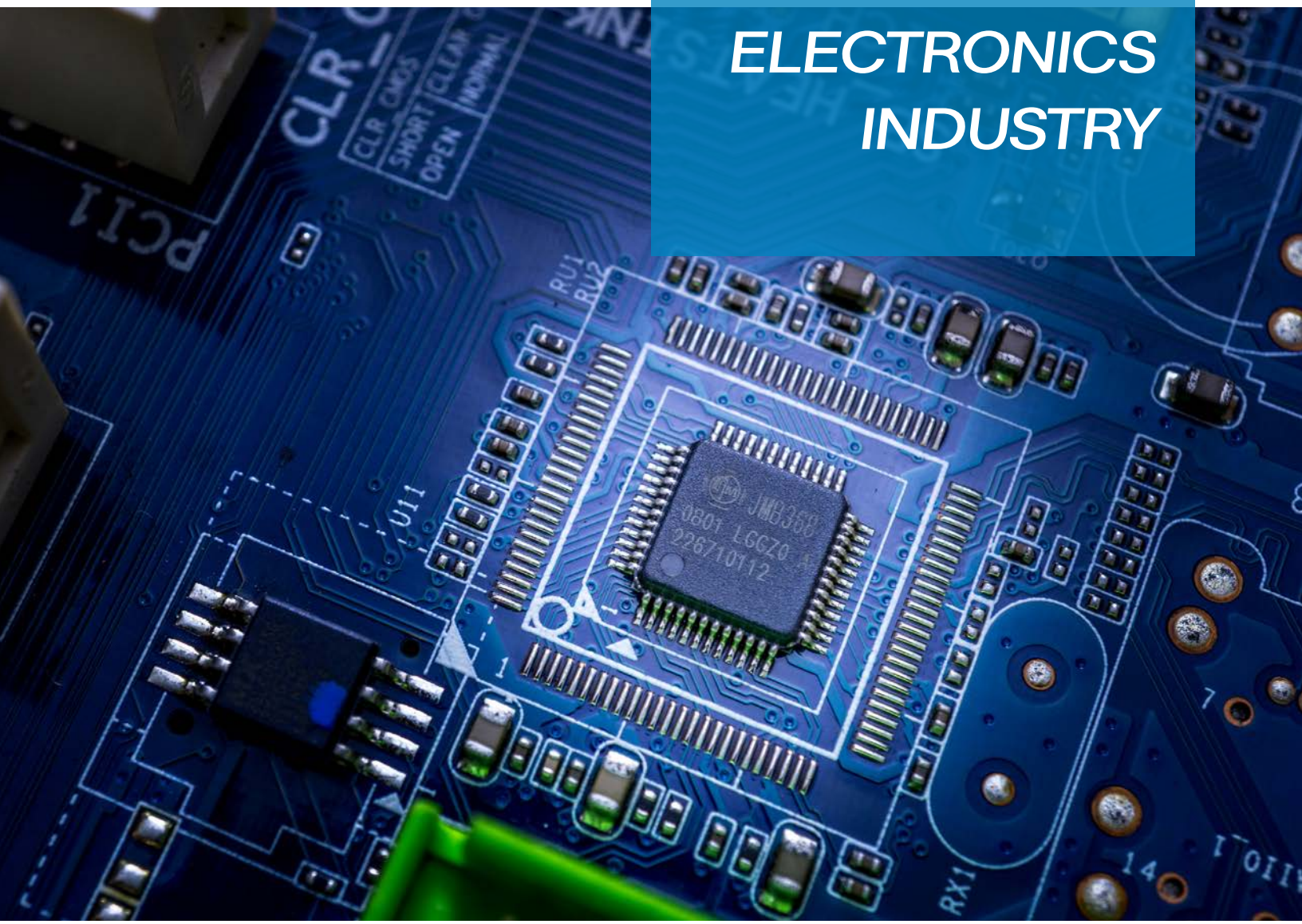
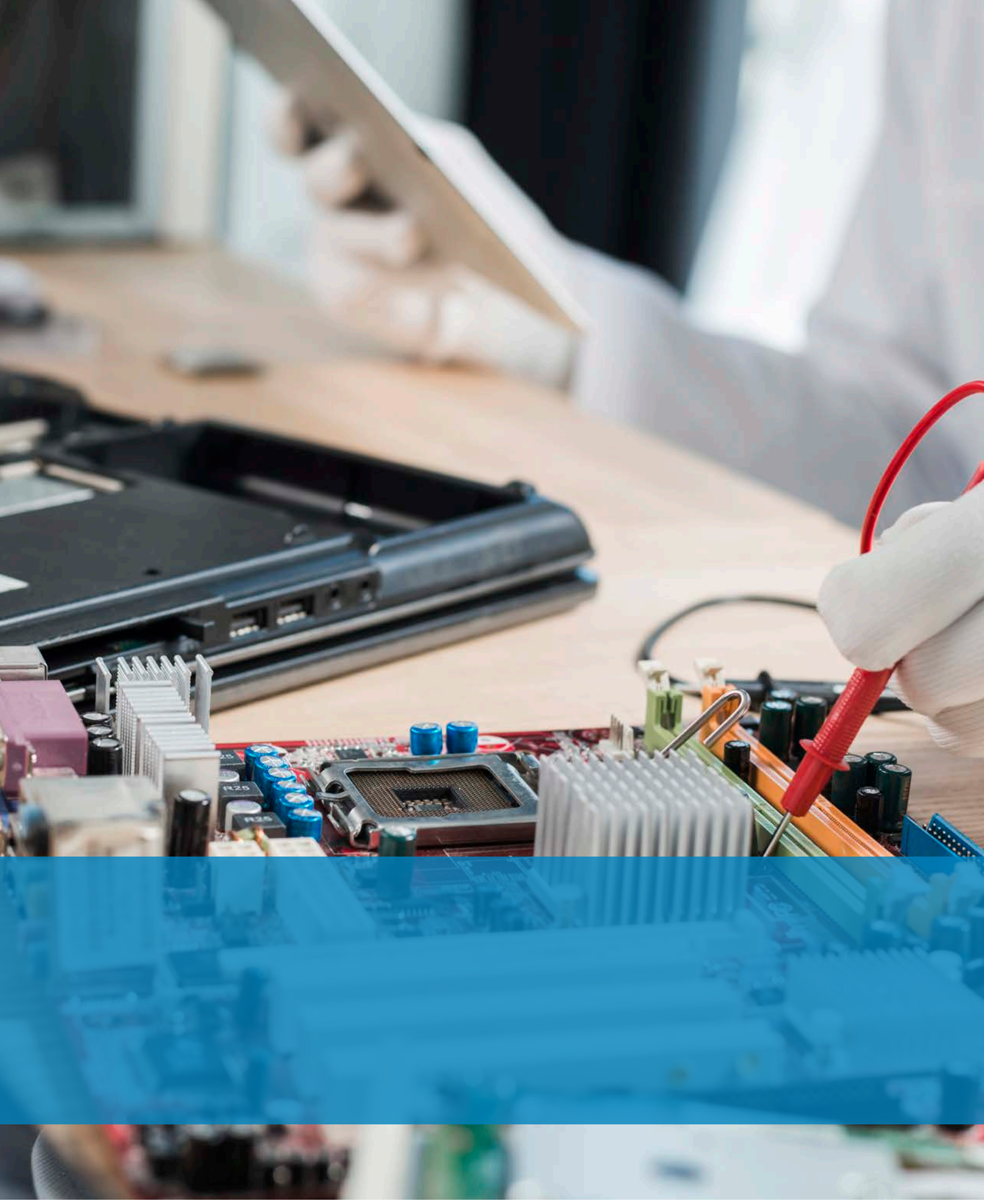
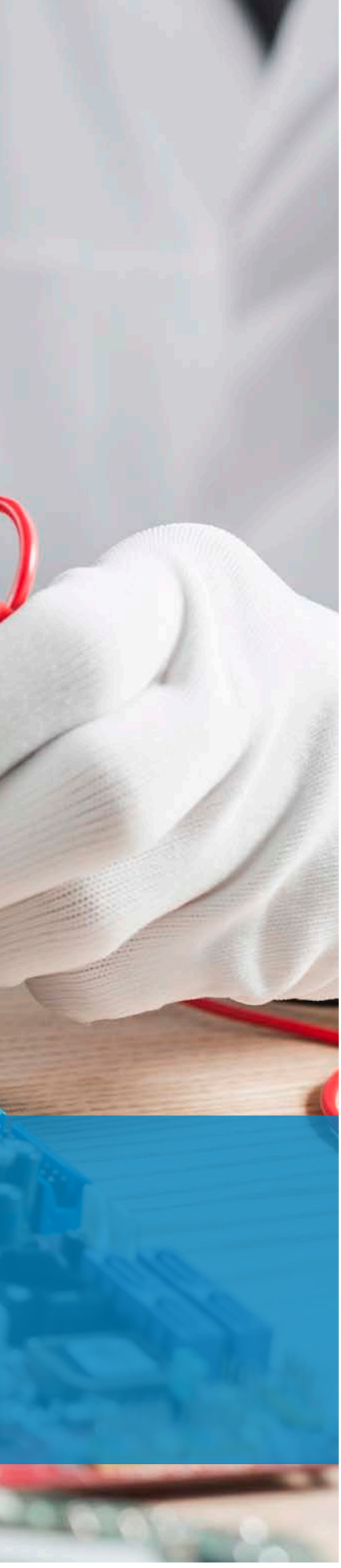
First Philippine Industrial Park
INTERCONNECTED ADVANTAGE

