025–2029)	MITI / CREST / MIDA / MIMOS
Semiconductor Industrial Park (focus on general infrastructure, utilities and others)	2	5 (2025–2029)	MOF / MITI / MIDA
Advanced Packaging Center (utilising and expanding existing facilities such as at MIMOS, in collaboration with CREST and industry)	0.5	2 (2025–2026)	MITI / CREST / MIDA / MIMOS / SIRIM
Additional RM 30 million per year for operation of the Advanced Packaging Center (operating costs required for at least 10 years)	0.3	10 (2026–2035)	MITI / CREST / MIDA / MIMOS / SIRIM
Collaborative R&D Project	2.7	5 (2026–2030)	MITI / CREST / MOSTI
Empower institutions supporting the semiconductor industry (namely MIMOS and CREST) – RM 15 million per institution	0.3	10 (2025–2034)	CREST / MIMOS
National Energy Transition Fund to support renewable energy facilities and supply (allocation provided)	2	-	PETRA

ranking among the world's top economies for ease of doing business.[49] Despite political changes between 2018 and 2023, policies towards foreign direct investment have remained stable, with minimal impact on the semiconductor sector. This **continuity reflects broad political consensus on the importance of E&E investments.** National frameworks such as the National Investment Aspirations and NIMP 2030 continue to prioritize advanced technologies, while Malaysia's participation in trade agreements such as RCEP and CPTPP further integrates investors into surrounding and global markets.

Non-Exhaustive List of Incentives	
Core tax incentives for manufacturing & high-technology activities	• Promotion of Investments Act 1986 (Pioneer Status, Investment Tax Allowance) • Income Tax Act 1967 (tax exemptions, allowances, incentive administration) • Reinvestment allowance for expansion, automation, and upgrading of existing operations • Incentives for high-technology, strategic and capital-intensive manufacturing activities administered by MIDA
Customs, trade facilitation & operating regimes	• Free Industrial Zones / Licensed Manufacturing Warehouse (LMW) • Customs Act–based facilitation for bonded operations and supply-chain efficiency
Incentives for research, development & innovation (R&D)	• Contract R&D company incentives • In-house R&D activities • Enhanced deductions or allowances for qualifying R&D expenditure (subject to eligibility and Global Minimum Tax considerations) • Incentives on supporting commercialisation
Automation, digitalization & productivity upgrading	• Automation Capital Allowance (ACA) for qualifying investments in automation and smart manufacturing • Incentives for acquisition of ICT equipment
Design, IP creation & knowledge-intensive activities	• Targeted incentives for semiconductor design, engineering and high-value services under evolving incentive frameworks • Export-oriented incentives extended to selected advanced services, including integrated circuit (IC) design and related activities (effective YA 2025) • Support mechanisms for IP development and commercialisation, subject to programme-specific conditions
Relocation, supply-chain diversification & strategic investments	• Time-bound relocation incentives for selected manufacturing activities (introduced in Budget 2023 and extended through 2024) • Transition towards outcome-based incentives under the New Investment Incentive Framework (NIIF), focusing on economic spillovers, supply-chain resilience and high-value activities (2026 onwards)
State-level & economic corridor incentives	• Selangor: facilitation incentives including land-related charges, licensing support and investment facilitation • Northern Corridor Economic Region (NCER): income tax exemptions, import duty exemptions for machinery and equipment, stamp duty relief for land transfer or lease (Penang, Kedah, Perlis) • East Coast Economic Region (ECER): stamp duty exemptions and location-specific facilitation incentives
Talent development & ecosystem support (non-tax)	• Grants and co-funding for training, upskilling and industry-linked academies (e.g. under NSS and NIMP 2030) • Support for academia–industry collaboration, applied research and workforce development through institutions such as MIMOS, CREST, PSDC and ASEM

Currently, semiconductor products exported from Malaysia to the US **remain exempt from the 19% reciprocal tariff**, which took effect on 8 August 2025, Malaysia exported nearly RM 120 billion (ca. EUR 25 billion) worth of electrical and electronic (E&E) products to the US in 2025, accounting for about 20 % of the country's total E&E exports. Of that amount, semiconductor products made up RM 60.6 billion (ca. EUR 12.5 billion).

