
TAIWAN AND THE GLOBAL SEMICONDUCTOR SUPPLY CHAIN

Edited by:
Chen-Yuan Tung, Ph.D.
Representative
Taipei Representative Office in Singapore

Please feel free to reach out to the Economic Division of the Taipei Representative Office in Singapore should you have any enquiries or are seeking partnership opportunities of investment or collaboration in the field of semiconductors in Taiwan.

Email: singapore@sa.moea.gov.tw

Telephone: +65 6500-0128

Published: Taipei Representative Office in Singapore

Address: 460 Alexandra Road, #23-00 mTower, Singapore 119963

Email: sgp@mofa.gov.tw

Telephone: +65 6500-0100

The Taipei Representative Office in Singapore provides monthly reports on Taiwan and global semiconductor supply chains. We welcome you and your friends to join our WhatsApp community, “**Taiwan Semiconductor Reports**”.

<https://chat.whatsapp.com/BqwdAMgi1sUIGsujDx3YDk>

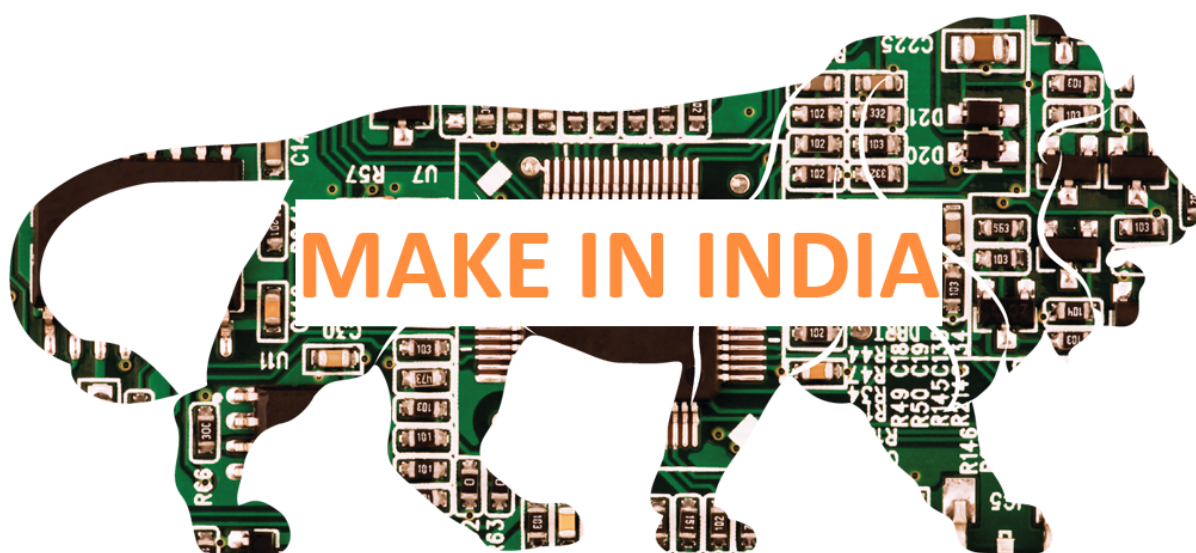
SCAN ME



IN THE SPOTLIGHT

Indian Semiconductor Industry

- India envisions itself becoming a key player in the global semiconductor supply chain, re-doubles efforts to create a supportive ecosystem for semiconductor manufacturing
- Amidst growing trade and geopolitical tension, India also offers itself as a democratic alternative tech hub to China
- Two-pronged chip strategy involves luring foreign firms to set up operations and invest in India, and forming alliances with other key semiconductor nations like the U.S.A.



Source: pngwing.com (adapted)

Overview

India, the world's most populous country,¹ is also the world's fifth largest economy in terms of nominal gross domestic product (GDP).² Global semiconductor sales reached US\$ 574 billion in 2022³, but India only represents 1% of the international semiconductor trade and 0.5% of global semiconductor sales, according to the World Semiconductor Trade Statistics (WSTS).