2022

THE PHILIPPINE ELECTRONICS INDUSTRY







Contents

Abbreviations

ADMATEL	Aerospace Industries of the Philippines
ASEAN	Association of Southeast Asian Nations
BOI	Board of Investments
BPO	business process outsourcing
CEA	Consumers Electronics Association
DOST	Department of Science and Technology
EDP	Electronic Data Processing
EIAPI	Electronics Industries Association of the Philippines, Inc.
EMS	electronics manufacturing service
EPDC	Electronics and Product Development Center
FDI	foreign direct investment
FPIP	First Philippine Industrial Park
HDD	hard disk drive
HKEIA	Hong Kong Electronics Industries Association
IT	information technology
JEITIA	Japan Electronics and Information Technology Industries Association
JIT	just-in-time
LCD	liquid crystal display
MNCs	multinational corporations
MSMEs	micro, and small, and medium enterprises
ODM	original design manufacturing
OLED	organic light-emitting diode
PCB	printed circuit board
PCBA	printed circuit board assembly
PEZA	Philippine Economic Zone Authority
PIIC	Philippine Institute of Integrated Circuits
PCIEERD	Philippine Council for Industry, Energy, and Emerging Technology Research and Development
PSA	Philippine Statistics Authority
R&D	research and development
ROHS	restriction of hazardous substances
ROW	right-of-way
SEIPI	Semiconductor and Electronics Industries in the Philippines Foundation, Inc.
SEZs	special economic zones
SMS	semiconductors manufacturing service

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

According to the Semiconductor & Electronics Industries in the Philippines, Foundation Inc. (SEIPI), "the Philippine Electronics Industry is classified into 73% Semiconductor Manufacturing Services (SMS) and 27% Electronics Manufacturing Services (EMS). Most of the electronics businesses in the country operate in four key areas: Metro Manila, CALABARZON, Northern/Central Luzon and Cebu. Electronic companies in the country practice the best known methods in manufacturing with capabilities ranging from integrated circuit packaging, printed circuit board assembly and full product assembly."

According to the organization, year-to-date (January – August) data of 2021 shows that PH Electronics Exports has a total value of US$ 29.99 billion. Moreover, 21.50% of the country's electronics exports went to Hong Kong, followed by USA (12.64%), China (12.60%), Singapore (9.15%) and Japan (6.55%), which complete the top five exports destinations of the electronics sector.

The Philippines is host to seven of the world's top 20 chipmakers, which comprise 10% of the global semiconductor manufacturing and supply. In addition, the country supplies 50% of the world demand for 2.5" hard disk drive (HDD) and 10% of the world demand for 3.5" HDD. Three of the largest HDD producers are in the Philippines: Hitachi Ltd. (produces 500,000 HDDs a year); Fujitsu Computer (manufacturers HDDs for desktops, servers and file storage, magneto-resistive heads, and media disk); and Toshiba Philippines (manufactures HDDs, laptops).

The Philippine semiconductors and electronics industry specializes in manufacturing assembly, testing, packaging and distribution. Among the firms investing in the country include Texas Instruments, Toshiba Information Equipment, Inc., Amkor, HGST (A Western Digital Company), and Fairchild Semiconductor (Phil.), Inc., Analog Devices, ONSemiconductor, Cypress, Maxim, NXP, STMicroelectronics, and IMI Electronics.

