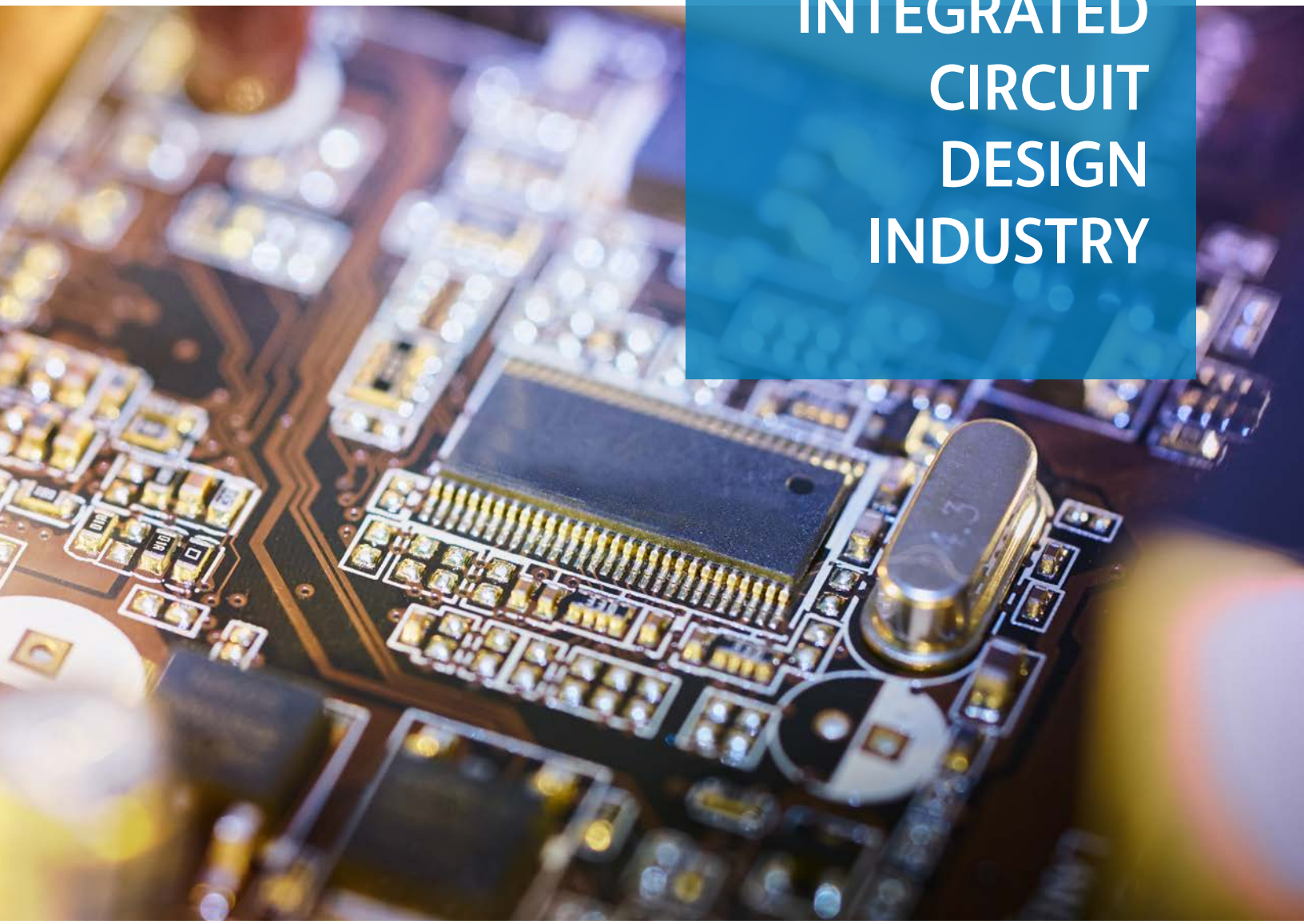
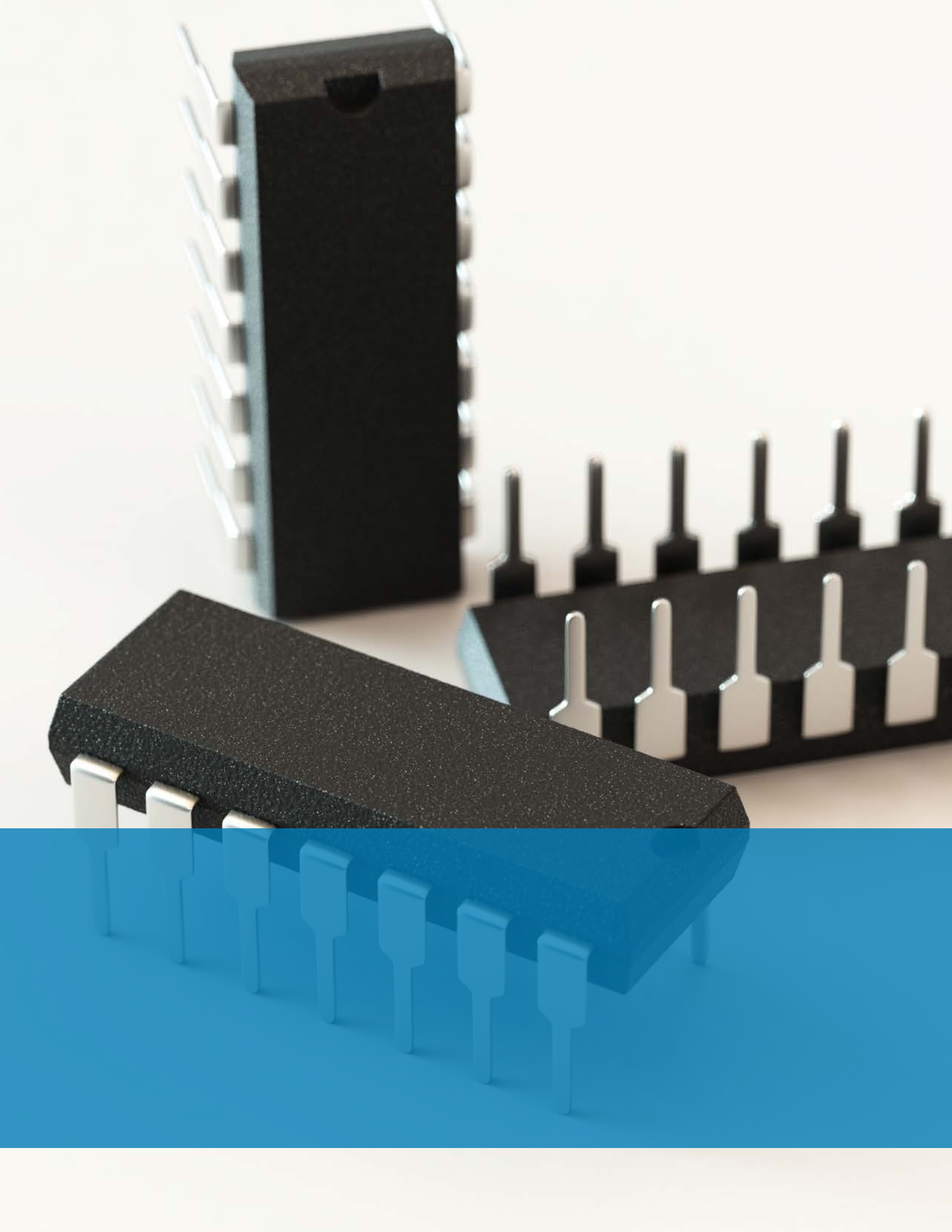
First Philippine Industrial Park
INTERCONNECTED ADVANTAGE