¹ Department of Economic and Social Affairs, United Nations, "UN DESA Policy Brief No. 153: India overtakes China as the world's most populous country," April 24, 2023.

² World Development Indicators database, World Bank, "Gross domestic product 2022," 1 July 2023.

³ Semiconductor Industry Association, 2023 SIA Factbook, May 05, 2023.

India's semiconductor market rose from US\$ 15 billion in 2020 to US\$ 27 billion in 2022.⁴ Deloitte predicts that the Indian semiconductor market will reach US\$ 55 billion by 2026, with demand largely driven by three industries—smartphones and wearables, automotive components, and computing and data storage. With an anticipated market size of US\$ 85 billion and additional 600,000 jobs by 2030, the Indian semiconductor industry is poised to play an important role in enhancing the global value chain.⁵

Across the various key phases of the semiconductor production value chain, India's strength lies in chip design. It is home to over 200 semiconductor design and embedded software companies, and Indian engineers account for around 20% of the world's semiconductor design workforce.⁶ Integrated device manufacturers such as Micron Technology, Infineon Technology and ON Semiconductor Corporation from the United States, and Switzerland-based STMicroelectronics have set up integrated circuit (IC) research and development centers in India to tap on its engineering talent pool.

Additionally, global semiconductor companies that have set up IC design centers in India include Advanced Micro Devices, Broadcom, Intel, LSI Logic, Nvidia, Qualcomm, Silicon Laboratories and Xilinx from the United States; Airoha Technology, ALi Corporation, Aspeed Technology Incorporated, Faraday Technology Corporation, MediaTek and Mstar Semiconductor from Taiwan; ARM Holdings from the United Kingdom; NXP Semiconductors from the Netherlands; and UNISOC from China (see Table 1).

⁴ Peeyush Vaish and Kathir Thandavarayan, "India emerging as major player in the semiconductor manufacturing industry," *Economic Times Auto*, June 21, 2023.

⁵ Deloitte, "India set to enter an era of revolution in live sports, semiconductor chips, AVOD, and 5G," February 27, 2023.

⁶ Strategic Investment Research Unit (SIRU), *Invest India*, "India's Emerging Prominence as a Semiconductor Superpower," July 6, 2023.

Table 1: India's Semiconductor Supply Chain

		IC R&D	IC Design	IC Manufacturing	IC Packaging and Testing
North India	Haryana		AMD (US)		
			Qualcomm (US)		
	Uttar Pradesh		Airoha Technology (TW)		
			MediaTek (TW)		
			Mstar (TW)		
			Ali Corporation (TW)		
			UNISOC (CN)		
			NXP (NL)		
	Rajasthan				Sahasra Semiconductors (IN)
South India	Karnataka	Samsung (KR)	Faraday (TW)		
		STMicroelectronics (CH)	MediaTek (TW)		
		Micro (US)	Aspeed Tech (TW)		
		Infineon (US)	KHMD (IN)		
		On Semi (US)	ARM (UK)		
			Intel (US)		
			LSI (US)		
			AMD (US)		
	Telangana		NXP (NL)		
			Silicon Labs (US)		
			Qualcomm (US)		
			NXP (NL)		
			Nvidia (US)		
			Broadcom (US)		
West India	Maharashtra		MediaTek (TW)		
			Nvidia (US)		
			Broadcom (US)		
			LSI (US)		
			NXP (NL)		

Source: Yu-An Tsao, "Overview of Semiconductor Industry in India," IEK, ITRI, August 15, 2023, p. 5.

The Semi-Conductor Lab (SCL) in Mohali is India's first and only semiconductor chip fab with full production lines of industry-grade equipment.⁷ SCL is currently capable of producing 8-inch CMOS microchip wafers mostly used for the country's strategic needs such as the space programme. The Indian Government has earmarked around US\$ 1 billion out

⁷ Arun Mampazhy, "Rise (Part 1): Ramping Up India's First Fab To Higher Capacity," Swarajya Magazine, July 10, 2022.

of the US\$ 10 billion incentive scheme administered by the India Semiconductor Mission for its modernization.