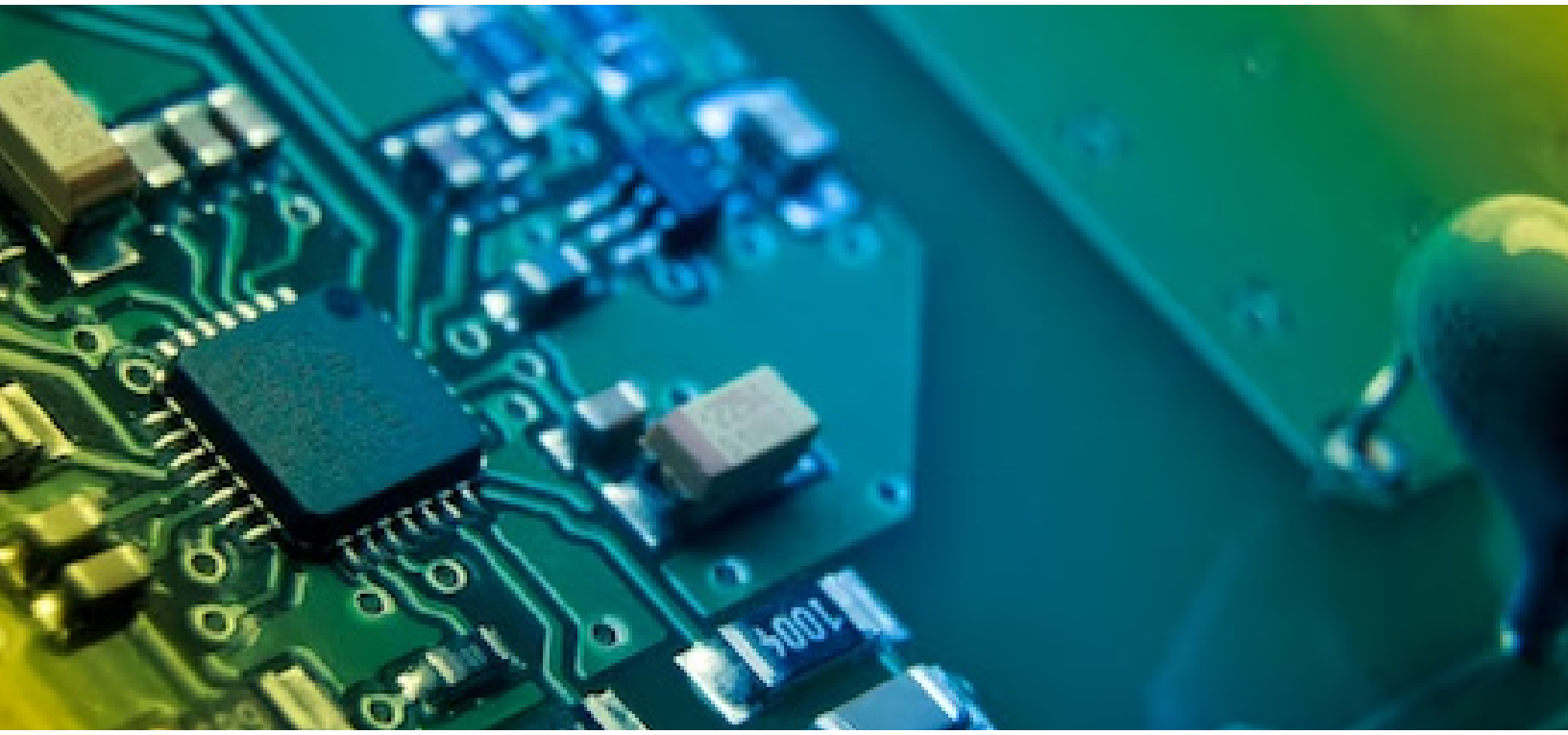
As of first quarter 2013, there are over 424 electronics firms in the Philippines. Majority of electronic firms in major hubs such as those in Baguio, Calabarzon, Cebu, Clark, and Metro Manila are declared as special economic zones. About 73% of the total number of Philippine electronics companies provide SMS services and 27% provide EMS capabilities.

Philippine electronics manufacturers have varied capabilities that include IC packaging, PCBassembly, full product assembly, and R&D. Employed manufacturing methods include Just-in Time (JIT), Total Quality Management (TQM), lean manufacturing (Six Sigma), GJ, BSC, and OPIC. PCBassembly is an EMS. It deals with the main PCBtypes of single-sided boards (circuits on one side only), double-sided boards (circuits on both sides), and multi-layer boards (three or more circuit layers).

The assembly and testing operations in the Philippines involve processes such as materials development, packaging modeling and simulation, process development, semiconductor packaging, test development, and test engineering. Some firms have other capabilities that increase the value- added of these backend operations (i.e., wafer bumping operations).

Advantages and Capabilities

- Critical Mass of Global Players
  - Majority of the electronics companies are located in Metro Manila,CALABARZON, Northern/Central Luzon and Cebu.
- Filipino Workers
  - Highly competitive, English-proficient and skilled workers
  - Trainable (8 weeks/2 months), adept at technology, and short learning curves
  - Wide talent pool as there are about 500,000 who graduate yearly
- Strategic Location
  - Located within 4-hour flying time from major capitals within the region



- A critical entry point to over 500 million people in the ASEANmarket
- A gateway of international shipping and air lanes suited for European and American businesses

The electronics industry roadmap includes five major strategies with specific activities that aim to contribute to the advancement of the industry, as follows:

- Drive Up Our Semiconductors and Electronics Manufacturing (DoSEMI)
- Foster Academic Linkage
- Develop Research and Development Capabilities
- Create Conducive Business Environment
- Reduce Costs of Operation

The industry blueprint Product and Technology Holistic Strategy (PATHS) was developed by the electronics and semiconductor industry to increase the amount of investments and export revenues of the country. Under PATHS, the sector expects annual investments to reach US$1.5 billion by 2020, US$3 billion by 2025, and US$5 billion by 2030.

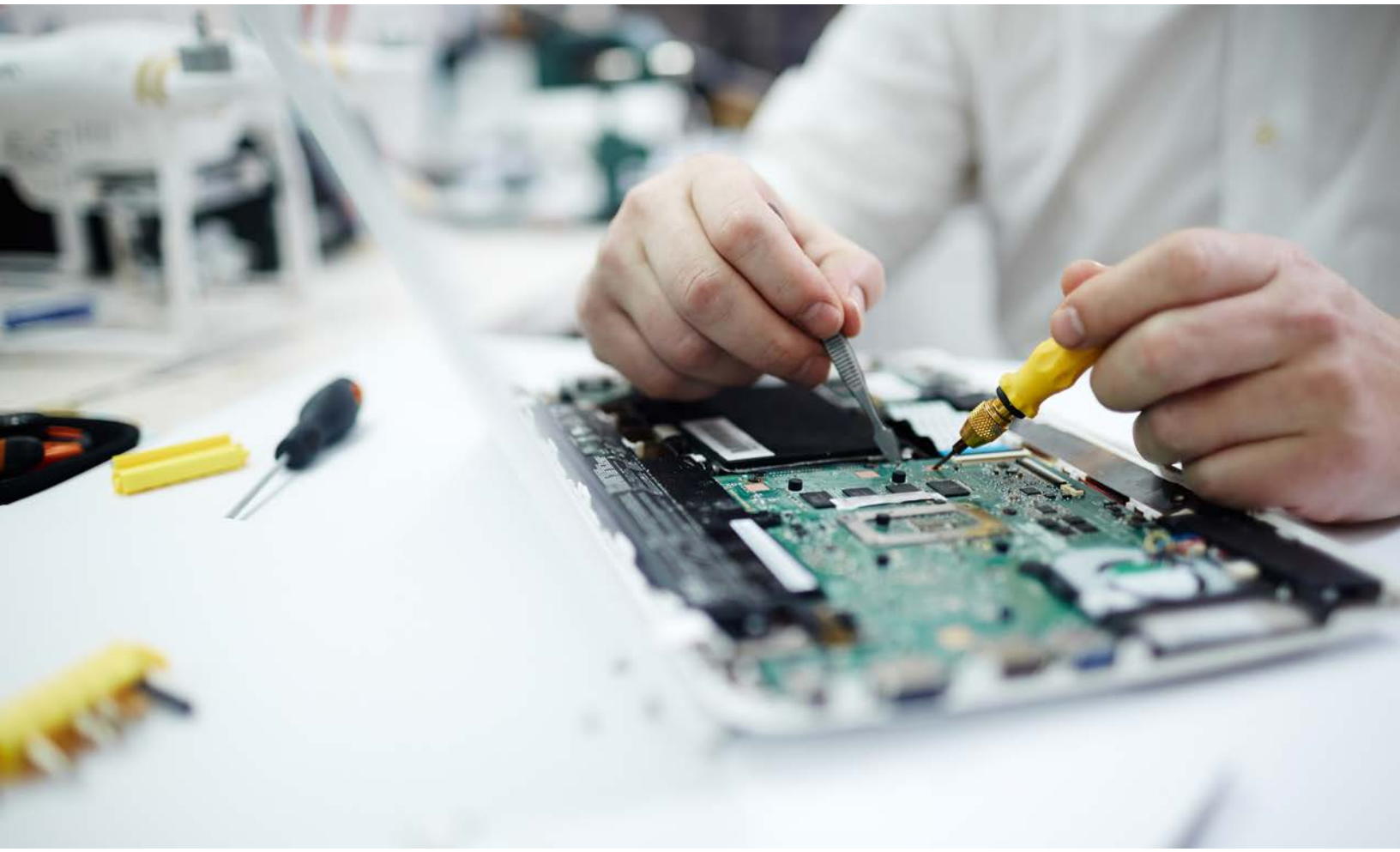
Export revenues are also expected to rise to US$40 billion in 2025 and US$50 billion in 2030.