2022

THE PHILIPPINE INTEGRATED CIRCUIT DESIGN INDUSTRY





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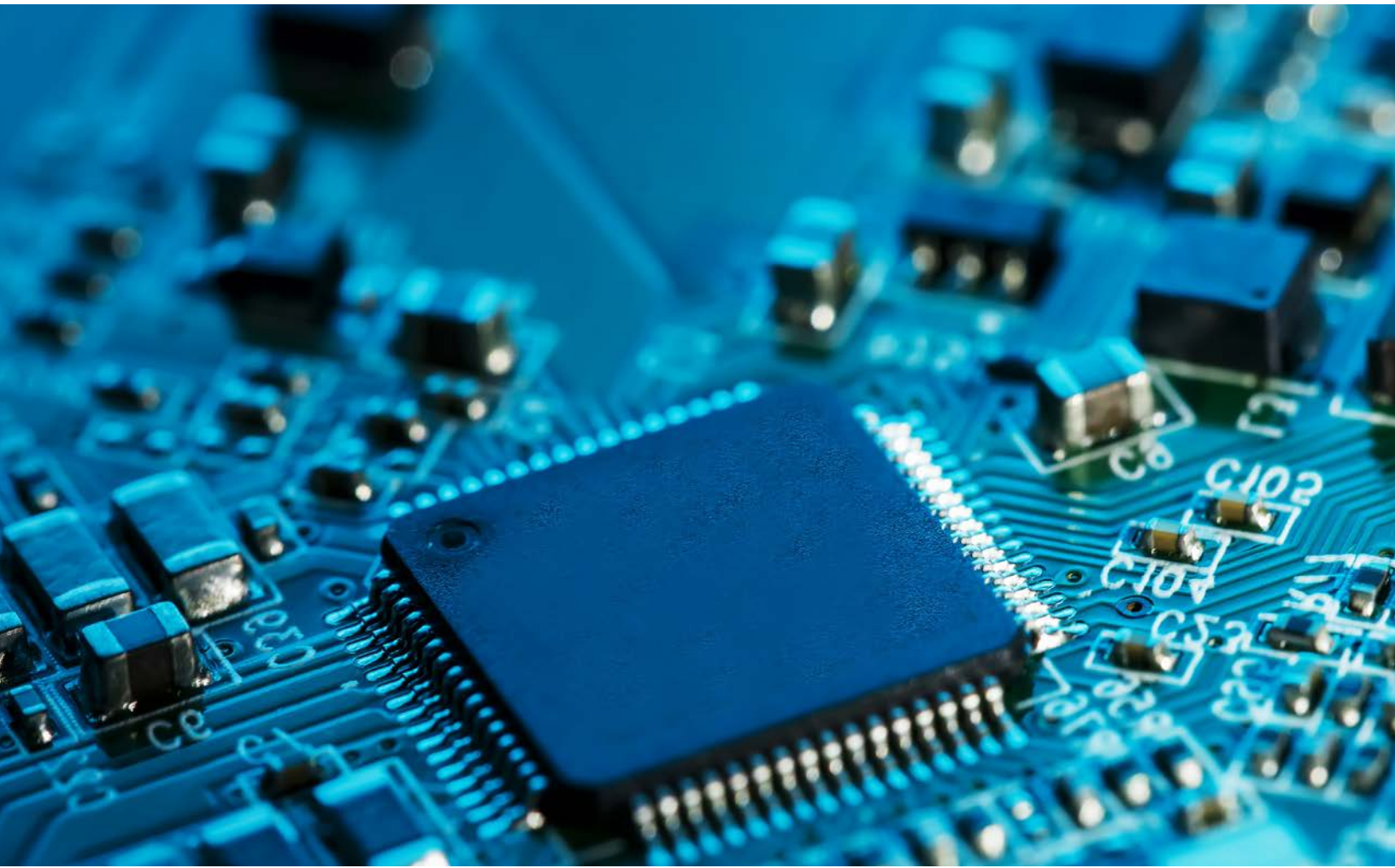


Abbreviations

ASIC	application-specific integrated circuit
AI	artificial intelligence
BE	back-end
BOI	Board of Investments
CAGR	compounded annual growth rate
EDA	electronic design automation
EMS	electronics manufacturing services
FE	front-end
FPIP	First Philippine Industrial Park
ICs	integrated circuits
IDM	integrated device manufacturer
IoT	internet of things
LED	light-emitting diode
ME	middle-end
ODM	original design manufacturer
OEM	original equipment manufacturer
PCBA	printed circuit board assembly
PEZA	Philippine Economic Zone Authority
PIIC	Philippine Institute for Integrated Circuits
R&D	research and development
S&E	semiconductor and electronics
SiP	system in package
SMS	semiconductor manufacturing services

First Philippine Industrial Park

INTERCONNECTED ADVANTAGE

First Philippine Industrial Park, Inc. (FPIP) is one of the Philippines' largest and fastest-growing premier industrial parks today. With over 600 hectares of prime industrial land, it is now the preferred location of over a hundred world-class locators.

FPIP was established in 1996 in response to the government's call for private-sector assistance in catalyzing industrial growth. Today, FPIP continues to work with its locator partners in contributing to national development and economic growth by helping generate tens of thousands of local jobs and billions of pesos in annual export earnings.

FPIP brings over two decades of operational excellence and an even longer history of multifaceted industry experience through its partners and parent companies.

FPIP is a joint venture between First Philippine Holdings (FPH) and Sumitomo Corporation of Japan. FPH brings leading and pioneering experience in energy, power generation and distribution, transformer manufacturing, commercial and residential estate development and management, construction and engineering, as well as education and healthcare.

Sumitomo Corporation's experience in industrial park development and management aids FPIP in offering integrated services and world-class experience to locators all over the world. Sumitomo Corporation is a leading industrial park developer and operator in Vietnam, Indonesia, Myanmar, India, Bangladesh, and the Philippines.

Executive Summary

Integrated circuits (ICs) are small wafers that can accommodate hundreds to millions of transistors, resistors, and capacitors. ICs enable the storage and/or processing of information in electronics, making them the most important electronic component. Some of the various types of ICs are memory, logic, microprocessors, and microcontrollers.

The IC market consists of sales of ICs and related services that are used in various applications such as automobiles, telecommunication, aerospace and defense, and consumer electronics. An IC is a small chip that acts as an amplifier, an oscillator, a timer, and a memory computer.

According to The Business Research Company, the global IC market size is expected to grow from $330.32 billion in 2021 to $349.76 billion in 2022 at a compound annual growth rate (CAGR) of 5.9%. The growth in the market is mainly due to the companies rearranging their operations and recovering from the COVID-19 impact, which had earlier led to restrictive containment measures involving social distancing, remote working, and the closure of commercial activities that resulted in operational challenges. The IC market is expected to reach $417.27 billion in 2026 at a CAGR of 4.5%.

IoT is expected to boost the growth of the IC market due to various benefits of using analog ICs across a wide range of real-time connected devices and applications. Analog ICs have efficient power consumption features and the signals processing capabilities that are needed to configure an automated devices ecosystem.

The global IC market is segmented into the following:

1. By Product Type: Digital IC, Analog IC, Mixed-Signal IC
2. By Application: Automotive, Industrial, Consumer Electronics, IT & Telecommunication, Health Care, Aerospace & Defense, Others
3. By Type: General-purpose IC, Application-specific IC

The IC value chain has the following main subdivisions: the upstream chip design industry (technology-intensive attributes); the midstream chip manufacturing industry (capital and technology intensive); and the downstream chip packaging and testing industry (labor and capital intensive), which together constitute the core of the value chain.

The Philippines aims to position itself as a key player in the global IC design industry ecosystem by becoming a home base of competitive IC design companies that would provide services to the worldwide IC ecosystem, and by being an attractive destination for foreign IC design-related companies so they would invest in the country.

As of the second quarter of 2021, semiconductors accounted for approximately 43.1% of the total goods exported from the Philippines, equivalent to over Php 314 billion. Semiconductors account for the highest share of electronic product exports from the country.

The Philippines accounts for 2.8% of world IC exports and has been among the top 10 exporters for at least the last decade.

