



UNIVERSITI
KEBANGSAAN
MALAYSIA
*National University
of Malaysia*



RIN Online Workshop 2024

Resilient Semiconductor Value Chain for Sustainable ASEAN

Prof. Dr. Azrul Azlan Hamzah

**Institute of Microengineering and Nanoelectronics
(IMEN)**

Universiti Kebangsaan Malaysia

24 October 2024 || RIN Online Workshop 2024



UNIVERSITI
KEBANGSAAN
MALAYSIA
*The National University
of Malaysia*

IMEN @ UKM



IMEN Research Facilities in UKM, Bangi

ASEAN: The ‘**surprise winner**’ in the US-China chip war

Geopolitical Dynamics and Strategic Location:

- Neutral position in US-China tug-of-war
- Investment from both sides

Skilled Workforce:

- Experienced talent pool (40+ years semicon industry)

The China Plus One Strategy:

- Companies diversifying supply chain beyond China
- ASEAN as a key alternative

The Rise of Penang:

- Emerging as a major semiconductor hub
- Investment from Intel and Micron

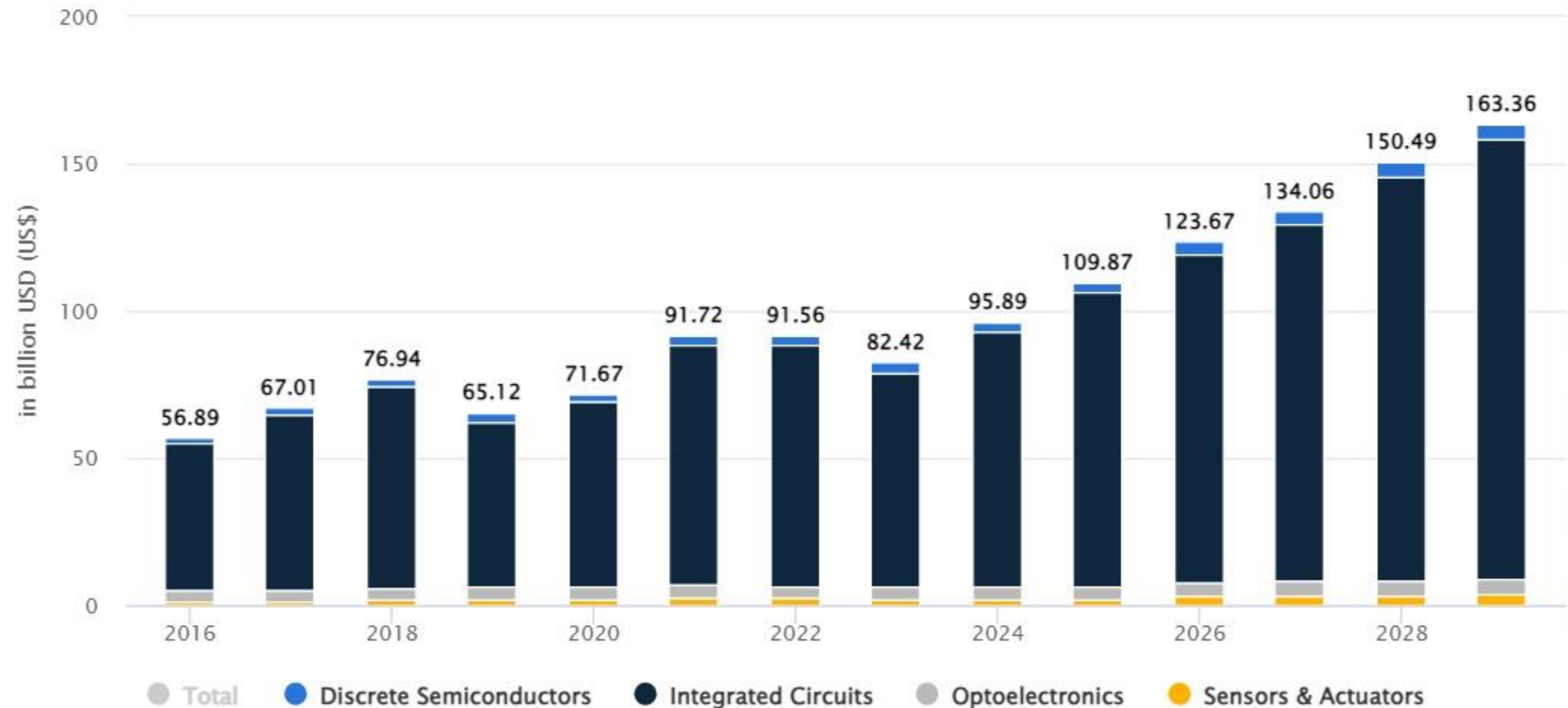
Global Semiconductor Landscape:

- Projected to exceed \$1 trillion by 2030.
- Growing demand for electronics across sectors.
- Recent supply chain disruptions highlight need for diversified production.

Malaysia's Strategic Position:

- Key player in the global semiconductor ecosystem.
- Established infrastructure, skilled workforce, supportive government policies.
- Evolving into a center for innovation and advanced technologies.

ASEAN Semiconductor Revenue



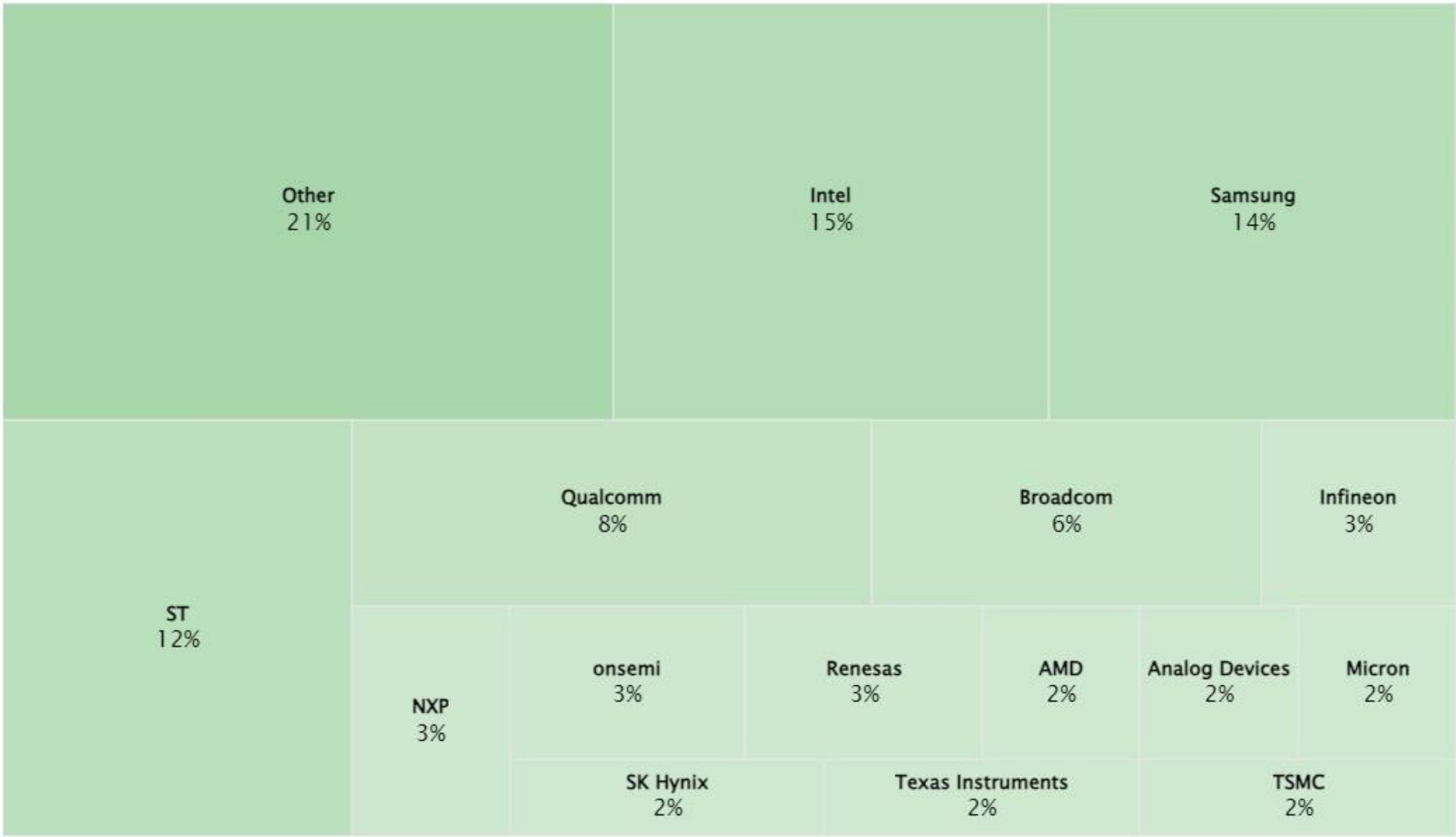
Notes: Data was converted from local currencies using average exchange rates of the respective year.