CONCLUSION AND OUTLOOK

Malaysia's semiconductor ecosystem offers a strong combination of established manufacturing capability and clear national ambition to move up the value chain. For Austrian semiconductor firms ranging from specialised SMEs to larger players in design, materials, or manufacturing, Malaysia provides a stable, business-friendly base in Asia with proven operational excellence and a growing innovation focus. Its position as a leading assembly and test hub is secure, while ongoing expansion into chip design and selective fabrication, supported by the National Semiconductor Strategy (NSS), signals sustained government commitment and a supportive environment for long-term investment.

Over the next five years, Malaysia is expected to further strengthen its advanced packaging capabilities, potentially emerging as a leading hub in this segment by building on its current 13 % global market share and targeting further gains by 2030. At the same time, new design and R&D clusters such as IC Design Parks in Selangor and the established design ecosystem in Penang are set to expand. This evolving environment enables closer collaboration between design firms, academia, and manufacturers, creating opportunities for Austrian chip design companies to access local talent, engage in partnerships, and co-develop IP or customised solutions for the ASEAN market.

Malaysia's comparative advantages are likely to endure. Its positioning as a neutral and reliable node in global semiconductor supply chains is increasingly valuable as firms pursue diversification beyond single-country dependence, including potential "China+2" or "China+3" strategies. Malaysia is well placed to feature prominently in such diversification due to its established track record and geopolitical neutrality. As Southeast Asia's semiconductor landscape evolves, Malaysia can function as a regional hub linking activities across Singapore, Vietnam, and the wider ASEAN ecosystem by supplying components, packaging services, and talent development. Investing and doing business in Malaysia therefore also provides access to the broader ASEAN growth trajectory, where Malaysia plays a connective role in the region's technology value chain.

Challenges remain, particularly in addressing the semiconductor talent gap over the short to medium term. Malaysia's ability to realise its ambitions will depend on whether it can produce and attract sufficient engineers with the right skill sets. Recent initiatives including partnerships with leading Taiwanese universities, targeted training programmes, and improved compensation structures are encouraging. Investors should plan to actively engage in talent development through university collaborations, in-house training academies, or scholarship and exchange programmes, ensuring workforce readiness while supporting the broader ecosystem. Continued investment in utilities and logistics will also be necessary, and active participation in industry–government dialogues can help ensure infrastructure development aligns with industry needs.

From a political and economic perspective, Malaysia has entered a period of greater stability, with coalition governance and major policy frameworks such as NIMP 2030 enjoying cross-party support. The country's diversified trade profile and strong manufacturing base underpin its resilience amid global headwinds, while broader economic diversification enhances overall stability. For foreign investors, Malaysia's long-standing record of protecting foreign direct investment remains a key assurance; expropriation or abrupt hostile regulation is highly unlikely. On the contrary, Malaysia continues to actively court investors through high-level task forces and sustained international trade and investment promotion efforts.

From a strategic perspective, Malaysia can serve multiple roles for Austrian semiconductor companies, as a manufacturing base for global or Asian markets, a sourcing hub for components and contract manufacturing, or a partnership platform for R&D and product development in priority areas such as automotive electronics, renewable energy technologies, and AI chips. Austrian firms such as ams OSRAM and AT&S have already demonstrated the viability of this model. Malaysia's professional, English-speaking business environment, supported by strong legal and intellectual property frameworks, is well suited to the high-value activities typical of European technology companies.

Suppliers to the large semicon companies can also benefit of the existing ecosystem to provide their products and services directly to established companies. Examples of Austrian firms operative in Malaysia in this aspect are EV Group, Siconnex, and Mechatronics Systemtechnik.

In conclusion, Malaysia's semiconductor ecosystem is at a clear inflection point. Building on its strong manufacturing base, the country is advancing towards higher-value design and selective front-end activities while continuing to innovate in back-end technologies. This transition is supported by targeted government incentives, improving infrastructure, a growing emphasis on talent development and R&D aligned with global industry needs. For investors, Malaysia presents substantial opportunities for growth and collaboration, provided there is active engagement with the local ecosystem, including universities, government initiatives, and industry partners. The policy direction signals a long-term commitment to strengthening Malaysia's role in the global semiconductor supply chain while addressing structural challenges such as talent and ease of doing business. For Austrian semiconductor companies, Malaysia represents a credible and strategic option, offering a stable manufacturing base, an emerging innovation platform, and a reliable gateway to the wider Asian market.