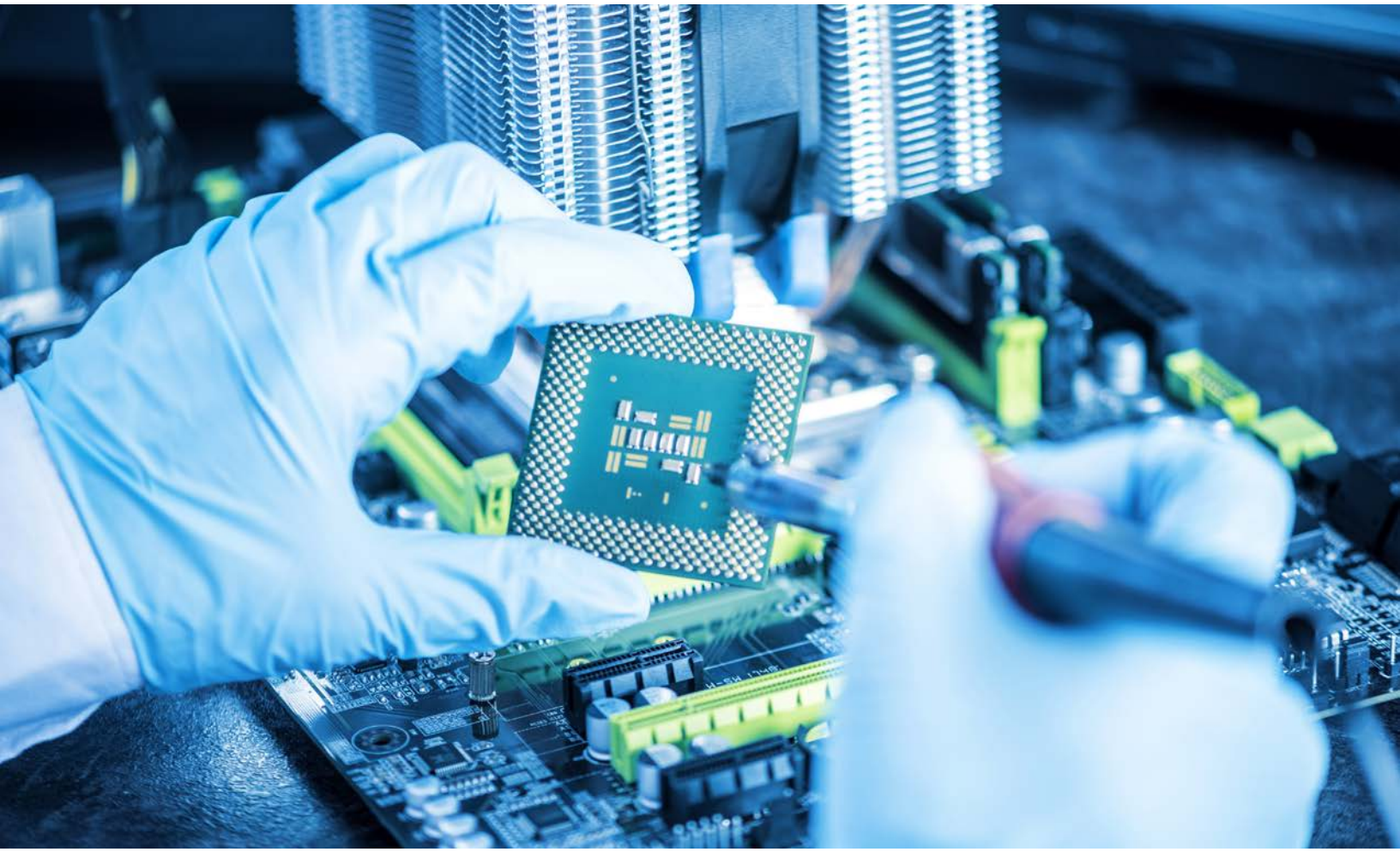
The semiconductor and electronics manufacturing industry is one of the biggest economic growth drivers in the Philippines. Mainly composed of SMS (73%) and EMS (27%) firms, the industry employs around 3.2 million direct and indirect workers.

Among the advantages and capabilities of the industry include

- the labor force; and
- critical mass of global players
- strategic location;
- business environment; and
- competence of the Philippine Export Zone Authority (PEZA)

Majority of the electronics companies are concentrated in Metro Manila (52.11%), CALABARZON (39.85%), Northern/ Central Luzon (4.98%), and Cebu (2.68%).

The opportunities for scalability for the country can be considered for two areas: the Mobile Convergence Segments, Industrial Segments.



Global Perspective

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[1] https://blog.tbrc.info/2022/03/global-integrated-circuits-market-overview-and-prospects/

earlier led to restrictive containment measures involving social distancing, remote working, and the closure of commercial activities that resulted in operational challenges. The IC market is expected to reach $417.27 billion in 2026 at a CAGR of 4.5%.

IoT is expected to boost the growth of the IC market due to various benefits of using analog ICs across a wide range of real-time connected devices and applications. Analog ICs have efficient power consumption features and the signals processing capabilities that are needed to configure an automated devices ecosystem.

Complexity in the design of automotive ICs acts as a major challenge in the IC market. The structure chain of automotive ICs is complex when compared to mobile phones and electronic home appliances, such as televisions and remote controllers.

Many of the semiconductors now part of Advanced Driver Assistance Systems (ADAS) are critical to the vehicle's function and safety where faults cannot be tolerated. Therefore, complex designing of highly reliable automotive ICs hinders the market's growth.

Increased use of next-generation mobile networks, such as 4G and 5G, requires the installation of new infrastructure. Chipsets such as radio frequency ICs, system on chips, application-specific ICs (ASIC), cellular ICs, and millimetre-wave ICs are mainly used in the development of 5G infrastructure, which creates a high demand for ICs .

According to *Statista*,[2] the worldwide IC semiconductor market reached 463 billion U.S. dollars in revenue in 2021. The market is set to grow by over ten percent in 2022 to 510.96 billion U.S. dollars.

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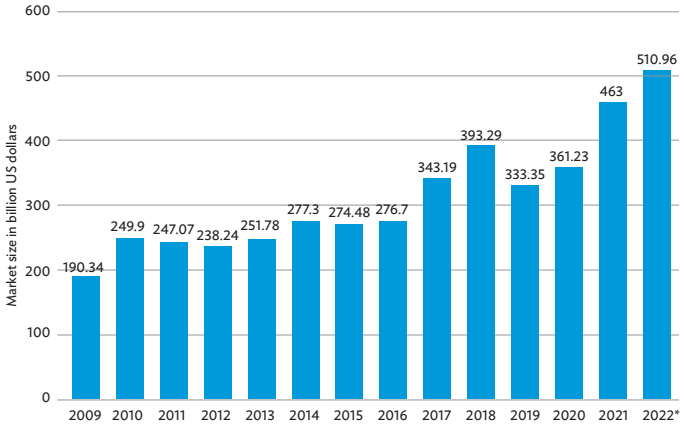
[2] https://www.statista.com/statistics/519456/forecast-of-world-wide-semiconductor-sales-of-integrated-circuits/

IC semiconductor market size worldwide from 2009 to 2022 (in billion U.S. dollars)



Source: https://www.statista.com/statistics/519456/forecast-of-worldwide-semiconductor-sales-of-integrated-circuits/

IC Value Chain

The IC value chain has the following main subdivisions: the upstream chip design industry (technology-intensive attributes); the midstream chip manufacturing industry (capital and technology intensive); and the downstream chip packaging and testing industry (labor and capital intensive), which together constitute the core of the value chain.

Chip Design Industry

Chip design is the core part of the IC industry. IC, being the most expensive component in electronics, entails high expenses for research and development (R&D), with high technical barriers. However, a high number of skilled employees is more critical than high capital requirements because chip design does not require investment in the production line. Product creativity, performance, quality, and service are some of the key factors needed to improve competitiveness in the market.

IC design activities are performed both at integrated device manufacturer (IDM) and fabless companies. Related companies usually maintain strong design expertise in-house, while looking at different external

options in order to reduce chip design cost, accelerate product time-to-market (TTM), and mitigate risks on R&D budget flexibility.

Chip Manufacturing

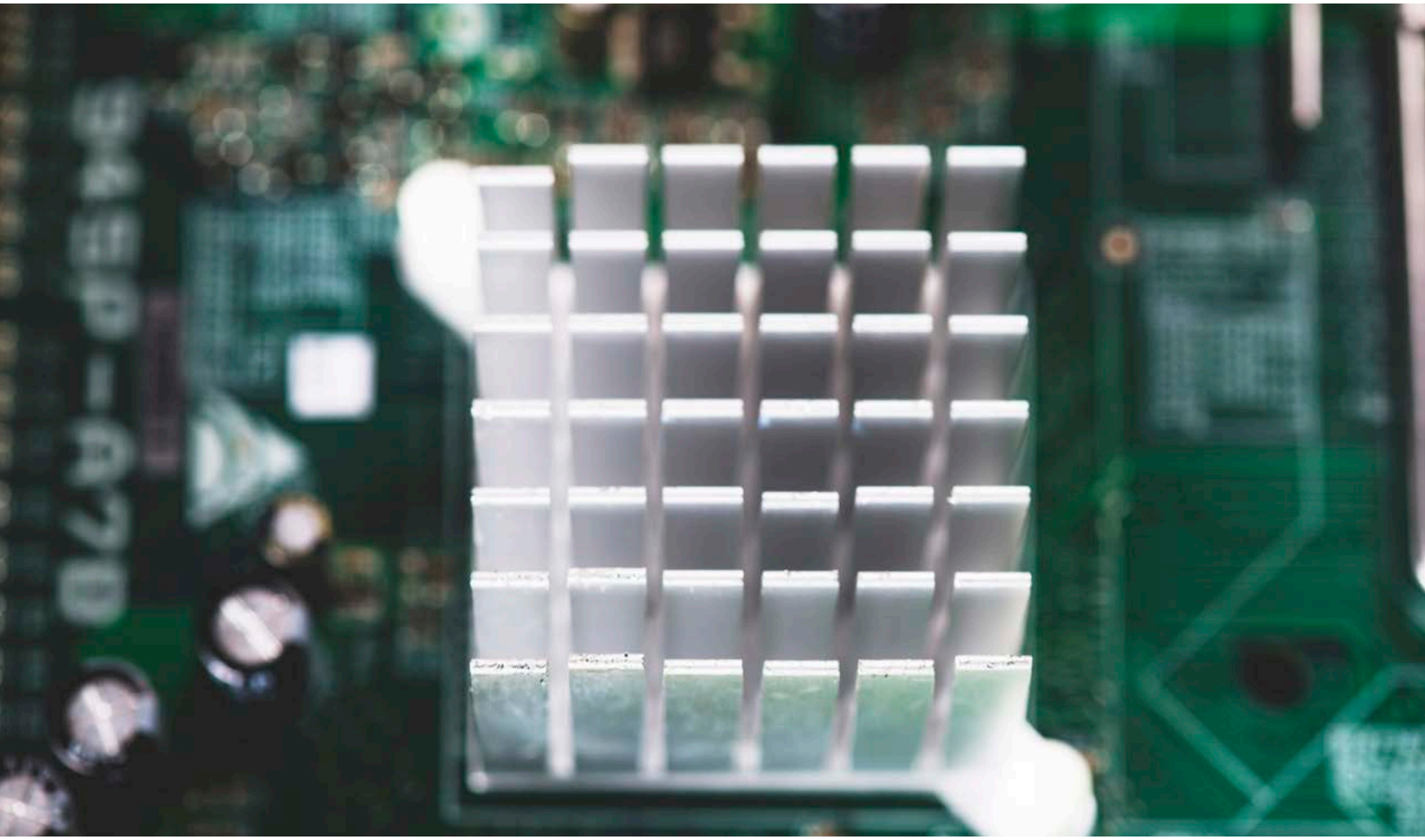
Chip manufacturing (mainly wafer manufacturing) processes include lithography, etching, oxidation, deposition, diffusion, and flatting. Intricate generation and maneuvering of extreme ultra-violet (EUV) radiation require high-end technical equipment, which is also very costly to develop and manufacture.