Most recent update: Aug 2024

Source: Statista Market Insights

Semiconductor Revenue by China: US\$177.80bn in 2024

ASEAN Semiconductor Market Share by Major Companies



Most recent update: Mar 2024

Source: Statista Market Insights

ASEAN Semiconductor Market

Malaysia holds a 7% share of the global semiconductor market and contributes to 23% of the US semiconductor trade. Also, Malaysia's strengths in the semiconductor industry include its capabilities in chip assembly, packaging, and testing. It accounts for 13% of global back-end semiconductor output.

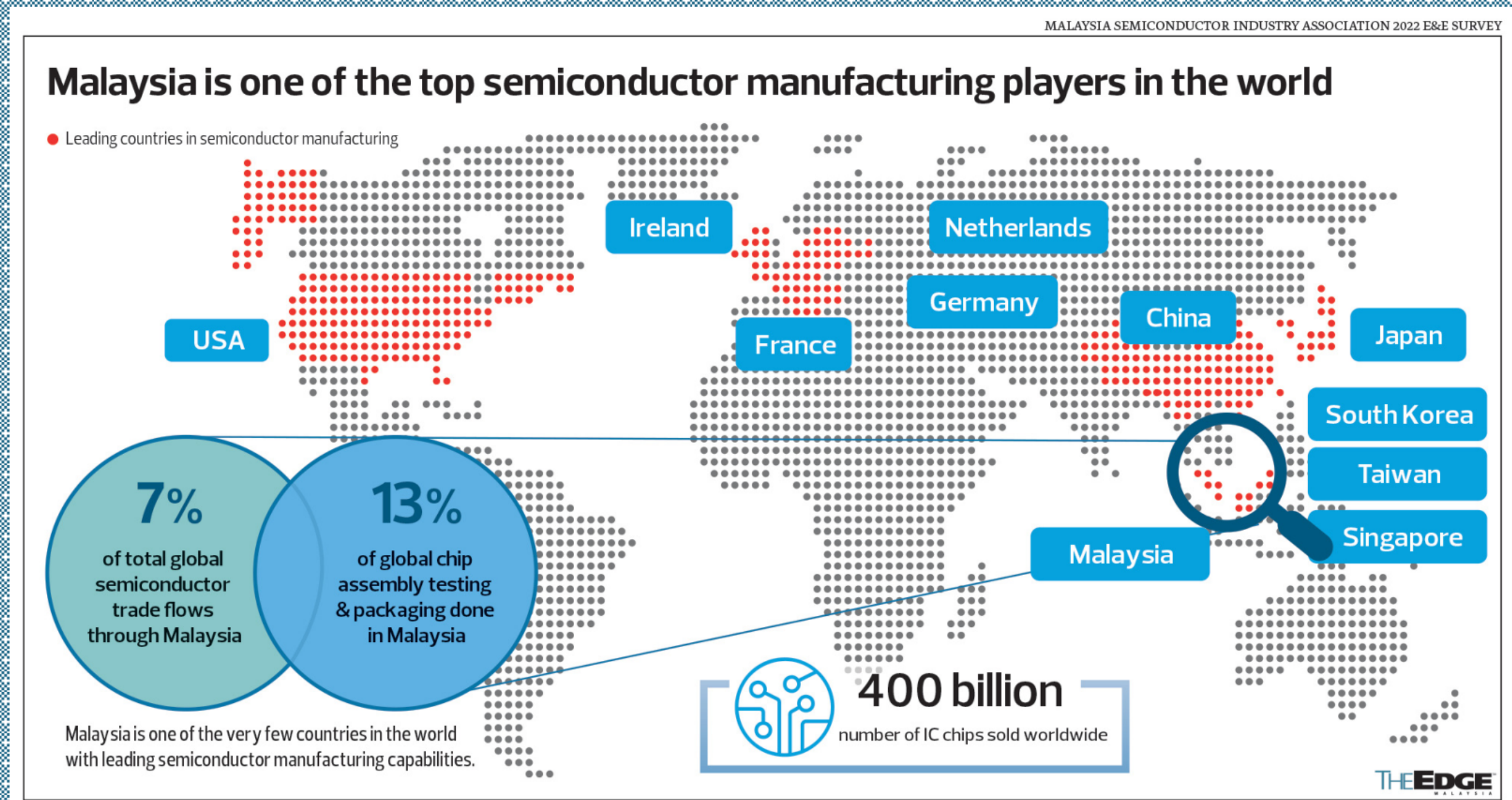
The **ASEAN** Semiconductor Market size was valued at USD 31.32 Billion in 2023 and is expected to grow to USD 52.9 Billion by 2032 and grow at a CAGR Of 5.98% over the forecast period of 2024-2032.”