The Department of Science and Technology Philippine Council for Industry, Energy, and Emerging Technology Research and Development (DOST - PCIEERD) introduced several programs that are relevant to the electronics industry: the Advanced Device and Materials Testing Laboratory (ADMATEL), the Electronics and Product Development Center (EPDC), and the Philippine Institute for Integrated Circuit (PIIC).

BOI, SEIPI, and the Department of Trade and Industry have identified market opportunities or potential players for the advancement of the electronics industry.

Integrated Industry-Government Strategy for Market Growth

- Supply Chain Development
  - Opportunities in the Solar Industry
  - Aggressive Investment Promotion
  - Build stronger linkages with the academe



Global Perspective[1]

Based on an article "MES beyond traceability for the Electronics industry" by Augusto Vilarinho, the "electronics as an industry segment is gearing up to implement and drive value through the implementation of Industry 4.0. Pre-pandemic competitive pressures and wide-spread disruption in demand and supply, combined with workforce availability during the COVID crisis, has propelled industry incumbents to invest in fundamental Industry 4.0 technologies like manufacturing execution systems. The goal is to ensure they can gain automation benefits, improved throughput, better quality and end-to-end supply chain traceability."

Thus, original equipment manufacturers (OEMs) and manufacturers in the sector need to plan and achieve value-chain wide digitalization.

In a pre-pandemic report, McKinsey highlighted the key trends which impact the Electronics manufacturing companies in pursuit of Industry 4.0. The pandemic, has further reinforced these trends while possibly

[1] https://www.criticalmanufacturing.com/blog/mes-beyond-traceability-for-the-electronics-industry/?q=/mes-beyond-traceability-for-the-electronics-industry/&/

forcing top management of companies to align their understanding and expedite activities to respond to new market pressures:

The industry is facing an ever-decreasing product technology lifecycle; technology upgrades are more frequent and faster than ever.

The demand for larger number of product variants is increasing, which implies even in mass production, the need to handle more variants on the same production lines has increased. The market is also becoming more and more competitive.

A skilled workforce is becoming harder to find and retain. High worker turnover and increasing labor costs are becoming prevalent. The pandemic further affected the availability of workers due to lockdowns and social distancing norms, which intensified the trend highlighted by McKinsey.

Shortage of raw materials, stringent regulations and consumer awareness is driving the industry towards a more ecological circular economy-based model.

The transformation of the Electronics industry starts with examining the manufacturing and supply chain practices. This includes improvements in material acquisition, product manufacturing, labor and quality management. Along these lines, McKinsey notes a few key drivers of Industry 4.0 for the Electronics industry:

- Closed loop control through sensor-based inline quality inspection, which translates to automated and real-time quality control and management.
- Reduction of dependence on manual labor through pursuit of widespread automation, including advanced analytics, AR/VR and automated data collection.
- Traceability across the value chain, to extend beyond simple material traceability and cover all aspects of the manufacturing and supply chain processes.

Electronics Global Value Chain

The global value chain of the electronics industry comprises five segments: raw materials and inputs, components, sub-assemblies, final products/ market segments, and distribution/ sales channel.

Storage and/or processing of information are among the capabilities of electronics, implying that products would have semiconductors or integrated circuits (IC). Research and development (R&D) and design activities such as IC design, circuitry design, software, and new product development are other main activities included in the value chain.

Inputs

The inputs and raw materials are needed to make electronic components depend on the product. Among the commonly used materials are silicon and silicon chips (for wafers); various metals (e.g., aluminum and copper, gold and silver); plastic (to form the layers of circuit boards); chemicals; and other materials (e.g., for packaging). Elements

such as boron, gallium, phosphorus, and arsenic are also used in silicon chips to turn a silicon crystal from a good insulator into a viable conductor, or anything in between.

Components

Electronic components are electronic elements that have two or more connecting leads or metallic pads that are intended to be connected, usually

by soldering to a printed circuit board (PCB), to create an electronic circuit. There are two types of electronic components: active components that amplify voltage and control the flow of electric current in a circuit; and passive components, which along with semiconductors, are configured together in an electronic subsystem, the most common type being a printed circuit board assembly (PCBA), for inclusion into a complete electronic sub-assembly.

The most expensive components are ICs (or semiconductors). They are also considered the most important as they enable a product to process and/or store information. Among the various types of ICs are memory, logic, microprocessors, and microcontrollers.

Sub-assemblies

Circuit boards are found in most electronic products and are put into a plastic or metal enclosure to form a sub-assembly. Manufacturers may create PCBA and/or put it in its casing; source raw materials or perform the operations on a contract or consignment basis for another company. The electro-mechanical assembly process, also referred to as "box-build" or systems integration, includes enclosure fabrication, installation of sub-assemblies and components, and installation and routing of cables. This stage is also defined as assembly work other than just PCBA.

Another common sub-assembly in consumer electronics are displays. If included, they are often the most expensive intermediate input. The two main types at present are: liquid crystal displays (LCD) and organic light-emitting diode (OLED). LCD and OLED markets can be classified based on size (i.e., large versus small; TV versus computers/ phones) and on type (e.g., within OLED, there is active-matrix OLED [AMOLED] and passive matrix OLED [PMOLED]).

Final Products/Market Segments

The final assembled product is then a "product-specific" part, meaning it is ready to go into a definable final product.

End markets for final products range from computers and electronics to appliances, cars, medical equipment and devices, industrial equipment, and aerospace and defense (A&D).

Distribution/Sales Channels

The distribution and sales methods depend on the type and relative value of the part. Passive electronic component manufacturers (except for semiconductors) forward more than half of their products via distributors. Semiconductors and PCB companies, on the other hand, sell directly to electronic product manufacturers. Customized products are directly sold to specific buyers, while standard products go through distributors.