This results in the advanced semiconductor device fabrication industry involving capital barriers that are very difficult to overcome. Moreover, the industry has high technical barriers: long learning curve for the chip manufacturing process and increasing costs of R&D as processing precision develops.

Chip Sealing and Testing Industry

The last step of the IC industry chain is the chip packaging test link. In this segment, the silicon wafer is connected with wires to the pins of its packaging devices (i.e., shells that encapsulate the semiconductor IC), to connect with other devices. This segment is labor-intensive and has relatively low technical capital requirements. Companies offering encapsulation testing are mainly in original equipment manufacturer (OEM) mode. Some countries and regions engaged in semiconductor packaging testing worldwide are Taiwan, Malaysia, mainland China, the Philippines, South Korea, and Singapore. China has comparative advantage in terms of labor cost and has, therefore, developed the highest industry maturity.

The current dominant trend in chip packaging technology is still in the era of surface packaging. Other technologies such as 3D lamination, 3D through-silicon vias (TSVs), and other 3D packaging technologies are still under development. Ball grid array (BGA) and chip scale packaging (CSP) are the mainstream technology routes adopted by international IC packaging technology.



Philippine Integrated Circuits Industry

The Philippines aims to position itself as a key player in the global IC design industry ecosystem by becoming a home base of competitive IC design companies that would provide services to the worldwide IC ecosystem, and by being an attractive destination for foreign IC design-related companies so they would invest in the country.

As of the second quarter of 2021, semiconductors accounted for approximately 43.1% of the total goods exported from the Philippines, equivalent to over Php 314 billion. Semiconductors account for the highest share of electronic product exports from the country.[3]

According to an article in the *Manila Bulletin,* despite strong demand globally, the Semiconductor and Electronics Industries in the Philippines, Foundation Inc. (SEIPI) has kept its original 7% exports growth forecast for 2021, taking into consideration the impact of the strict lockdowns in the country and the ASEAN region.[4]

The Philippines accounts for 2.8% of world IC exports and has been among the top 10 exporters for at least the

[3] https://www.statista.com/statistics/1264606/philippines-export-share-of-semiconductors/
[4] https://mb.com.ph/2021/08/27/seipi-approves-7-growth-forecast-for-2021/

last decade. Among the largest global IC companies located in the Philippines are Texas Instruments, STMicroelectronics, NXP, ON Semiconductor, Analog Devices, and Maxim. ICs, particularly assembly and test (A&T) activities for analog semiconductors, are the main area within electronic components in the country.

Included in the Philippine electronic components manufacturing cluster is a growing silicon design and development industry. The sector requires more technical and engineering backgrounds, and has a higher value-add than components manufacturing, placing it higher up in the value chain. Companies involved in IC design such as Intel, Sanyo Semiconductor, Eazix, Symphony, and BitMICRO conduct ASIC and Field Programmable Gate Arrays (FPGA) design, as well as Very High Speed Integrated Circuit Hardware Description Language (VHSIC-HDL) verification. Companies such as TI Phils. and Fairchild Semiconductor operate IC packaging design.

IC design is among the preferred activities for Strategic Services in the 2017 Investments Priority Plan. It covers all logic and circuit design techniques required to design ICs. The 2022 Investment Priority Plan lists "highly technical manufacturing, and production of innovative products and services: Manufacture of equipment, parts, and services, commercialization of intellectual property (IP) and R&D products/services, aerospace, medical devices, Internet of Things (IoT) devices and systems, full-scale wafer fabrication, advanced materials" in its Tier 3 priorities.[5]

Trends[6]

In 2020, the Philippines exported $22.6 billion in ICs, making it the 8th largest exporter of ICs in the world. In the same year, ICs were the 1st most exported product in the Philippines. The main destinations of IC exports from the Philippines are: Hong Kong ($6.35 billion), China ($4.33 billion), Singapore ($4.05billion), Germany ($1.07billion), and the United States ($1.05billion).

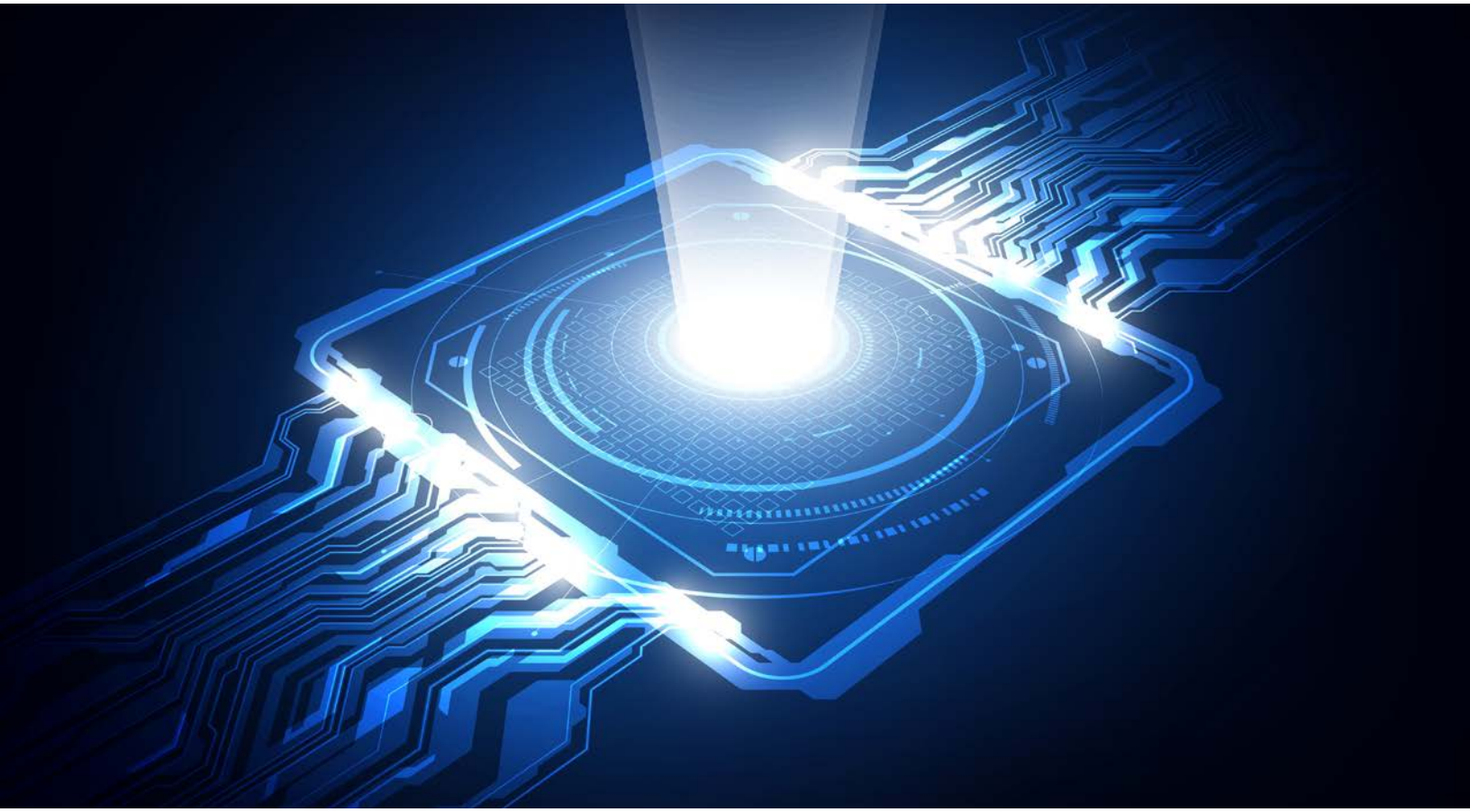
On the other hand, the Philippines imported $12.3 billion in ICs in 2020, becoming the 11th largest importer of ICs in the world. In the same year, ICs were the 1st most imported product in the Philippines. The Philippines imports ICs primarily from: South Korea ($2.77 billion), Chinese Taipei ($2.64 billion), China ($1.72 billion), the United States ($1.32 billion), and Singapore ($1.07 billion).