ASEAN
Semiconductor
Market is to
reach USD 52.9
Billion by 2032,
Driven By EV
Semiconductor
Demand | SNS
Insider



Global Exporter

Malaysia has
achieved 7th
largest
semiconductor
exporter globally.

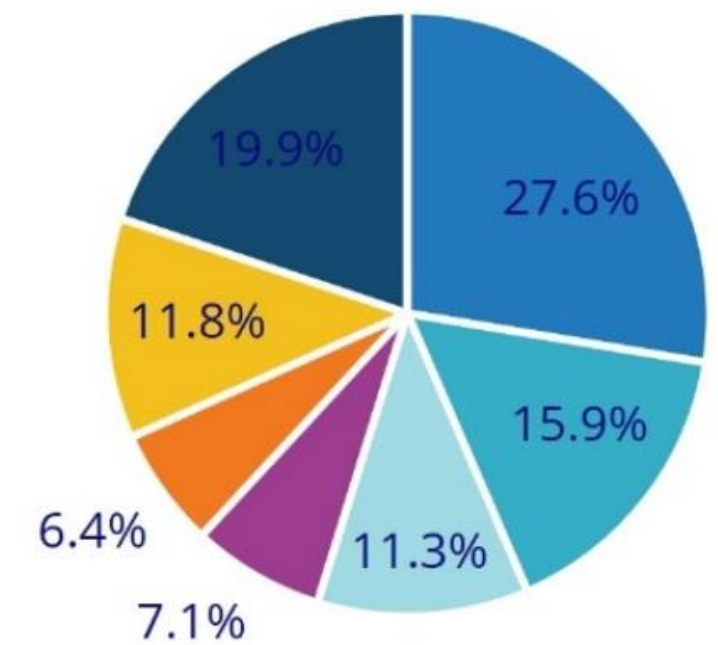


ASEAN OSAT

Worldwide Top 10 OSAT Companies, 2022 Market Share

■ ASE ■ Amkor ■ JCET ■ TFME ■ PTI ■ Top6-10 ■ Others

Source: IDC 2023



Malaysia

the Hub for Overseas Semiconductor Assembly & Testing Facilities

Semiconductor devices and electronics ICs accounted for 65.2% of Malaysia's total E&E exports in 2022

Major Export Markets

Singapore, the USA, China, Hong Kong, & Taiwan

Malaysia - Leading OSAT, ATE & EMS player

#12th largest exporter of E&E products
#7th largest semiconductor exporter worldwide