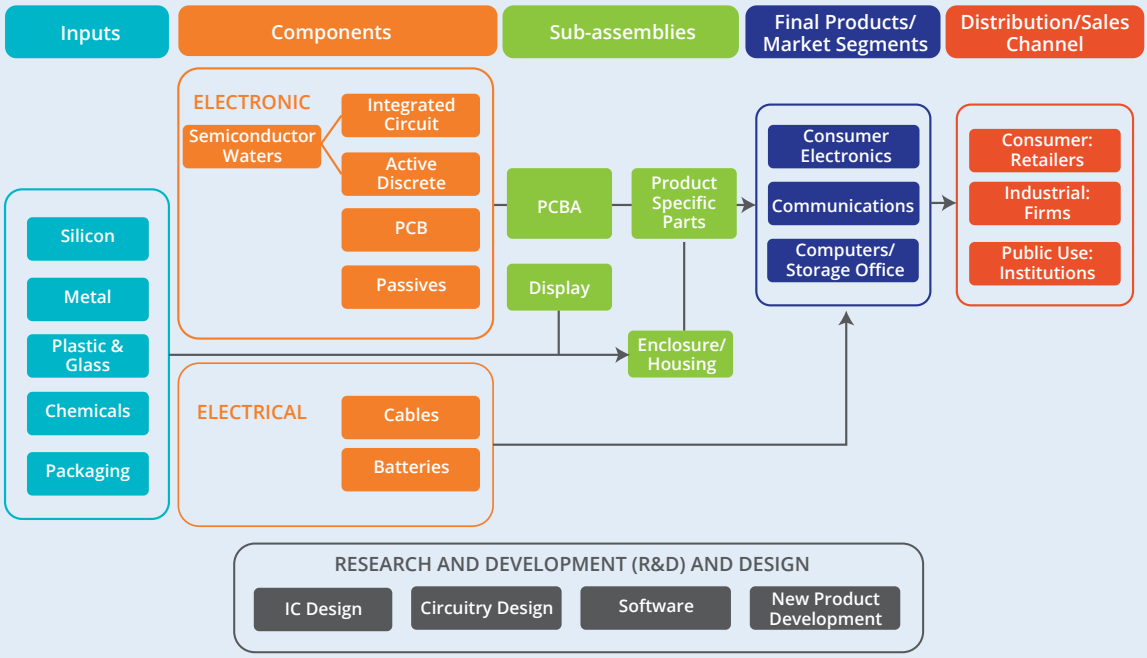
Forecast[2]

The global power electronics market reached a value of US$ 27.8 Billion in 2021. The market is expected to reach US$ 39.9 Billion by 2027, exhibiting at a CAGR of 6.48% during 2022-2027.

Power electronics involves the study, analysis, and design of circuits that convert electrical energy from one form to another. It is widely utilized in consumer electronics, such as television (TV) sets, personal computers (PCs), and battery chargers. Nowadays, several manufacturers are introducing modern power electronics wherein electric power is converted using

[2] https://www.researchandmarkets.com/reports/5562377/power-electronics-market-global-industry-trends?utm_source=GNOM&utm_medium=PressRelease&utm_code=-j4lf9g&utm_campaign=1683137+-+Global+Power+Electronics+Market+(2022+to+2027)+-+Industry+Trends%2c+Share%2c+-Size%2c+Growth%2c+Opportunity+and+Forecasts&utm_exec=jamu2

Figure 1. Electronics "3C" Global Value Chain



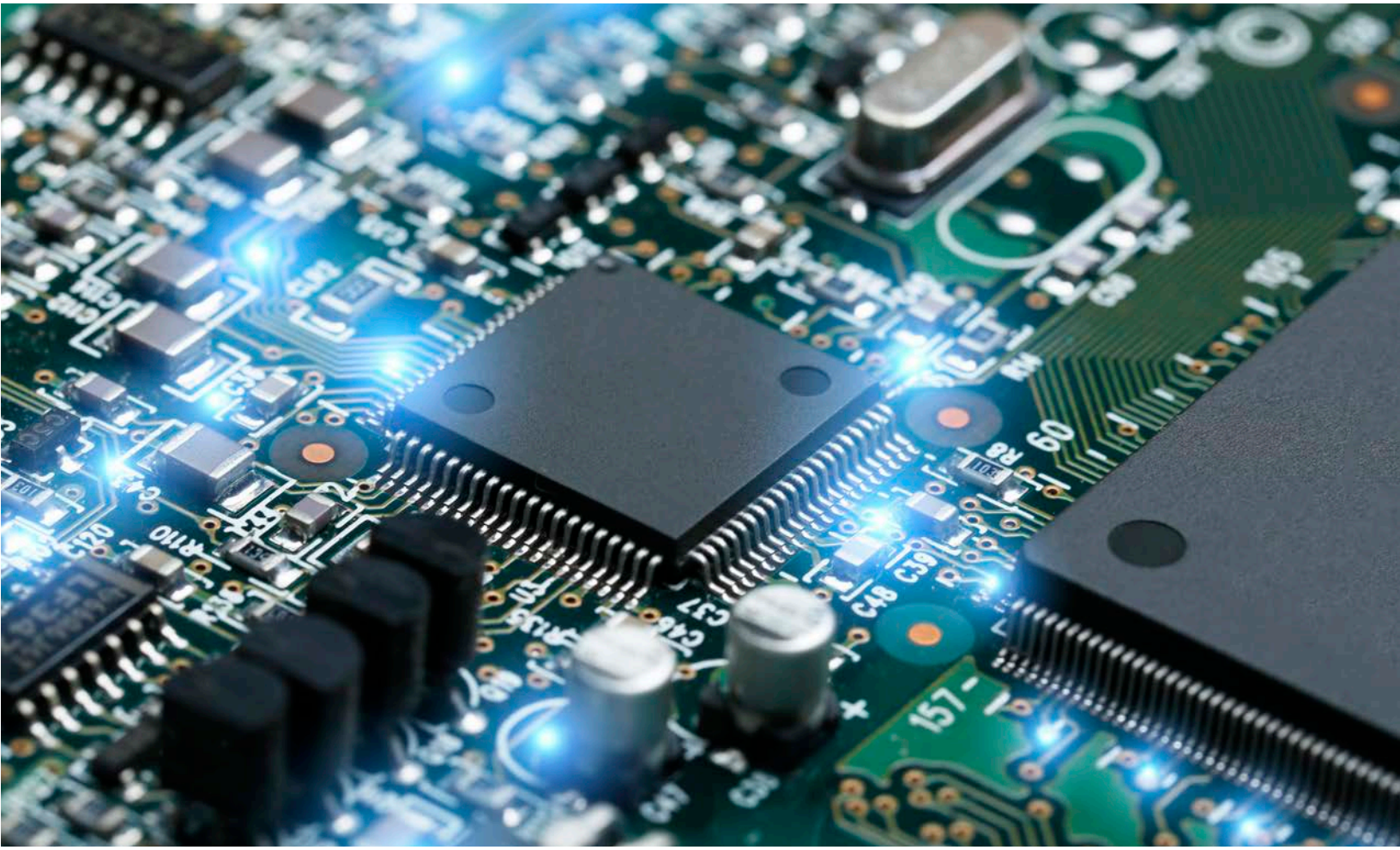
IC = integrated circuits, PCB = printed circuit board, PCBA = printed circuit board assembly.
Note: 3C refers to consumer electronics, computers, and communication devices.
Source: Frederick, 2017; 3C refers to consumer electronics, computers and communication devices.

semiconductor switching devices. Some of these switching devices include diodes, thyristors, and power metal-oxide-semiconductor field-effect transistor (MOSFET) and insulated-gate bipolar transistor (IGBT).

Power Electronics Market Trends:

The increasing reliance on consumer electronics on account of rapid urbanization and rising disposable incomes represents one of the key factors positively influencing the application of power electronics in fan regulators, light dimmers, air conditioners, induction cooking, emergency lights, vacuum cleaners, and uninterrupted power systems (UPS). In addition, the rising adoption of electronic devices, such as pumps, blowers, elevators, rotary kilns, arc furnaces, and compressors, in textile mills and other manufacturing units is fueling the market growth.

Apart from this, it is employed in the automotive industry to enable electric power steering, interior lighting, braking system, seat control, and central body control in vehicles. This, in confluence with the escalating demand for safe, luxurious, and smart vehicles with integrated infotainment systems, is contributing to market growth. Furthermore, the growing construction and mining activities are driving the usage of power electronics in off-the-road (OTR) vehicles. It is also gaining traction in the defense, aeronautics, and spacecraft industries worldwide to supply power and advance control in aircraft, satellites, missiles, space shuttles, and unmanned aerial vehicles (UAVs). Moreover, the surging need for renewable energy sources on account of inflating prices of conventional energy sources and rising environmental concerns is expanding the applications of power electronics in solar and wind panels.