The fastest-growing import markets in ICs for the Philippines between 2019 and 2020 were Chinese Taipei ($147 million), South Korea ($132 million), and Japan ($63.6 million), while the fastest-growing export markets were China ($441 million), Hong Kong ($381 million), and Vietnam ($81.4 million).

In August 2021, ICs were exported mostly to Hong Kong ($551 million), China ($223 million), Singapore ($155million), Japan ($105 million), and Chinese Taipei ($83.4million), while imports were mostly from Chinese Taipei ($225 million), Japan ($120million), the United States ($97.6 million), Singapore ($77.1 million), and South Korea ($50.7 million).

5 https://www.aseanbriefing.com/news/the-philippines-2022-strategic-investment-priority-plan/

6 https://oec.world/en/profile/bilateral-product/integrated-circuits/reporter/phl?redirect=true



The Philippine IC Value Chain

The semiconductor and electronics (S&E) supply chain is traditionally divided into two different segments: (1) semiconductor manufacturing services (SMS) – from IC design, IC front-end (FE) and IC back-end (BE) manufacturing ; and (2) electronics manufacturing services (EMS), which address the printed circuit board assembly (PCBA) and device/assembly C·box level. Due to recent technology evolutions and business model changes, two other key segments are now co-existing, finding their own value proposition in the supply chain, intercalated with the other segments, as follows:

- Middle-End (ME) segment: this IC manufacturing segment is between the FE and the BE. It is a fairly new segment addressing the advanced packaging new technologies that need to be performed in an FE environment (e.g., wafer-level processing).
- Sub-system/Module segment: This segment is a derivative from the EMS, but also includes some microelectronics and micro-assembly processes (e.g., Flip-chip, Chip-on-board, optical micro-assembly, system in package [SiP]). This segment produces some parts (sub- assembly) that need to be assembled at system level by an EMS.

Therefore, the supply chain has evolved into six different segments, as follows:

1. IC Design
2. IC FE (Silicon/ SC wafer fabrication)
3. IC ME
4. IC BE (IC assembly and test)
5. Subsystem/Module
6. EMS (PCBA, devices, system)

The supply chain is also supported by different key segments as follows:

- Research institutes and intellectual property (IP) houses - feed the supply chain at every stage/ segment level with innovation
- Materials providers - very active along the supply chain from FE (bare wafer), ME/BE (interposer, interconnect, packaging materials), as well as on the Module/EMS (printed wire board [PWB], PCB) and other materials needed for electrical/ mechanical specifications
- Equipment providers—supply manufacturing, assembly and testing equipment to production lines at every stage/ segment

The semiconductor and electronics manufacturing industry is one of the biggest economic growth driver in the Philippines. Mainly composed of SMS (73%) and EMS (27%) firms, the industry employs around 3.2 million direct and indirect workers. In 2018, the indsutry accounted for about $37.57 billion of commodity exports—representing more than half or about 55.67% of the country's total exports – up by 2.83% from 2017 figures, according to the Philippine Statistics Authority (PSA).

From January to September 2019, total electronics exports grew to $32.22 billion, up by 2.25% from the same period last year, and accounting for 61.3% of the Philippines' total exports, data from the Semiconductor and Electronics Industries in the Philippines Inc. (SEIPI) shows.[7]

Table 1. Key Players in the Philippine IC Supply Chain

Sector	Key Players
IC Design	Fabless: LATTICE SEMI, BITMICRO IC design services: XINYX IDM and global players: ANALOG DEVICES, KYOCERA, CANON, ROHM
IC Back-End (or IC Assembly and Test)	IDM: TI, ANALOG DEVICES, STM, FAIRCHILD, MAXIM, ON SEMI OSAT: AMKOR Assembly and test houses: FASTECH, PHOENIX, PSI, TONGSHIN, ATEC, AMERTRON
Subsystem/ Module	SiP houses: IQXPRZ, PSI Module EMS/ODM: LITEON, IMI, EMSCAI, IONICS, TONGHSIN
EMS (PCBA, devices, system)	EMS: IMI, IONICS, EMSCAI ODM: Fox Electronics Manufacturing, Micrologic Systems, Himmax, Alexan, Innovatronics, Centertronics, Trident electronics, Star Communications OEM: CANON, LEXMARK, MOOG, EPSON, BROTHER, MURATA, TOSHIBA, CONTINENTAL, REMEC, KNOWLES

[7] https://www.eetasia.com/a-look-at-the-current-philippine-electronics-manufacturing-landscape-part-1/

Advantages and Capabilities

Among the advantages and capabilities of the industry include

- the labor force;[8] and
- critical mass of global players.

The majority of the electronics companies are concentrated in Metro Manila (52.11%), CALABARZON (39.85%), Northern/ Central Luzon (4.98%), and Cebu (2.68%); strategic location; business environment; and competence of the Philippine Export Zone Authority (PEZA).

According to the Board of Investments (BOI), "the country's Electronics Industry roadmap envisions the country as a globally competitive electronics hub by 2030 with investments of$10 billion, exports of$112 billion and direct and indirect employment of up to 24 million. For the short-term, the country's total exports are expected to top$52 billion by 2022."[9]

The Philippines Trade and Investment Center (PTIC) states that "the Philippines is home to about 500 semiconductor and electronics companies and is a successful hub for SMS and EMS. It is also becoming an emerging player in IC design, with a growing base of competitive IC design companies. The pandemic, likewise, led to the fast development of the Philippine medical devices industry. The Philippines has advanced telecom and datacom infrastructure, owing to the large number of companies in the IT/Business Process Outsourcing (BPO) sector; robust logistics industry, with the presence of global forwarders and courier services; duty free and "green lane" system in importation and exportation in the economic zones." [10]

Based on BOI, "the Philippines provides access to key markets through bilateral and regional free trade agreements with Japan, the European Free Trade Association, ASEAN and ASEAN's FTA partners including China, Australia, New Zealand, India, South Korea and Japan. The Philippines is also a recipient of the generalized system of preferences representing tariff privileges with countries such as the US, Canada, the EU, UK, and Russia. The country is also accelerating discussions with India, currently not a member of the Regional Comprehensive Economic Partnership (RCEP), to commence negotiations on a preferential trade agreement. This presents vast opportunities to lay foundations for American businesses expansion and diversification plans into the region. The Philippines certainly fits the bill as the next complimentary investment destination since it provides preferential trade agreements with global strategic partners, being part of the support industries for global manufacturing."[11]

BOI further states that "the Philippines' special economic zones (SEZs), which are managed by PEZA, are chosen by most foreign investors that have located their manufacturing plants in the country due to their lower overall costs of manufacturing and greater ease of doing business. According to a survey by Duke University, PEZA has been rated by foreign investors as being organizationally stable and responsive to their needs."

- **Labor Force.** The current population of the Philippines is more than 108 million, of which 43.5 million comprize the labor force and 66.4 million compose the working age population. The Philippine labor force is young, relatively cost-competitive, and English-proficient. They are highly trainable (within eight weeks or two months), adept at technology, and with short learning curves. The Semiconductor and Electronics industries in the Philippines Foundation, Inc. (SEIPI) estimates that approximately 500,000 graduates are readily employable in the industry annually. Employees in the electronics industry receive around 17% higher compensation compared to workers in other industries (National Statistics Office [NSO], 2013).
- **Critical Mass of Global Players.** The Philippine Trade and Investment Center (PTIC) states that "the Philippines is home to about 500 semiconductor and electronics companies and is a successful hub for SMS and EMS". The majority of the electronics companies are concentrated in Metro Manila (52.11%), CALABARZON (39.85%), Northern/ Central Luzon (4.98%), and Cebu (2.68%).

[8] https://www.einnews.com/pr_news/553117340/the-philippines-is-well-positioned-to-support-high-tech-electronics-manufacturing-companies-growth-in-southeast-asia

[9] https://boi.gov.ph/philippines-urged-to-establish-competitive-digital-niche-in-asia/

[10] https://www.einnews.com/pr_news/553117340/the-philippines-is-well-positioned-to-support-high-tech-electronics-manufacturing-companies-growth-in-southeast-asia

[11] https://www.einnews.com/pr_news/553117340/the-philippines-is-well-positioned-to-support-high-tech-electronics-manufacturing-companies-growth-in-southeast-asia

- **Strategic Location.** The Philippines, being equidistant (four-hour travel time) from all major Asian countries such as Thailand, Korea, Japan, Guam, Vietnam, Hong Kong, Singapore, Brunei, Malaysia, Shanghai and Xiamen in China, and Taiwan, isa an ideal hub with its strategic position and potential vital link in the supply chain.