Malaysia: OSATs assemble, package, and test semiconductor chips



7th

Global E&E exporters

≥50%

SEA's packaging and testing activities are from Malaysia

7%

of total global semiconductor trade flows through Malaysia

13%

of global chip assembly testing & packaging done in Malaysia

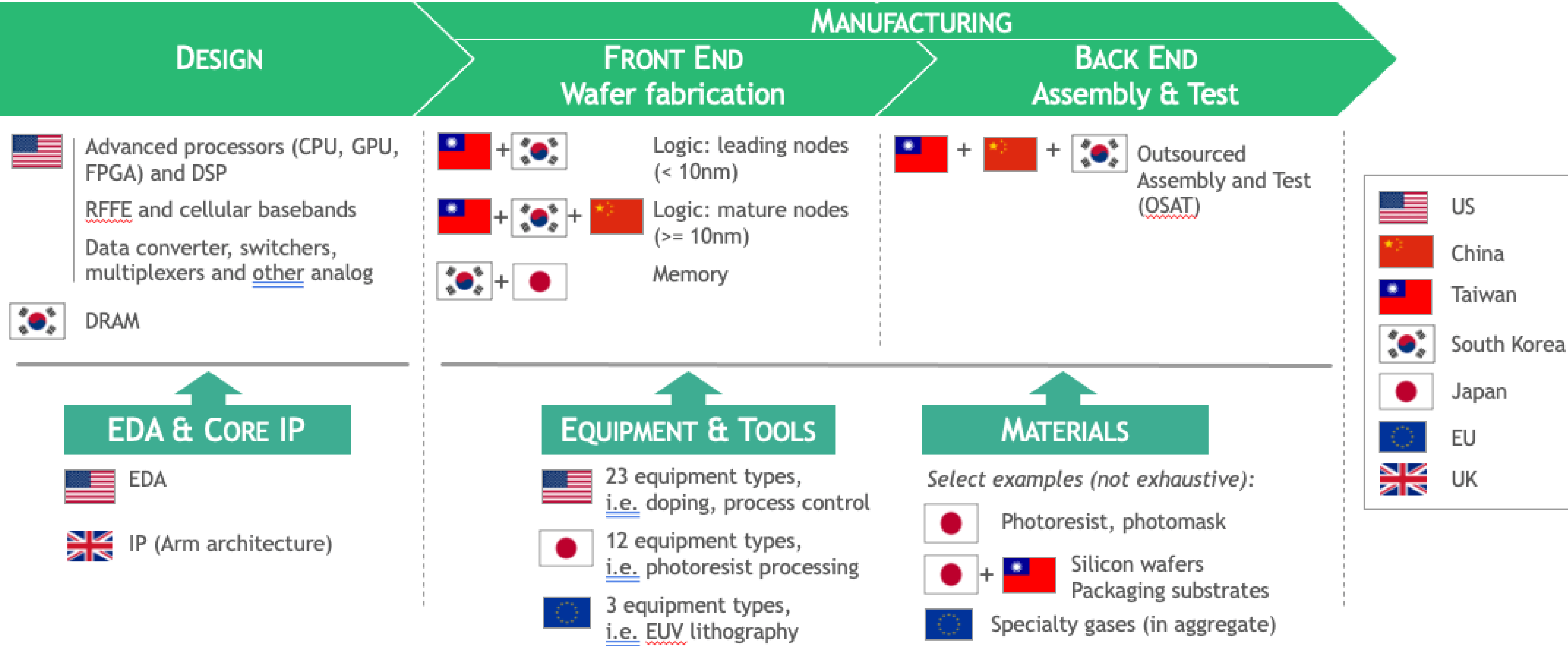
Industry Structure:

- Dominated by Outsourced Semiconductor Assembly and Test (OSAT) (65%) and Electronics Manufacturing Services (EMS) (30%).
- Key players: Intel, Infineon, STMicroelectronics, ASE, Unisem.
- Significant contributors to Malaysia's GDP (7%) and exports (top 10 globally).
- Malaysia has 13% foothold in testing and packaging. Expanding into advanced packaging would boost its role in the global Semiconductor industry.