The Philippine Electronics Industry[3]

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[3] https://www.seipi.org.ph/profile/about-the-industry/

Philippine Electronics Exports

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Manufacturing and the electronics industry[6]

Based on data from the Philippine Statistics Authority, in 2018, a total of 337,560 workers were hired under sub-contract agreement in manufacturing industry. The highest share was reported by manufacture of electronic components activities with 51,313 employees (15.2%) followed by manufacture of other food products activities with 25,941 employees (7.7%).

Manufacture of electronic components activities paid the highest average annual compensation. Total compensation of manufacturing industry in 2018 reached PhP 411.2 billion. The average annual compensation per employee engaged in manufacturing activities is at PhP 329.8 thousand.

In 2018, total revenue generated by the manufacturing industry reached PhP 5.8 trillion. Manufacture of electronic components activities had the largest share in revenue with PhP 639.4 billion (11.1%). Manufacture of beverages activities followed next with PhP 405.5 billion (7.0%) and manufacture of other food products with PhP 365.4 billion (6.3%).

Total expense amounted to PhP 5.3 trillion. Total expense, including compensation incurred in business operations by all manufacturing establishments, amounted to PhP 5.3 trillion in 2018.

The manufacture of electronic components activities also had the largest proportion in expense with PhP 580.3 billion (11.0%).

Establishments engaged in manufacture of electronic components activities spent the highest compensation to its employees with Php 58.5 billion (14.2%). Compensation paid by establishments in the manufacture of parts and accessories for motor vehicles activities and manufacture of dairy products activities were reported at PhP 23.4 billion (5.7%) and PhP 22.8 billion (5.6%), respectively.

Almost half (43.3%) of the total value of output was generated in CALABARZON with PhP 2.4 trillion. This was followed by NCR with PhP 1.1 trillion (20.5%), and Central Luzon with PhP 930.3 billion (16.7%).

Among the industry groups, the combined output value of the top ten industries accounted for PhP 3.0 trillion or a combined share of 54.3 percent of the total. Manufacture of electronic components activities contributed the biggest output of PhP 633.0 billion (11.4%), followed by manufacture of beverages with PhP 395.4 billion (7.1%).

Total value added produced by all establishments engaged in manufacturing in 2018 was estimated at PhP 1.9 trillion. Among industry groups, manufacture of beverages generated the highest value added amounting to PhP 249.2 billion (13.2%). Manufacture of electronic components came in second with PhP 189.2 billion (10.0%) followed by manufacture of other food products with PhP 158.0 billion

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[4] Head Office, Makati City.
[5] Head Office, Makati City.
[6] https://psa.gov.ph/content/2018-census-philippine-business-and-industry-manufacturing

The organization SEIPI aims to strengthen the Philippines as a globally competitive business environment for semiconductor and electronics technology.

In support of the industry, the Department of Science and Technology's (DOST) established the Advanced Device and Materials Testing Laboratory (ADMATEL) to improve the industry's current capabilities. The facility contains equipment for failure analysis and materials characterization, thereby lessening production costs and lead time for testing products abroad.

The Philippine government and SEIPI are working to further develop the industry's labor force, including strengthening industry-academe linkages through the promotion of more apprenticeship and immersion programs among firms and training schools.[7]

Programs

DOST-PCIEERD ADMATEL

The Advanced Device and Materials Testing Laboratory (ADMATEL) is a DOST national testing facility equipped with state-of-the-art analytical equipment for Failure Analysis and Materials Characterization. The ADMATEL facility is based on the standards acceptable for a scientific laboratory to accommodate sophisticated equipment, such as Focused Ion Beam – Field Emission Scanning Electron Microscope (FIB-FESEM), Auger Electron Spectroscope (AES), and Time-of-Flight Secondary Ion Mass Spectrometer (TOF-SIMS).

The Php 378 million-facility was established to reinforce and upgrade the capabilities of the local electronics sector and its related industries. It reduces the delays and costs of having products tested abroad.

ADMATEL has already catered to 44 clients from the electronics and related sectors. It is currently being managed by PCIEERD, with SEIPI's guidance.

DOST-ASTI EIAPI EPDC

The Electronics and Product Development Center (EPDC) is a planned facility to strengthen the local electronics and semiconductors industry by enabling local firms to conduct R&D, design, and prototyping of products. It will offer various electromagnetic compatibility services (such as electromagnetic interference pre-compliance testing and harmonics and flicker tests); provide design, prototyping, and testing capabilities for printed circuit boards; provide electronic product prototyping for 3D enclosure design, 3D scanning, and enclosure design simulation, and enclosure prototyping using 3D printer, restriction of hazardous substances (RoHS) analysis, and thermal imaging.

The semiconductor and electronics manufacturing industry is the biggest economic growth driver in the Philippines. Mainly composed of semiconductor manufacturing services (73%) and electronics manufacturing services (EMS) firms (27%), the industry employs around 3.2 million direct and indirect workers. In 2018, the segment 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. SEIPI is the largest organization of multinational and Filipino-owned semiconductor and electronics companies in the Philippines, with over 346 members, including manufacturing firms, allied and support industries, and the academe. For the full year 2019, SEIPI expects the country's electronics industry to register a 3% growth in total exports despite the flat growth in the global semiconductor market.

The Philippine Electronics Value Chain

The Philippine electronics industry is export- oriented. Most of the outputs of electronic firms are sold to their parent companies, thus the majority of their sales represent export sales.

[7] https://industry.gov.ph/industry/electronics/

The industry's expertise has been widely accepted to be in backend semiconductor operations, assembly and test. However, there are several electronic firms that are also into EMS and a few Filipino small and medium-sized enterprises (SMEs) that are into original design manufacturing (ODM).