Overall, India’s share of the world’s semiconductor output value from 2018 to 2022 has remained at a negligible low of 0.7–0.8% (see Table 2). India is, therefore, reliant on imports to meet its chip demand and counts Taiwan and Singapore among its major suppliers.⁸

Table 2: Output Value of India's IC Industry

Unit: US\$ million

	2018	2019	2020	2021	2022
India	3,360	3,180	3,210	3,840	3,980
World	468,800	412,300	440,400	555,893	574,084
Share	0.7%	0.8%	0.7%	0.7%	0.7%

Sources: Chia-Chen Lee, "Review and Outlook of Worldwide Semiconductor Industry Development," IEK, ITRI, June 28, 2023, p. 1.; Yu-An Tsao, "Overview of Semiconductor Industry in India," IEK, ITRI, August 15, 2023, p. 3.

The global chip shortage in 2020 caused by the COVID-19 pandemic has made countries around the world, including India, more cognizant of the need to strengthen its resilience against shocks in the global semiconductor supply chain. Consequently, the Indian government is intensifying its efforts to establish an indigenous semiconductor manufacturing ecosystem to cushion itself against supply chain shocks, and to become a key player in the global semiconductor supply chain. Additionally, at this time of growing trade and geopolitical tension, India is now offering itself as a democratic alternative tech hub as western economies shift their semiconductor supply chain from China.

Policies and Initiatives

Centre of Excellence in Nanoelectronics

The Center of Excellence in Nanoelectronics (CENs) program was set up in 2006 by India’s Ministry of Electronics and Information Technology (MeitY). The CENs program has transformed India’s nanoelectronics research ecosystem. However, India has yet to have its own R&D center, along the lines of Belgium’s Interuniversity Microelectronics Centre (IMEC), Taiwan’s Industrial

⁸ Sanjay Gupta, "India’s quest to take the lead in semiconductor manufacturing," *The Times of India*, February 26, 2022.

Technology Research Institute (ITRI) or Singapore’s Institute of Microelectronics (IME), that could play a pivotal role in helping the local semiconductor sector translate existing research to industrially relevant technologies.⁹

‘Make in India’ Initiative

In 2014, Indian Prime Minister Narendran Modi launched the ‘Make in India’ initiative to promote manufacturing in India, make the country a global manufacturing hub, and enable it to become an integral part of the global supply chain.¹⁰

India Semiconductor Mission

The India Semiconductor Mission (ISM) was set up in 2021 within MeitY to drive the long-term strategies for developing sustainable semiconductors and display ecosystems.¹¹

Semicon India Programme

MeitY announced a US\$ 10 billion package under the Semicon India Programme in December 2021. The programme seeks to position India as a global hub for electronics manufacturing, with semiconductors serving as the foundational building block. Administered by ISM, the programme received only three applications for setting up semiconductor fabrication units during its 45-day application window. The three applicants were the International Semiconductors Consortium (ISMC) comprising Israeli foundry Tower Semiconductor Ltd. and Abu Dhabi based Next Orbit Ventures, Singapore-based IGSS Ventures, and a joint venture between Indian conglomerate Vedanta Group and Taiwan’s Hon Hai Technology Group, popularly known as Foxconn.

⁹ U. Ganguly, S. Lashkare, & S. Ganguly, “India’s Rise in Nanoelectronics Research,” arXiv preprint, August 12, 2020.

¹⁰ Ministry of External Affairs, India, “Make in India Initiative” at https://mea.gov.in/Images/attach/Make_in_India_Initiative.pdf.

¹¹ Ministry of Electronics & IT, press release titled “India Semiconductor Mission,” December 21, 2022.