Competitive Advantages:

- Highly skilled workforce with competitive wages.
- Focus on automation and Industry 4.0 adoption.
- Strong government support through incentives and infrastructure development.
- Ranked among the top 10 most attractive destinations for FDI in manufacturing.

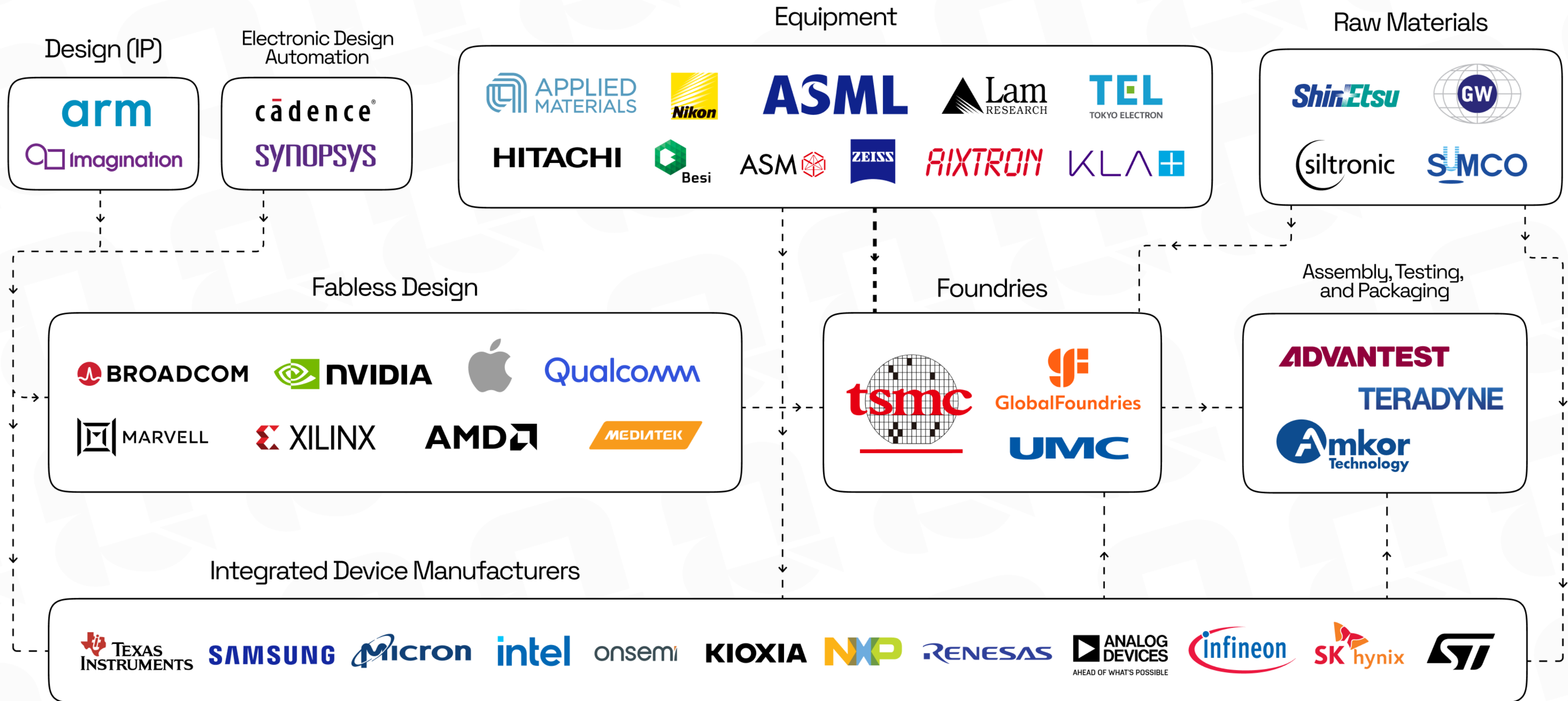
VALUE CHAIN ACTIVITIES WHERE ONE SINGLE REGION ACCOUNTS FOR ~65% OR MORE OF GLOBAL SHARE¹