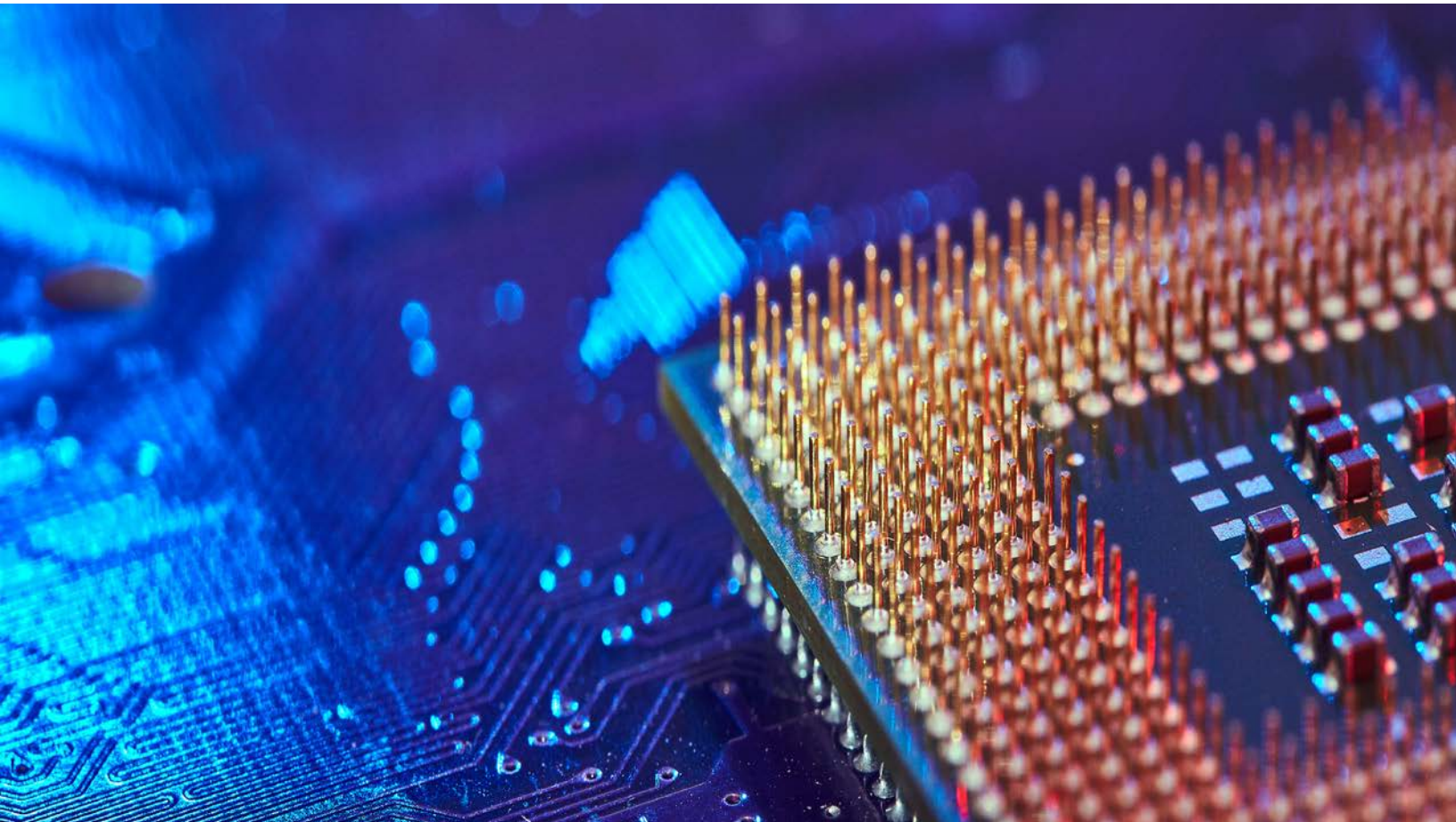
The Philippine Electronics' Technological Capabilities

Philippine electronics manufacturers have varied capabilities that include IC packaging, PCB assembly, full product assembly, and R&D. Employed manufacturing methods include Just-in Time (JIT), Total Quality Management (TQM), lean manufacturing (Six Sigma), GJ, BSC, and OPIC. PCB assembly is an EMS. It deals with the main PCB types of single-sided boards (circuits on one side only), double-sided boards (circuits on both sides), and multi-layer boards (three or more circuit layers).

The Philippines has minimal participation in the actual manufacturing of PCBs. IC packaging is an SMS and is the final stage of semiconductor device fabrication. It involves the encapsulation of a tiny block of semiconducting material with a supporting case (known as the "package") that prevents physical damage or corrosion. The "package" supports the electrical contacts that connect the device to a circuit board. It may either be a through-hole package or a surface mount package (both of which may be made with either ceramic or plastic). The output is the IC that may form a complete electronic system. The Philippines does not manufacture ICs as it currently lacks foundries that would allow for wafer fabrication. IC-related services, however, are present in a handful of electronics firms in the Philippines. These include contract services (i.e., verification, layout, and design services), modifications of ICs, and IC design teams that support factory operations.

The assembly and testing operations in the Philippines involve processes such as materials development, packaging modeling and simulation, process development, semiconductor packaging, test development, and test engineering. Some firms have other capabilities that increase the value- added of these backend operations (i.e., wafer bumping operations).

The identified processes in the electronics sector are often associated with the cost minimization targets of electronics multinational companies (MNCs). The idea is



that these companies export capital and skill-intensive components, which are manufactured in developed economies, to countries with low labor wages and re-export it to target markets. This allows MNCs to exploit differences in labor wages across countries for a labor-intensive operation.

Advantages and Capabilities

- Critical Mass of Global Players
- Majority of the electronics companies are located in Metro Manila,CALABARZON, Northern/Central Luzon and Cebu.
- Filipino Workers
- Highly competitive, English-proficient and skilled workers
- Trainable (8 weeks/2 months), adept at technology, and short learning curves
- Wide talent pool as there are about 500,000 who graduate yearly
- Strategic Location
- Located within 4-hour flying time from major capitals within the region
- A critical entry point to over 500 million people in the ASEAN market

A gateway of international shipping and air lanes suited for European and American businesses

Industry Associations

- SEIPI is the largest organization of foreign and Filipino electronics companies in the Philippines. It aims to develop the country to become a globally competitive business environment for semiconductor and electronics technologies. The association continues to fulfill its mandate through training, research, and development advocacy, information, networking, and services (TRAINS). It regularly engages local suppliers, encourage member firms to participate in trade fairs, and facilitate greater collaboration among large-scale, medium- scale, and small-scale players.

  SEIPI continues to build stronger linkages with the academe and wider network of local enterprises participating in the supply chain. At present, over 30 universities are members of SEIPI, representing industry-academe linkages.

- The Electronics Industries Association of the Philippines, Inc. (EIAPI) was founded to promote the growth of an indigenous, globally competitive electronics industry in the country.

  The association primarily serves its members by acting as an information clearinghouse with regards to the business environment, government regulations, and the like. The association also helps its member companies through nurturing of original design, particularly for the medium and small-scale electronics enterprises.

- The Philippine Electronics and Semiconductor Suppliers Association (PESSA) represents the suppliers' segment of the Philippine electronics industry.
- The Philippine electronics sector, through SEIPI, is actively involved in various electronics associations abroad such as the following:
  - World Electronics Forum;
  - Asian Electronics Forum;
  - ASEAN Electronics Forum; and
  - Counterpart electronics associations abroad (e.g., Japan Electronics and Information Technology Industries Association [JEITIA], the Hong Kong Electronics Industries Association [HKEIA], and the Consumers Electronics Association [CEA], etc.).

Current Initiatives

The electronics industry roadmap includes five major strategies with specific activities that aim to contribute to the advancement of the industry, as follows:

- Drive Up Our Semiconductors and Electronics Manufacturing (DoSEMI)
  - Includes the identification of customers' needs, understanding suppliers' baseline, development of capabilities (particularly of the SMEs), and the periodic assessment of the local players' capabilities

- Foster Academic Linkage
  - The roadmap intends to immerse students in the electronics firms to familiarize them with the industry, enabling them to work in electronic firms either through on-the-job training or residency.
  - It also aims to address industry needs through an updated curriculum of Science and Technology courses and partnership with the Technical Education and Skills Development Authority (TESDA) to develop training regulations for electronics skills and include it as part of the K-12 program.
    - SEIPI works with the Department ofEducation (DepEd) to improve the curriculum of Grades 11 to 12 and Don Bosco Technical Institute to build up the technical skills of students. Over 300 Grade 12 students have been hired to work for the industry.Temic Automotive (Phils.), Inc. works with four universities in Calamba doing internships and scholarships. The company has conducted 140,000 training hours inside its Calamba plant in 2018, including technologies, which are not widely available in schools in the country.
  - Includes the creation of Regional Centers of Excellence, promotion of Distance Learning, and participation in transnational inter-school partnerships
- Develop Research and Development Capabilities
  - Creation of more incubation labs
  - Produce more graduates with MS/ PhDs
- Create Conducive Business Environment
  - Improvement of infrastructure
  - Improvement of peace and order situation
  - Minimize labor disruptions
  - Provide incentives for investments
  - Ensure Competitive exchange rate
  - Ensure Availability of local suppliers
- Reduce Costs of Operation
  - Encourage investments in new or upgraded power plants
  - Promote true open competition in power generation, transmission, and distribution
  - Allow aggregation of power demand from PEZA companies
  - Encourage development of renewable energy
  - Eliminate hidden costs

The industry blueprint Product and Technology Holistic Strategy (PATHS) was developed by the electronics and semiconductor industry to increase the amount of investments and export revenues of the country. Under PATHS, the sector expects annual investments to reach US$1.5 billion by 2020, US$3 billion by 2025, and US$5 billion by 2030.