CONTACTS – MINISTRIES, AGENCIES & ASSOCIATIONS

- **Malaysian Investment Development Authority (MIDA)**
  MIDA is the government's principal agency to oversee and drive investment into the manufacturing and services sectors in Malaysia. MIDA assists companies which intend to invest in the manufacturing and services sectors, as well as facilitates the implementation of their projects. The services provided by MIDA include providing information on the opportunities for investments, as well as facilitating companies which are looking for joint venture partners. They also evaluate the following applications for projects in the manufacturing sector and selected services sub-sectors: manufacturing licenses, tax incentives, expatriate posts, and duty exemptions.

- **Ministry of Investment, Trade and Industry (MITI)**
  The Ministry of Investment, Trade and Industry (MITI) is responsible for international trade, industry, investment, productivity, small and medium sized enterprises, development finance institutions, halal industry, automotive, steel, and strategic trade. Their goals are to promote and strategise Malaysia's global competitiveness in international trade by producing high value added goods and services, and to spur the development of industrial activities. MITI plans, legislates and implements international trade and industrial policies that will ensure Malaysia's rapid development, encourages foreign and domestic investment, and promotes Malaysia's exports by enhancing national productivity and competitiveness in the manufacturing and services sector.

- **Ministry of Science Technology & Innovation (MOSTI)**
  MOSTI's goal is to transform Malaysia into a high-tech nation through Science, Technology, Innovation and Economy (STIE), and to use STIE to address national issues and challenges for sustainable development. They aim to develop local technology and innovation by strengthening policy and regulation, and provide effective and efficient STIE enablers and services through agile governance.

- **Malaysia Digital Economy Corporation (MDEC) Sdn Bhd**
  Malaysia's lead agency driving digital transformation and the growth of the digital economy, including initiatives to attract investment, scale tech talent, and enable innovation across high-tech sectors. The organisation supports industries such as semiconductors through digital infrastructure development, high-value technology adoption, and ecosystem partnerships both locally and internationally.

- **Collaborative Research in Engineering, Science and Technology (CREST)**
  CREST is an industry-led organization focused on strengthening the semiconductor and advanced electronics ecosystem through collaborative R&D, talent development, and industry–academia partnerships. It plays a key role in supporting IC design, advanced packaging, and high-value manufacturing initiatives in alignment with national semiconductor strategies.

- **MIMOS Berhad**
  MIMOS is a national applied research and development centre, driving innovation in semiconductors, microelectronics, and digital technologies. It supports the industry through advanced R&D, IC design, prototyping, and commercialization initiatives aligned with Malaysia's national semiconductor strategy

- **Malaysia Semiconductor Industry Association (MSIA)**
  MSIA represents companies across Malaysia's semiconductor value chain, from design and manufacturing to assembly, testing, and equipment. The association supports industry growth through policy engagement, ecosystem development, talent initiatives, and collaboration with government and global partners.

- **The National Tech Association of Malaysia (PIKOM)**
  PIKOM represents Malaysia's digital and ICT industry, including companies supporting the semiconductor ecosystem through software, automation, digital manufacturing, and Industry 4.0 solutions. It plays a key role in policy advocacy, ecosystem development, and talent initiatives that enable digital transformation across semiconductor manufacturing and high-tech industries.

- **Federation Malaysia Manufacturer (FMM)**
  FMM is the national industry body representing Malaysia's manufacturing sector, including a strong base of semiconductor and electronics companies. FMM supports the semiconductor ecosystem through policy advocacy, industry dialogue, talent development, and facilitation of trade, investment, and supply-chain competitiveness.

- **Penang Skills Development Centre (PSDC)**
  Penang Skills Development Centre (PSDC) is Malaysia's leading skills training institute that offers TVET programmes aligned with industry needs, including accredited certifications and advanced technical training relevant to semiconductor manufacturing and precision engineering.

- **Advanced Semiconductor Academy of Malaysia (ASEM)**
  Malaysian training and talent development provider offering industry-aligned programmes in engineering, semiconductors, and digital technologies. ASEM works closely with commercial and industry partners who serve as placement and hiring channels, enabling students to gain industry exposure and transition directly into employment upon completion of their programmes.

- **Semiconductor Fabrication Association Malaysia (SFAM)**
  Established in December 2012, this specialized group consists of major fabrication players such as MIMOS, SilTerra, X-Fab, ON Semiconductor, Osram, Fuji Electric, and Infineon Technologies. It was created to focus on mature technology fabrication plants and strengthen the local E&E ecosystem by fostering collaborations within the semiconductor wafer fabrication industry.

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