1. For Design, EDA & Core IP, Equipment & Tools and Raw Materials: global share measured as % of revenues, based on company headquarter location. For Manufacturing (both Front End and Back End) measured as % of installed capacity, based on location of the facility
Sources: BCG analysis with data from Gartner, SEMI, UBS; SPEEDA

The Semiconductor Value Chain

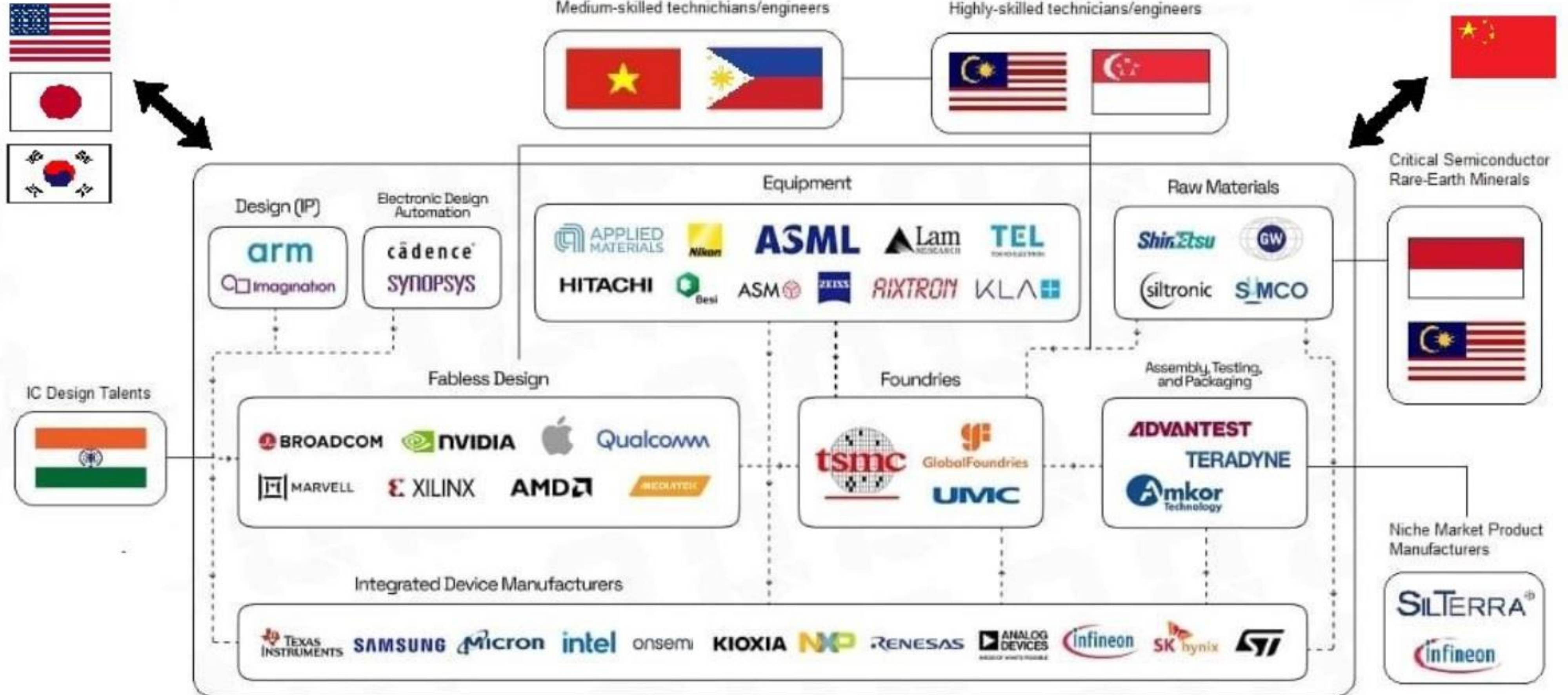
Created by  Quartr



Note: The exact flows might differ between companies (subsidiaries, hybrid business models, etc) | Created by Quartr_App 