As of end-May 2023, all three conglomerates were deemed to have not met ISM's selection criteria.¹² The chip-making plans of the ISMC consortium are stuck owing to Tower's delayed merger with Intel. The Singapore-based consortium led by IGSS Ventures, has decided to re-submit its proposal as it wants to bring in a major global semiconductor company on board as lead investor of the consortium.¹³ In the case of the Vedanta-Foxconn joint venture, both joint venture partners had disagreements and have since decided to re-apply for funding separately.

Modified Semicon India Programme

In June 2023, India announced its decision to reopen the application process for existing and new applicants interested in setting up semiconductor fabrication plants, with the launch of the Modified Semicon India Programme. This time, the application window has been extended and will be open till December 2024. Companies, consortia, and joint ventures interested in setting up semiconductor fabs in India, regardless of their node (including mature nodes), will be eligible for a fiscal incentive equal to 50% of the project cost. Similarly, a fiscal incentive of 50% of the project cost will be available for the establishment of display fabs utilizing specified technologies in India.¹⁴

Vedanta, Foxconn, IGSS and ISMC remain optimistic about their chip fabrication plans and are set to re-apply.¹⁵ According to India's media, Rajeev Chandrasekhar, Indian Minister of State for Electronics and Information Technology, has confirmed that Vedanta's 40 nanometer (nm) fab proposal backed by a tech licensing agreement from a global semiconductor major is currently being evaluated by the government.¹⁶ Meanwhile, Foxconn has partnered with STMicroelectronics and is applying for ISM's incentive scheme to establish a 40 nm chip plant in the country.¹⁷

¹² Outlook, "45 Day Window For \$10 Billion Chip Manufacturing Plan Was A Mistake, Says MoS Rajeev Chandrasekhar", July 31, 2023.

¹³ Gulveen Aulakh, "Foxconn pulls out of chip JV with Vedanta," *Hindustan Times*, July 11, 2023.

¹⁴ Ministry of Electronics and Information Technology, Republic of India, "Modified Programme for Semiconductors and Display Fab Ecosystem", July 5, 2023.

¹⁵ Surajeet Das Gupta and Sourabh Lele, "Govt invites new applications for semiconductor manufacturing unit," *Business Standard*, May 31, 2023.

¹⁶ BL Mumbai Bureau, "Foxconn's withdrawal from semicon JV with Vedanta has no impact on India's goals: Rajeev Chandrasekhar," *The Hindu Business Line*, July 10, 2023.

¹⁷ Chetan Thathoo, "Foxconn Partners STMicroelectronics To Set Up Semiconductor Plant In India," *Inc42*, September 7, 2023.

Foreign Investments

Taiwan

The Modi administration's policies — specifically the Act East Policy and initiatives such as the Semicon India Programme and 'Make in India' — align with Taiwan's New Southbound Policy, which seeks to enhance cooperation and exchange between Taiwan and 18 countries in Southeast Asia, Australasia and South Asia. Moreover, as a semiconductor manufacturing powerhouse, Taiwan is a natural partner in India's renewed endeavors to build an effective semiconductor ecosystem.

Starting from scratch in the 1970s, Taiwan has built a semiconductor supply chain complete with IC design, wafer fabrication and IC packaging and testing. All in, it has taken decades for Taiwan Semiconductor Manufacturing Company (TSMC), United Microelectronics Corporation (UMC) and other leading Taiwanese semiconductor companies, driven by government spending and countless billions in capital investment, to get to where they are now.