According to the Board of Investments (BOI), "the Philippines provides access to key markets through bilateral and regional free trade agreements with Japan, the European Free Trade Association, ASEAN and ASEAN's FTA partners including China, Australia, New Zealand, India, South Korea and Japan. The Philippines is also a recipient of the generalized system of preferences representing tariff privileges with countries such as the US, Canada, the EU, UK, and Russia".

- Business Environment. PTIC also states that "the Philippines is also becoming an emerging player in IC design, with a growing base of competitive IC design companies. The pandemic, likewise, led to the fast development of the Philippine medical devices industry. The Philippines has advanced telecom and datacom infrastructure, owing to the large number of companies in the IT/Business Process Outsourcing (BPO) sector; robust logistics industry, with the presence of global forwarders and courier services; duty free and "green lane" system in importation and exportation in the economic zones".
- Competence of the Philippine Economic Zone Authority (PEZA). The Philippines' special economic zones (SEZs), which are managed by PEZA, are chosen by most foreign investors that have located their manufacturing plants in the country due to their lower overall costs of manufacturing and greater ease of doing business. According to a survey by Duke University, PEZA has been rated by foreign investors as being organizationally stable and responsive to their needs.

Initiatives

IC design is considered among the priority areas for an investment promotions plan. BOI has worked on an industry value proposition to include initial supply chain mapping of high-growth subsectors such as auto electronics, consumer electronics, electronic data processing (EDP), light-emitting diode (LED), and photovoltaic cells.

Among other priorities include implementing science, technology, and innovation (STI)-driven programs in collaboration with DOST. With STI-driven strategies and programs, MSMEs will be better positioned to address growth challenges and meet changing market demands for quality and new products and services. By embracing digital transformation, MSMEs can operate efficiently, reduce costs, and earn profits while manufacturing more affordable products. Adopting new technologies and digital platforms will lead to competitiveness improvements that would allow MSMEs to integrate into domestic supply and value chains as well as to penetrate the global value chains of multinational companies.[12]

IC design activities in the Philippines represent about 1,000 related jobs, mainly in the engineering level. Among this pool of professionals, around 300-400 people are fully-trained and operational within the Philippines. Around 700-800 IC designers from the Philippines are working abroad in the US, EU, Australia, and more recently, in Singapore and Malaysia. The IC design industry is just emerging with a business level just below$1 million for pure service providers, and a rough estimated total value of $8–$15 million yearly from the Philippines.

There are current initiatives implemented by the private sector to increase the availability of engineering talents on IC design (verification, layout capabilities) out from Batangas and to reproduce synergies (technology development, incubation, etc.)

There is an emergence of a strong clustering axis between Manila (where there is dispersion of SMS activities) and Batangas, with the academe and emerging facilities on both North and South ends, with the private companies located along the axis. Another emerging competitive cluster for S&E is identified in Cebu, attracting investments from multinational companies (MNCs) (e.g., KYOCERA, KNOWLES, etc.).

[12] https://www.dti.gov.ph/sec-pascual-speeches/stakeholders-events/speech-of-trade-secretaryfirst-map-general-membership-meeting/

Table 2. Philippine IC Design Structure

Companies	Type	Headquarters	IC Design in the Philippines
XINYX Design	IC Design House	Philippines	Greater Manila
LATTICE Semi	Fabless	USA	Greater Manila
ANALOG DEVICE	IDM	USA	Greater Manila
BITMICRO	Fabless	USA	Greater Manila
CANON	Global S&E player	Japan	Greater Manila
ROHM	IDM	Japan	Greater Manila
KYOCERA	Global S&E player	Japan	Cebu

Source: IC Design Roadmap.

A potential list of targets on IC design based on BOI's identified opportunity for growth at system level includes the following:

- IC design for automotive applications (including electric vehicle [EV]/hybrid electric vehicle [HEV])
- Microelectromechanical systems (MEMS) IC design (could also include microbolometer technology for IR sensor)
- Imaging IC design: focusing on simple design (ambient light sensor, IR detector)
- Radio-frequency (RF) IC design and global navigation satellite system (GNSS) IC design
- Power electronics IC design (inverters)
- IC design for smart systems (e.g., Smart LED lighting), sensor hubs and measurement units (controller, driver, ASIC, digital signal processor [DSP]/ application-specific standard product [ASSP])
- IC for industrial and harsh environment (including re-design for aerospace/ military)

Action Programs

Three development tracks have been drafted as part of a comprehensive strategy aligned with the supply/demand drivers for growth, to address the different issues. These are:

- Track I (Accelerator for Supply Drive): Revamp the local supply chain for IC design industry's integration
    - Boost Philippine attractiveness to investors
        - Increase visibility and ensure competitiveness as a home base and destination for IC design activities
    - Build on existing assets
    - Form around two clusters and reinforce innovation
    - Reinforce incubation centers
        - Incorporate innovative companies and start-ups into the ecosystem
    - Develop multidisciplinary skills
    - Develop research and technology
        - Enable industry-university ties and partnerships beyond the manpower education mission
    - Defragment the supply chain flows
    - Technology roadmapping (tech push)
- Track II (Accelerator for Demand Pull): Accelerate the demand for IC designed in the country
    - Develop initiative on IoT
    - Create centers of excellence (hubs and platforms)
    - Coordinate nodal activities and international cooperation
    - Create a specialized area for the Philippines to address key market segments
- Track III: Launch key enhancement actions (that is particularly linked to facilitate the clustering foundation)

- Invest in people
- Enhance intellectual property rights (IPR) in the Philippines and differentiate versus competitors
- Provide support for the incubation of start-ups and growth of small and mid-size enterprises
- Access to IT and Electronic Design Automation (EDA) tools

The Philippine Institute for Integrated Circuits (PIIC), funded by the Philippine Council for Industry, Energy, and Emerging Technology Research and Development of the Department of Science and Technology (DOST-PCIEERD), aims to develop a training program that will supply the human resource requirements of local IC design companies. The training program features the fundamentals of IC design, from circuit analysis, simulation, to full custom layout and verification, and includes modules that utilize industry-grade EDA tools. Through capacity building and training, the PIIC represents the substantial efforts of the academe and the government in supporting the competitiveness of the local electronics industry.

PIIC's activities are vital to strengthening the "Academia Pillar" for the Philippine IC design industry and these include the following::

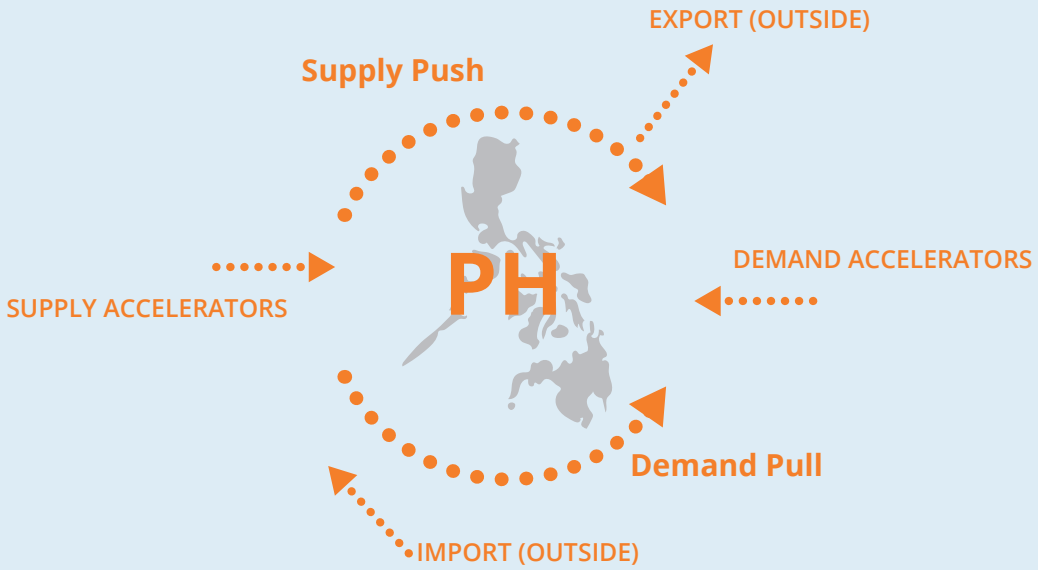
- Reaching a critical mass of IC designer talents from local universities
- Improving awareness of potential attractive careers for young people
- Improving the quality of curriculum for "hard skills" (e.g., analog to be reinforced)

Potential Upgrading Trajectories

The opportunities for scalability for the country can be considered for two areas:

- The Mobile Convergence Segments
  - Opportunity to address for the Philippines, mainly based on IC Design as a service industry (high volume, growing segment, but highly competitive)