Export revenues are also expected to rise to US$40 billion in 2025 and US$50 billion in 2030.

Government-Led Programs for Research and Development

The Department of Science and Technology Philippine Council for Industry, Energy, and Emerging Technology Research and Development (DOST - PCIEERD) introduced several programs that are relevant to the electronics industry: the Advanced Device and Materials Testing Laboratory (ADMATEL), the Electronics and Product Development Center (EPDC), and the Philippine Institute for Integrated Circuit (PIIC).

ADMATEL aims to provide local failure analysis and materials characterization capabilities for the electronics sector and its related industries. It houses three laboratories for surface analysis, thermal analysis, and chemical and metallurgical analysis. The facility has already catered to 44 clients from the electronics and related sectors. It is currently being managed by PCIEERD, with SEIPI's guidance. The facility is eyeing ISO standards certification.

EPDC is a planned facility that sets to strengthen the local electronics and semiconductors industry by enabling local electronics firms to conduct R&D, design, and prototyping of electronics products. It would offer various electromagnetic compatibility services, design, prototyping, and testing capabilities, electronic product prototyping (for enclosure design, 3-D scanning, and enclosure design simulation) and enclosure prototyping (using 3-D printer, restriction of hazardous substances [ROHS] analysis, and thermal imaging).

PIIC is a program between PCIEERD and the University of the Philippines Diliman that seeks to expand the capabilities of engineers and graduates in IC design. PIIC is working closely with seven universities for the training (as two-week courses). It has certified 250 students that have undergone the course programs.

Projects

- Development of a Grid-tied Solar Inverter. Undertaken by EIAPI and funded by the DOST-PCIEERD, the project is one of the first electronics R&D projects initiated by an industry association with funding from the government. The product is to be commercialized by the members of the association.
- Charging in Minutes (CharM). Another project of EIAPI, CharM is a fast charger for e-tricycles, which can fully charge in 20–30 minutes.
  The charger includes an onboard Battery Management System, supports cash and smart card payments, and uses industry- standard electronic vehicle (EV) charging outlets
  and plugs.

Investment Policies

- Omnibus Investments Codes of 1987 (Executive Order 226)
- Investments Priorities Plan
  - Entitlement of incentives
  - Equity ownership
  - Equity requirement
  - Regional dispersal of industries
  - Exemption from locational restriction
- Special Economic Zone Act of 1995 (Republic Act 7916)

Potential Upgrading Trajectories

BOI, SEIPI, and the Department of Trade and Industry have identified market opportunities or potential players for the advancement of the electronics industry.

- Integrated Industry-Government Strategy for Market Growth

- The industry may explore opportunities to other segments of the electronics value chain and shift its portfolio from EMS to segments that would enable spillover/ linkage opportunities.
- Promote investments for solar power, aerospace, automotive, medical and military companies.

- Supply Chain Development
  - Encourage a robust supplier base through supplier development or matching.
  - The creation of manufacturing clusters or the identification of production hubs could enable opportunities for SME development and integration of local companies intothe sector's production chain.

    Expansion of IC design activities through a technology center housed at SEIPI, DTI, or DOST, or any other private entity to increase opportunities for design startups and students to access IC design.
  - According to SEIPI, there are only about four or five IC design companies in the country. In comparison, Taiwan has some 1,000 design companies that employ some Filipino engineers.
  - To produce IC design prototypes, a wafer fabrication would also be needed.

- Opportunities in the Solar Industry Subsector
  - The presence of two large solar companies in the world namely Solaria Corporation and SPML in the Philippines represent opportunities to help attract other companies in the solar supply chain that specialize in other products and capabilities (e.g., solar glass, frames, equipment design, automation, etc.).
  - SEIPI envisions the Philippines to become a solar manufacturing hub in Asia by leveraging the presence of existing solar companies to establish its own local solar industry.
- Aggressive Investment Promotion
  - Target emerging markets that are expected to achieve faster economic recovery rates (e.g., India, China, ASEAN)
  - Capture export-oriented foreign direct investments (FDI) from EU and Japan as well as investments into the economic zones
- Build stronger linkages with the academe
  - Electronics companies must be involved in curriculum development and develop the education system to be more receptive to industry's needs.
  - Faculty and students, as stakeholders from the academe, should be immersed in the sector's developments. Partnerships between the academe and the industry must be institutionalized.
  - Donated equipment and materials by electronics companies may be improved with a simplified system or process.

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

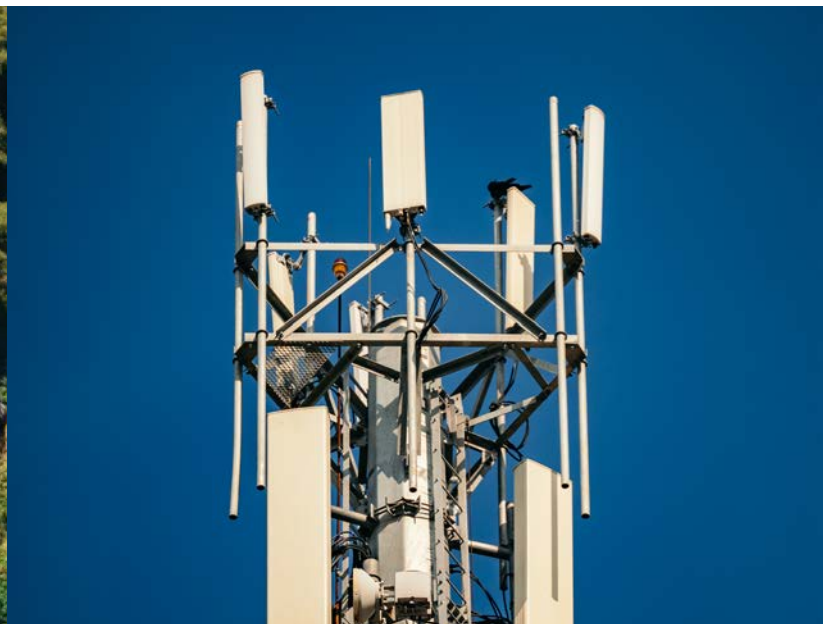
As part of the park's sustainability efforts and waste management, FPIP treats domestic effluents in its Centralized Wastewater Treatment Facility (CWTF). Wastewater from park locators is treated in the CWTF and becomes available for recycling or reuse. With this, groundwater extraction is reduced, and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