With its broad engineering capabilities and deep expertise in semiconductors, Taiwan can aid India in setting up its domestic manufacturing capabilities. Taiwanese companies could also help train and upskill Indian talent and help India in gradually scaling the steps of establishing its own ecosystem: connecting with local fabless chip design houses; building assembly, testing, marking, and packaging (ATMP; referring to outsourced semiconductor assembly and test) plants; and setting up the fabs.¹⁸

In recent years, countries have been wooing investments from Taiwan-based electronics and semiconductor manufacturers as they seek to strengthen their indigenous semiconductor manufacturing capabilities. As a relatively late-starter in the semiconductor game, India faces tough competition from both developed and developing countries. To date, the U.S.A., Japan and Germany have offered TSMC billions of dollars in subsidies for it to set up new leading-edge semiconductor manufacturing facilities on

¹⁸ Jagannath P. Panda, "Can India Rupture the Semiconductor Market?," Institute for Security and Development, July 2023.

their soil.¹⁹ Southeast Asia, driven by strong government support, a skilled workforce, and a favorable business environment, is also an attractive destination for semiconductor investments.²⁰

Over the years, a number of major semiconductor firms based in the U.S.A., Taiwan, South Korea and Switzerland have set up their R&D centers for chip development and design in India. Taiwan's MediaTek, for example, has one of its largest R&D footprints in India, with research wings in Bengaluru and Noida, and employs over 900 engineers.²¹ Other Taiwanese semiconductor companies, including MStar Semiconductor and Ali Corporation, have also established their R&D centers in India, and are part of India's world-class semiconductor design services industry.

Taiwan's Foxconn, best known as the main assembler of Apple's iPhones, has been looking to diversify both geographically and in terms of its portfolio of products. Its main operations are in China, where it runs the world's largest iPhone factory. Besides looking at investing outside China, Foxconn is also looking to diversify beyond consumer electronics, and is trying to enter the semiconductor manufacturing area. India, which has been pushing to bring high-tech manufacturing to the country, has been a target of Foxconn's expansion plans.

In February 2022, Foxconn and India's Vedanta Limited announced their joint venture to manufacture chips and display panels in India as part of a US\$ 19.5 billion joint venture under the 'Semicon India Programme'. Despite anticipation that Vedanta-Foxconn would be the first project approved by the India Semiconductor Mission, the joint venture faced challenges in setting up its manufacturing unit.

According to India's media, the Vedanta-Foxconn project was denied government funding for not fulfilling the requirements, namely no technology partner and no manufacturing grade technology license for the construction of

¹⁹ Refer to Taipei Representative Office in Singapore's Monthly Report, "Taiwan and the Global Supply Chain", September 2023, for details.

²⁰ Linda Tan, "SEMI Southeast Asia Helps Region's Chip Industry Grow Global Footprint," SEMI, May 2, 2023.

²¹ Subhrojit Mallick, "MediaTek plans to source chips locally once ecosystem's ready: India MD," *ETTelecom*, April 10, 2023.

28 nm chips.²² In July 2023, Foxconn announced it mutually agreed to part ways with Vedanta Limited.²³ After calling it quits on the chip joint venture, both companies have pledged to continue with their respective chip-making plans in India, albeit with new partners.²⁴

According to India's media, Foxconn now intends to set up at least four to five semiconductor fabrication lines in India, and it has already signed memoranda of understanding (MoUs) with two technology partners. Additionally, the company is also in talks with both Indian as well as global companies for a potential partnership.²⁵ To date, Foxconn and STMicroelectronics have applied for the ISM's incentive scheme to establish a 40 nm chip plant in India.²⁶

Moreover, India's new extended window for funding application may encourage companies like the Powerchip Semiconductor Manufacturing Corporation (PSMC), that was in news early this year for scouting potential partners like the Tata Group, to enter into joint production in India.²⁷

United States

According to the Indian Commerce Ministry's data, the U.S.A. surpassed China to become India's biggest trading partner in 2022.²⁸ The following year, 2023, further marks a remarkable year for US-India bilateral relationship, with Indian Prime Minister Narendra Modi on a state visit to the U.S.A. in June and US President Joe Biden in India for the G20 summit in September.

²² Jagannath P. Panda, "Can India Rupture the Semiconductor Market?," Institute of Security and Development Policy, July, 2023.

²³ Ben Blanchard, Munsif Vengattil and Aditya Kalra, "Foxconn dumps \$19.5 billion Vedanta chip plan in blow to India," *Reuters*, July 11, 2023.