Figure 1. IC Demand/Supply Economic Circle



- The Industrial Segments (including Automotive, Medical, Telecommunications, etc.)
    - Strong opportunity for the Philippines, based on an innovation-centric approach and application-driven activities (low volume, high mix, growing segment). Also a target for IC design as a service industry.
- In terms of capability, the Philippines should emphasize talent development on analog and build a more robust foundation for IC design services (also addressing the Mix Signal segment). The development of the local industry should also rely on a more structured go-to-market strategy and support (e.g., business development).
- Curriculum should be developed to be aligned with strategic directions and industries' local needs ((e.g., IoT, industrial segments enabling technologies, applications and cross- disciplinary activities such as acoustics and microelectronics, smart agriculture, etc.)
- Develop a local "champion" on IC design service
    - Developing a local champion and promoting the Philippines to Fabless/IDM as a suitable location to locate IC design teams, are the two keys to increase overall performance of the local ecosystem to reach a critical mass.
- Create "Innovation Centers"/clusters that would serve as centers of excellence in terms of technology development, with the capability to create synergies and launch collaborative programs
- Create a common facility dedicated to IC design technology development in the country
    - Attract intellectual property houses on the IC design subsector to set up activities in the country
    - Further develop emerging R&D activities linked to microelectronics at the University of the Philippines

- Develop activities of original design manufacturers (ODM)/OEM to trigger additional IC design needs
    - Focus on "Niche Module ODM"
- Extend PIIC's role to become a technology development center
- Increasing consumption of automotive electronic components
    - The automotive segment for semiconductor vendors is expected to be a big revenue source. Global automotive semiconductor revenue is expected to hit$60 billion in 2022, with Asia Pacific leading with 41% growth.
- Artificial Intelligence (AI) chip domination
    - AI chips are the heart of the AI technology chain and are central to the processing of AI algorithms. The AI chip market is expected to account for over 12% of the total AI market by 2022, with a CAGR of 54%.
- Attract fabless companies or IDM to set up satellite design centers in the country

First Philippine Industrial Park

First Philippine Industrial Park (FPIP) is one of the largest and fastest-growing premium industrial parks in the Philippines. With over 500 hectares of prime industrial land, it is the preferred location of the world's largest companies with more than 140 world-class locators, all contributing to national development, jobs creation, and economic growth. These locators include industry giants such as Brother, Canon, Murata, Collins Aerospace, Honda, Philip Morris, and Nestle, among others.

Established in 1996, FPIP is a 500+ hectare special economic zone (SEZ) located in the thriving industrial CALABARZON area south of Metro Manila. Considered the most prime investment location in the country today, it is host to a growing number of global leaders in diverse sectors such as aerospace, automotive, consumer goods, electronics, medical devices, and office equipment, among others.

FPIP offers locators best-in-class infrastructure and utilities, while providing industry-leading park management and support to its locator partners. Alongside special incentives in form of tax holidays and lower tax rates,* the unique FPIP experience assures locators ease of doing business, safety and security, and the consistency of a first-world manufacturing environment. These enable locators to focus on increasing their competitiveness in the global marketplace.

* For eligible enterprises.

FPIP brings over two decades of operational excellence, and an even longer history of multifaceted industry experience through its partners and parent companies.

FPIP is a joint venture between the local conglomerate First Philippine Holdings (FPH) and the Japanese conglomerate Sumitomo Corporation (SC). FPH brings leading and pioneering experience in energy, power generation and distribution, transformer manufacturing, commercial and residential estate development and management, construction and engineering, as well as education and healthcare.

On the other hand, Sumitomo Corporation's experience in industrial park development and management aids FPIP in offering integrated services and world-class experience to locators all over the world. Its network and sales arm are instrumental in helping FPIP attract a significant number of Japanese locators, which are more than half of the locators inside the park. Sumitomo Corporation is also a leading industrial park (IP) developer and operator in Vietnam, Indonesia, Myanmar, and India as well as an IP sales agent in Indonesia, Thailand, and Cambodia.

FPIP and its locator-partners have created about 70,000 jobs to date, transforming the host communities of Sto. Tomas and Tanauan in Batangas into a thriving industrial hub. FPIP also supports the local educational and health systems, and contributes significantly to local infrastructure development to help improve overall living conditions and uplift the lives of residents in the area.

Upholding World-Class Standards

FPIP is a multi-awarded, ISO-certified, and a PEZA Hall of Fame Awardee.

Among over 400 ecozones in the country, FPIP is one of the only two recipients of PEZA's first Green, Health, Smart and Sustainable Award due to its notable commitment to promoting healthy industrialization and sustainably designed, smart, and green economic zones.

FPIP achieved the Investors in People Silver recognition from 2016 to 2019, the international benchmark for companies that aim for business improvement through people management.

For 3 years (2018, 2019, 2021), FPIP was recognized and awarded by the DENR- Environmental Management Bureau of the CALABARZON region for being an active partner in the protection of fragile natural resources through the implementation of Republic Act No. 9003, or the Ecological Solid Waste Management Act of 2000, and for its sustainable practice of using Best Environmental Technology (BET) and Best Available Practice (BAP) governance.

FPIP has also been the recipient of other awards over the past 25 years in recognition of its support for the community and the environment. Other awards given by various sources include the "Outstanding Community Project Award" granted by PEZA; the "Game Changer Communities Award" conferred by DENR-EMB; the "Gawad Kalasag Plaque of Recognition" awarded by NDRRMC; and the "Outstanding Environmental Performer Award" given by PEZA, among others.

Options to Optimize Your Business

Industrial Offerings

FPIP envisions to be the manufacturing location of choice of high-quality export-oriented locators seeking to grow their businesses, and in the process, help build industries and create jobs. FPIP provides best-in-class infrastructure, highly reliable utilities, and industry-leading park management. FPIP has dedicated teams

of engineers and technical staff to ensure that the park is safe, clean, and operating efficiently to serve the needs of its locators, employees, and visitors.

Industrial Land

FPIP's prime-grade and site-developed lots are ideal for manufacturing operations of light and medium industries. Strategic location, various lot sizes and options, and access to supporting facilities and services enable seamless construction and expansion of small, medium, and large-scale facilities.

Ready-Built Factories (RBFs)

FPIP's locator-ready, shell-type factory buildings cater to the needs of smaller-scale light to medium industries, as well as serve the back-end business of various industries such as assembly and contract manufacturing, and support/allied industries. This enables RBF locators to quickly establish efficient operations near their partners and prospective customers.This will allow the suppliers or partners of multinational and local companies to be located near their customers, an important requirement to enhance the coordination between buyers and suppliers.

FPIP continues to increase the leasable area of its ready-built factories, with over 180,000 square meters in leasable RBF space to date. FPIP's newest RBF clusters are now configured to accommodate solar panel installations. To complement the RBF specification customization that FPIP offers to meet the unique requirements of locators, FPIP also practices regular predictive and preventive maintenance to ensure that the facilities and equipment are in top condition.

Built-to-suit RBFs

Apart from FPIP's standard RBF offerings, FPIP offers built-to-suit RBFs to cater to a prospective locator's specific needs and requirements. FPIP's in-house teams of engineers and technical staff can provide expertise on refurbishment and renovations based on the locator's preferred handover conditions. Value-added services such as mechanical, sanitary/plumbing, and electrical engineering assistance are also offered, ensuring that locators receive the best customizable menu package available.

Benchmark for Park Development and Management

Best-in-class Infrastructure and Utilities with the Highest Reliability

FPIP provides high-quality infrastructure and utilities to assure locators of stable power and water supplies, reliable communication services, and accessibility. The park also boasts a centralized wastewater treatment facility and a solar-powered bridge as part of the park's sustainability efforts.

Power Supply

FPIP provides the most stable and reliable power supply to its locators via its exclusive on-site 115 kV substation with redundancy via three separate circuits and exposure to minimal inclement weather risk due to the presence of an underground power distribution grid.

FPIP also offers its locators the choice to get energy supply from clean and renewable sources through affiliates First Gen Corporation (FGen) and Energy Development Corporation (EDC). Both FGen and EDC have Retail Electricity Supply and Renewable Energy Supply licenses that allow partners to switch to 100% green and good power.

FPIP strives to deliver resilient and compelling energy solutions that promote energy productivity, empowering its customers to make the right choices and to do more with less energy, while simultaneously reducing their carbon footprints. By offering this option to locators, FPIP contributes to its group's mission of forging collaborative pathways for a decarbonized and regenerative future.

Industrial Water

FPIP has abundant industrial water through its fifteen deep wells and above-ground reservoirs, a 24/7 water supply to locators via a centralized distribution system backed by full-scale generators, and modern wastewater and centralized sewerage collection and treatment facilities.