The Extended Asean Semiconductor Value Chain



The proposed extended ASEAN semiconductor value chain

1. Strategic resource at the beginning of the semiconductor supply chain



2. Medium-skilled technician or engineers to a more advanced semiconductor, or directly supplying the talents to OSAT players



3. Highly skilled technicians or engineers directly feed into the foundries, IC design and other semiconductor companies



4. The output of local home-grown semiconductor industries in ASEAN economies are often niche products, (e.g., power devices, RFID memory devices and specialized PV panels)



5. Spur local industry growth and fulfil the needs of those countries

Malaysia Semiconductor IC Design Park

C) IC Design Park @PFCC Puchong – 60,000 sq ft, 400++ Engineers

Vibrant Location

- Highways**
 - KL-Shah Alam Expressway (KESAS)
 - Puchong-Gongsi Baru (Bukit Jalil) Highway
 - Danumura-Puchong Expressway (LDP)
- Public Transportation**
 - Bandar Puteri LRT Station
 - Taman Perindustrian Puchong LRT Station
 - Pusat Bandar Puchong LRT Station
 - IOI Puchong Jaya LRT Station
- Shopping Malls / Hypermarkets**
 - IOI Mall Puchong
 - AEON @ IOI Mall Puchong
 - Larkin's Extra Puchong
 - WendyMarket @ Bandar Puteri Puchong
 - Jaya Grocer @ IOI Rio
- Entertainment / Recreational**
 - Tamanjaya @ Bandar Puteri Puchong
 - Taman Wawasan Recreational Park
 - Ayer Hitam Forest Reserve
- Hospitals**
 - Puchong Jaya Hospital

Phase 1:

- Located in Puchong Financial Corporate Center (PFCC)
- 60,000 sq.ft.
- 400-600 IC design engineers
- Consortium of local and international IC design companies: BlueChip VC, ARM Holdings, Cadence Design System, Synopsys, Siemens EDA, Keysight dan Shenzhen Semiconductor Association

Selecting Talents from >3,300 Graduate Resumes

Largest IC Design Park in SEA opens in Selangor
300 High-Salary Tech Jobs

Taman Reka Bentuk IC terbesar di SEA dibuka di Selangor
300 Pekerjaan Teknologi Bergaji Tinggi

Electrical and Electronics Engineering
Mechanical Engineering
Mechatronics
Computer Science

Estimated Salary
RM 5000-6000
for fresh graduates
RM 7000
for master degree/ extensive industry experience

Kejuruteraan Elektrik dan Elektronik
Kejuruteraan mekanikal
Mekatronik
Sains Komputer

Anggaran Gaji
RM 5000-6000
untuk graduan baharu
RM 7000
untuk ijazah sarjana/ pengalaman industri yang luas

Selangor's semiconductor park offers fresh engineers on-par salary with Singapore, Vietnam — CEO

By Anis Hazim / theedgemaalaysia.com

06 Aug 2024, 05:24 pm • Updated - 07:22 pm



Selangor Information Technology and Digital Economy Corp CEO Yong Kai Ping: Malaysia and Southeast Asia are lacking talent [in IC design] compared to China, Taiwan and [South] Korea. So, must offer salaries that match those in Singapore, otherwise, our top talent will [leave] for our neighbours, or even [for] Vietnam. (Photo by Low Yen Yeing/The Edge)

SILICON™ MALAYSIA





SILICON NORTH



CONGRATULATIONS ON YOUR 50TH ANNIVERSARY



Strategies to Move Forward



Focus on Advanced Technologies



Research and Development Capabilities



Digital Transformation and Industry 4.0

National Strategies:

- 12th Malaysia Plan (2021-2025) focuses on high-value activities:
 - Integrated circuit (IC) design
 - Advanced packaging
 - Compound semiconductors
- Aim to become a regional hub for semiconductor innovation.

Initiative

- National Policy on Science, Technology, and Innovation (NPSTI)
- E&E Roadmap 2021-2030



UNIVERSITI KEBANGSAAN MALAYSIA
The National University of Malaysia

Thank you