²⁴ Soumyarendra Barik, "Foxconn pulls out of \$19.5-billion chip plan with Vedanta, Govt asks it to set up independent unit," *The Indian Express*, July 11, 2023.

²⁵ Nidhi Singal, "Vedanta-Foxconn split: Who the two companies partner with next could be the next big story for India's semiconductor industry," *Business Today Magazine*, July 20, 2023.

²⁶ Sankalp Phartiyal, "Foxconn Seeks to Work With STMicro to Build India Chip Plant," *Bloomberg*, September 7, 2023.

²⁷ Ayush Jain, "Tata Eyes Chip Manufacturing. Will PSMC be the Preferred Partner?," *Analytics India Magazine*, January 15, 2023.

²⁸ Department of Commerce, Ministry of Commerce and Industry, Government of India, Trade Monitoring Dashboard, <https://dashboard.commerce.gov.in/commercedashboard.aspx>.

During the U.S. visit, President Biden and PM Modi hailed the signing of the Memorandum of Understanding (MoU) on Semiconductor Supply Chain and Innovation Partnership as a significant step in the coordination of both countries' semiconductor incentive programs, especially in the bilateral promotion of commercial opportunities, research, talent, and skill development. Additionally, announcements were made by U.S. companies, Micron Technology, Inc. (Micron), LAM Research, and Applied Materials on their plans to invest in India.²⁹

Micron announced that it would invest up to US\$ 825 million to build a new semiconductor assembly and test facility in Gujarat, India. Its new facility will enable assembly and test manufacturing for both DRAM and NAND products and address demand from domestic and international markets. Under the Indian government's "Modified Assembly, Testing, Marking and Packaging (ATMP) Scheme," Micron will receive 50% fiscal support for the total project cost from the Indian central government and incentives representing 20% of the total project cost from the state of Gujarat. The combined investment by Micron and the two government entities over the course of both phases will be up to US\$ 2.75 billion, and would create up to 5,000 new direct and 15,000 community jobs opportunities in the next five years.³⁰

Lam Research announced its proposal to train 60,000 Indian engineers in nanotechnologies, over a ten-year period. Through its Semiverse Solutions with SEMulator3D®, Lam Research will deliver a virtual nano fabrication environment to help train the next generation of semiconductor engineers in India.³¹ Meanwhile, Applied Materials announced its plan to invest US\$ 400 million to establish a collaborative engineering center in India.³²

Following the G20 meeting, the U.S.A. and India agreed to undertake a midterm review in September 2023 of the US-India initiative on Critical and Emerging Technology (iCET). The iCET covered areas including semiconductors, defence innovation and technology cooperation in space, quantum technology, and will drive momentum towards the next annual iCET

²⁹ The White House, "Joint Statement from the United States and India," June 22, 2023.

³⁰ Micron Technologies, Inc., "Micron Announces New Semiconductor Assembly and Test Facility in India," June 22, 2023.

³¹ Lam Research, "Lam Research Unveils Plans to Advance India's Semiconductor Workforce Development Goals at White House Today," June 22, 2023.

³² Forbes India, "Can India truly become a global semiconductor hub?," August 7, 2023.

review, to be co-led by the National Security Advisors of both countries, in early 2024.

Both countries also expressed satisfaction at the ongoing implementation of announcements made in June 2023 by US companies, Micron, LAM Research, and Applied Materials.³³ More recently, India's media reported that Micron, whose proposal was the first to be approved by the India Semiconductor Mission, broke ground for its semiconductor testing and assembly plant in Gujarat's Sanand on September 23, 2023.³⁴ It is set to be India's first private semiconductor testing and assembly facility in three decades.³⁵

Japan

On July 20, 2023, Ashwini Vaishnaw, India's Minister for Electronics and Information Technology, announced that India and Japan have formally agreed to establish a joint mechanism aimed at facilitating collaboration between their respective governments and industries in the field of semiconductors. The Memorandum of Understanding (MoU) between India and Japan covers five key areas of cooperation, which include semiconductor design, manufacturing, equipment research, talent development, and enhancement of semiconductor supply chain resilience.