Centralized Wastewater Treatment

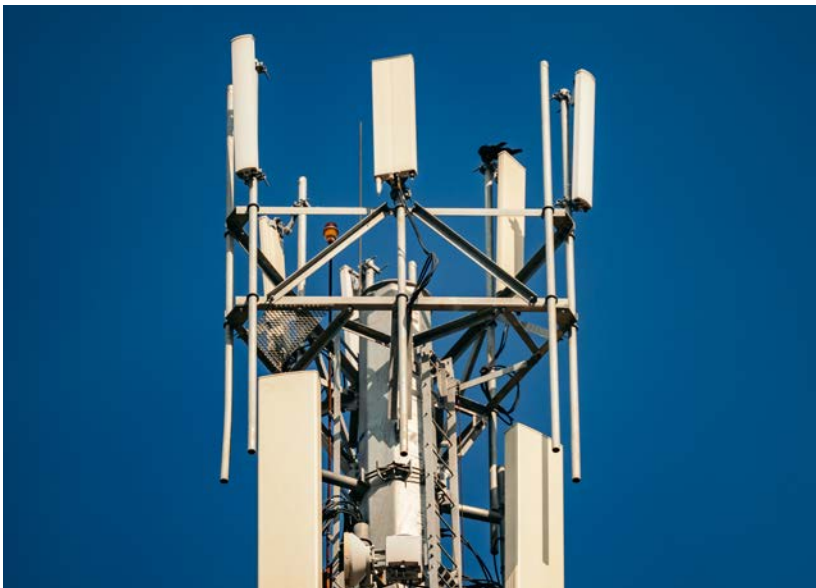
As part of the park's sustainability efforts and waste management, FPIP treats domestic effluents in its Centralized Wastewater Treatment Facility (CWTF). Wastewater from park locators is treated in the CWTF and becomes available for recycling or reuse. With this, groundwater extraction is reduced, and groundwater resources are preserved.

Telecommunications

FPIP ensures fast, consistent, and reliable internet services, capable of supporting video, voice, and data transmissions, through its wireless underground fiber optic and copper cables. It also offers a wide choice of telecommunication services through partnerships with multiple leading providers.

Road Network

FPIP provides a network of wide, well-paved, and properly spaced roads, with broad, concrete, 6-lane/ 40-meter right-of-way (ROW) main roads, 23m secondary roads, as well as newly installed dedicated bike lanes to ensure ease of mobility around the park. It offers a flood-free environment through an extensive underground drainage system and also remains environment and pedestrian-friendly with its well-lit pedestrian and bicycle lanes.



Solar-Powered Bridge

FPIP's newly constructed bridge is powered by solar energy and symbolizes the company's commitment to energy efficiency, sustainability, and low carbon emissions as it connects the industrial park with its expansion areas.

Laboratory Services

FPIP offers environmental laboratory services to locators, including monitoring services for wastewater to ensure compliance with environmental regulations. These efforts are also expected to result in increased convenience, lower costs, and faster response time for FPIP locators. FPIP is also increasing capacity by purchasing additional laboratory equipment, while adding qualified chemists, and ensuring strict compliance with external regulatory bodies.

Commercial Offering

FPIP offers not just space for industrial businesses, but office and commercial spaces as well.

Oasis Commercial Center

The Oasis Commercial Center is primed for office and commercial lease requirements. The three-story building offers office and retail spaces, and includes a school, retail establishments, banks, and a multi-purpose sports facility, among other amenities.

A Growing Variety of Commercial Facilities and Amenities
FPIP offers a wide range of facilities and amenities for its locators and visitors to enjoy.

SanTomas Suites and Microtel Hotels

Business, leisure travels, and lodging are also made more convenient and comfortable at FPIP through the presence of SanTomas Suites and Microtel located within the industrial park.

- **SanTomas Suites** is a 40-room business hotel that serves as the perfect place for overnight or extended stays. It comes with all the essential amenities that ensure comfort and functionality, including a king-sized bed, high-speed internet access, work desk with lounge chair, and an energy-efficient airconditioning system.

- **Microtel Suites** is a 78-room hotel centrally located at FPIP which offers warm hospitality and smartly designed rooms. Each room offers the best value and amenities such as an individually controlled airconditioning unit, and a fully automated fire safety system.

Restaurants

Restaurants within FPIP that offer a wide range of cuisines include Minori-Tei (authentic Japanese food), Jongro Korean restaurant (authentic Korean cuisine) and Millie's (all-day continental and local dining), and are open for breakfast, lunch, and dinner. These restaurants also offer delivery services.

Consuelo Park

The new Consuelo Park, named after the matriarch of the Lopez family, aims to provide a space for relaxation, reinvigoration, well-being, and enjoyment to all those who visit. With its eco-trails, 600-person capacity amphitheater, bamboo grove, play fields, and pond feature, this community park is also envisioned to heighten social inclusivity and environmental responsibility.

Consuelo Park Residences

FPIP offers locator-employees the experience of relaxed community living with the Consuelo Park Residences, FPIP's first residential dormitory complex. Consuelo Park Residences features six (6) dormitory buildings and common facilities. Situated at the heart of the industrial hub and alongside Consuelo Park, residents enjoy easy access to work and recreational facilities as well as experience convenient and comfortable living through common facility provisions such as a dining hall, laundry shop, pocket gardens, walkways, bike racks, and the availability of internet and air conditioning units upon request. Safety and security of the place is also ensured with its gated premises and 24/7 security and CCTV surveillance.

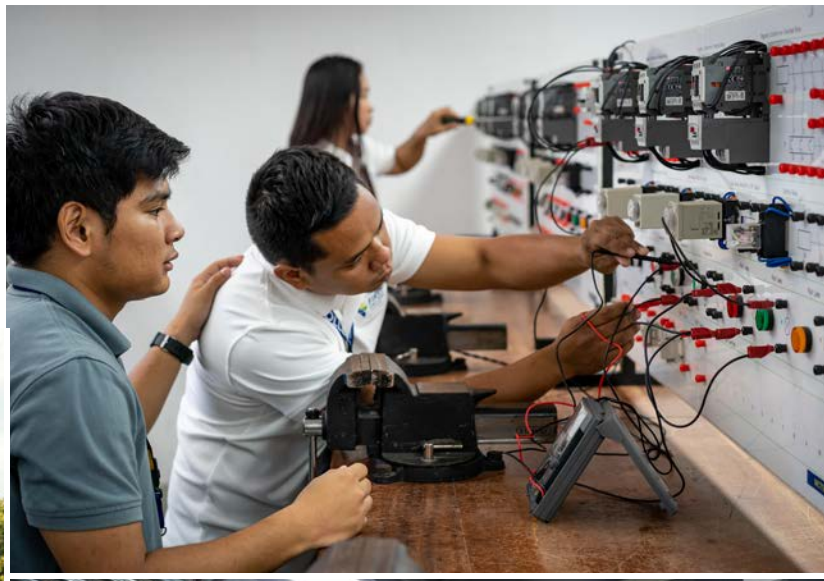
School: FIRST College

FPH established FIRST College in 2018 with a vision to create a school that will deliver real-world, relevant, up-to-date, and practical technical training. The goal was to develop students whose technical training and education is truly useful to modern industries—in a way that companies would want to hire students immediately after graduation.

It is the first college located inside an industrial park, and the first to offer a Bachelor of Science in Industrial Operations and Management program in the Philippines. FIRST College is committed to cultivating graduates that have both the technical and leadership skills needed to succeed in the 21st Century workplace.

Oasis Multi-purpose Covered Court

The facility also includes the Oasis Multi-Purpose Covered Court, a covered twin court for different sports and recreational activities such as basketball, volleyball, tennis, badminton, darts, and table tennis. The venue may be leased for different company activities and events.



Our Locators

FPIP is the preferred location of more than 140 world-class manufacturing facilities and support services. Today, FPIP is home to global and industry-leading businesses from various industries such as leading consumer electronic manufacturers Brother, Canon and Murata, leading aircraft interior manufacturer Collins Aerospace, bicycle parts manufacturer Shimano, motorcycle manufacturer Honda, tobacco giant Philip Morris, and leading food and beverage producers Nestlé and D&L, among others.

Through their partnership with FPIP, FPIP locators also gain access to the expertise and resources of the subsidiary companies of First Philippine Holdings (FPH), one of FPIP's parent companies. FPH's subsidiary companies offer end-to-end solutions, expertise, and experience in energy, power generation and distribution, transformer manufacturing, construction and engineering, commercial and residential estate development and management, as well as education and healthcare.

First Industrial Township

First Industrial Township (FIT), formerly known as Philtown Industrial Estate, is FPIP's sister company. It was acquired by First Philippine Holdings (FPH) and Sumitomo Corporation in January 2015 with the goal of expanding the industrial estate portfolio and increasing the reserve of land area for incoming locators.

FIT offers industrial land for lease, and investment solutions tailored to various locators' needs. FIT's offerings also include utilities and infrastructure with site developed lots in a variety of sizes and reliable facilities to ensure that locators will have everything they need to efficiently run their businesses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