This is the second major country-level agreement that India has signed. Earlier this year, India and the U.S.A. had signed multiple agreements to cooperate and work together on semiconductor design, manufacturing, packaging as well as supply chain resilience. While companies from the U.S.A. are world leaders in manufacturing and packaging, companies from Japan are leaders in peripheral industries which produce the chemicals and gasses needed for the manufacturing of semiconductor chips.³⁶

³³ The White House, "Joint Statement from India and the United States," September 8, 2023.

³⁴ Surabhi Agarwal and Suraksha P, "Micron set to break ground for chip unit," The Economic Times, September 20, 2023.

³⁵ Jingyue Hsiao, "Micron signed MoU with Gujarat for India's first private semiconductor manufacturing facility in 3 decades," DIGITIMES Asia, June 29, 2023.

³⁶ The Economic Times, "India and Japan ink pact to foster semicon ecosystem," July 21, 2023.

United Kingdom

The SRAM & MRAM Technologies and Projects India Pvt Limited, the Indian unit of UK-based SRAM & MRAM Group, had signed a memorandum of understanding (MoU) with the state government of Odisha, India, on March 26, 2023 to set up a semiconductor fabrication unit. To be sited in Odisha's Ganjam district, the initial investment entails ₹ 30,000 crore (US\$ 3.6 billion) in the first phase, while the overall project is worth around ₹ 2 lakh crore (US\$ 30.76 billion).³⁷

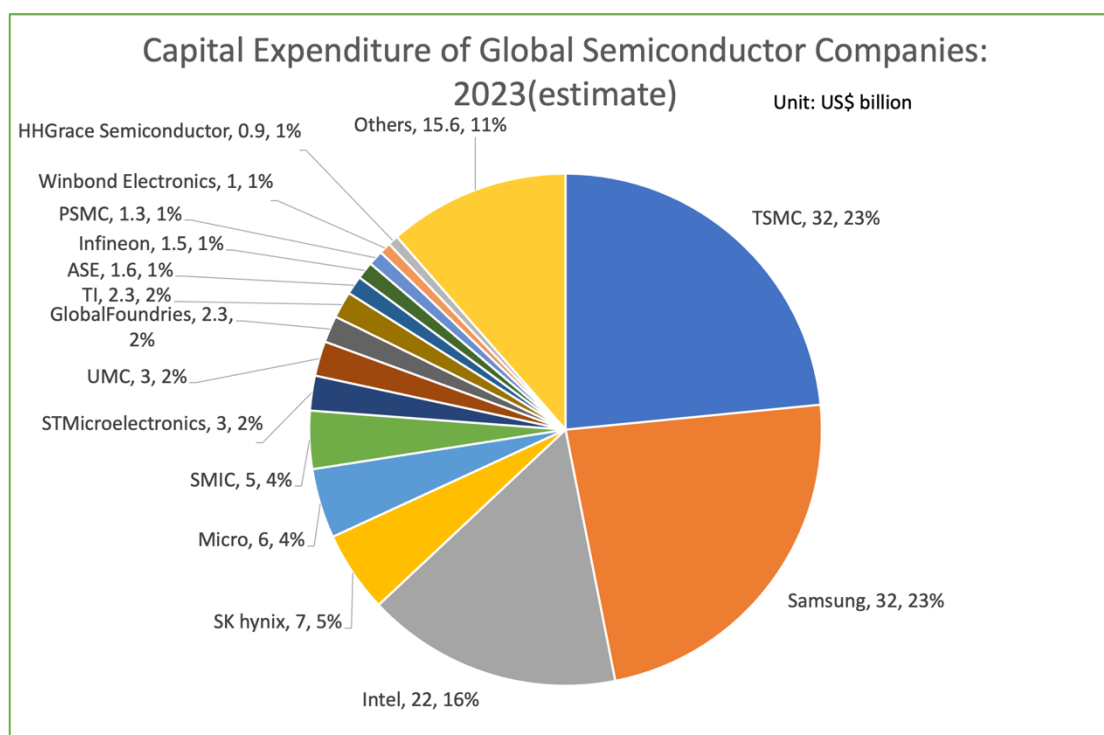
³⁷ NDTV, Press Trust of India, "UK Firm Plans 800-Acre Semiconductor Unit In Odisha Worth ₹ 2 Lakh Crore," July 1, 2023.

SEMICONDUCTOR STATISTICS AT A GLANCE

GLOBAL TRENDS

The three semiconductor industry heavyweights – Intel, TSMC and Samsung – account for the lion's share of capital expenditure. TSMC and Samsung, with capital expenditures of US\$ 32 billion each, sit at the top of the list, while Intel follows closely behind with a capital expenditure of US\$ 22 billion. Combined together, the three companies account for approximately 62% of the total semiconductor capital investment in 2023 (see Figure 1).

Figure 1: Capital Expenditure of Global Semiconductor Companies in 2023 (estimate)



Source: Chia-Chen Lee, "Taiwan IC Industry Development in 2023Q2," IEK, ITRI, September 7, 2023, pp. 4-5.

The global semiconductor market size was valued at US\$ 574 billion in 2022. This is projected to decline in 2023, with the market contracting across the board for all regions in Quarter 1 of 2023. This contraction is especially pronounced for China, which saw its market shrink from a high of US\$ 50.5 billion in Quarter 1 of 2022 to a low of US\$ 36.8 billion in Quarter 2 of 2023. In Quarter 2 of 2023, the global market posted a small quarter-on-quarter growth of 4% (see Table 3).

Table 3: Global Semiconductor Market: 2022Q1-2023Q2

Unit: US\$ billion

	2022Q1	2022Q2	2022Q3	2022Q4	2023Q1	2023Q2
USA	34.5	36.3	36.1	34.2	28.8	29.8
Japan	11.7	12.3	12.2	12.0	11.6	11.8
Asia-Pacific	41.1	40.2	36.0	33.2	32.0	32.0
China	50.5	48.7	43.2	38.0	33.3	36.8
Europe	13.9	13.0	13.6	13.4	13.8	14.0
World	151.7	150.5	141.0	130.8	119.5	124.5

Source: Chia-Chen Lee, "Taiwan IC Industry Development in 2023Q2," IEK, ITRI, September 7, 2023, pp. 2-3.

TAIWAN

Taiwan's IC industry output value witnessed healthy growth in 2022 in nearly all segments (IC design, wafer foundry, IC packaging and IC testing). In 2023, it registered a fall of 13% in Quarter 1 of 2023 and a further 18% slide in Quarter 2 of 2023. Taiwan's IC product output, on the other hand, has registered negative growth since 2022 (see Table 4).

Table 4: Taiwan IC Output Value: 2021-2023Q2

Unit: NTD 100 million

	2021	2022	2023Q1		2023Q2	
			Value	Growth Rate	Value	Growth Rate
IC Industry	40,820	48,370	10,084	-13.0%	10,150	-18.0%
IC Design	12,147	12,320	2,400	-27.3%	2,685	-22.2%
IC Manufacturing	22,289	29,203	6,279	-5.8%	6,075	-15.6%
Wafer Foundry	19,410	26,847	5,873	-1.6%	5,674	-13.3%
Memory	2,879	2,356	406	-41.8%	428	-37.3%
IC Packaging	4,354	4,660	940	-14.5%	927	-19.4%
IC Testing	2,030	2,187	465	-11.4%	463	-19.5%
IC Product	15,026	14,676	2,806	-29.8%	3,113	-24.7%

Source: Chia-Chen Lee, "Taiwan IC Industry Development in 2023Q2," IEK, ITRI, September 7, 2023, p. 6.