

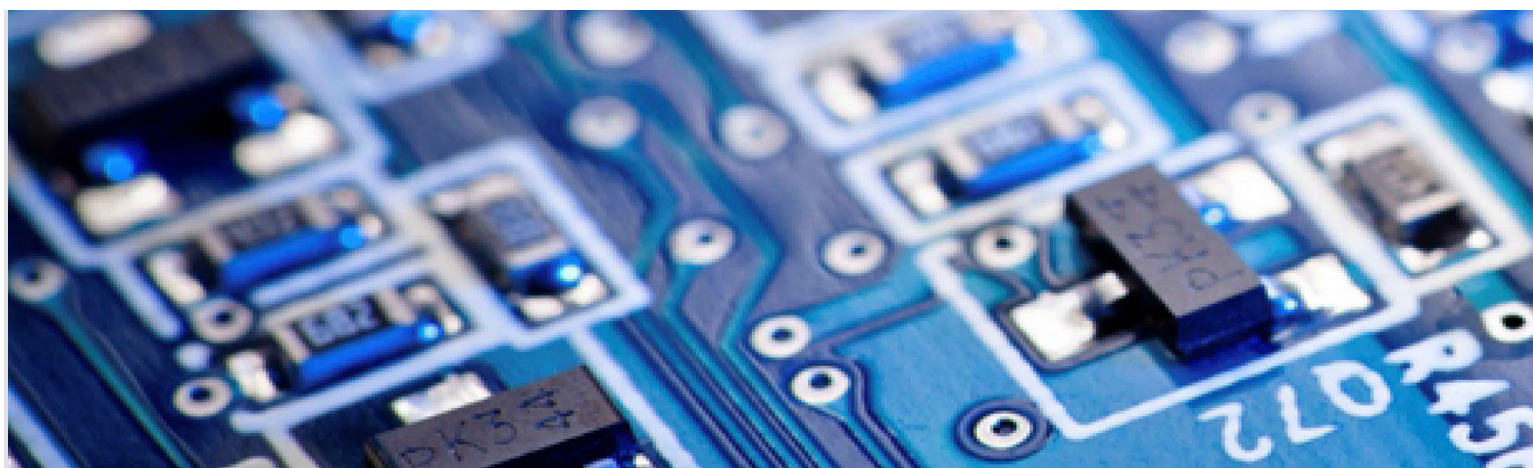


PHILIPPINES ELECTRONICS COMPONENTS MANUFACTURING

2017

STEPS TO REGAIN COMPETITIVENESS

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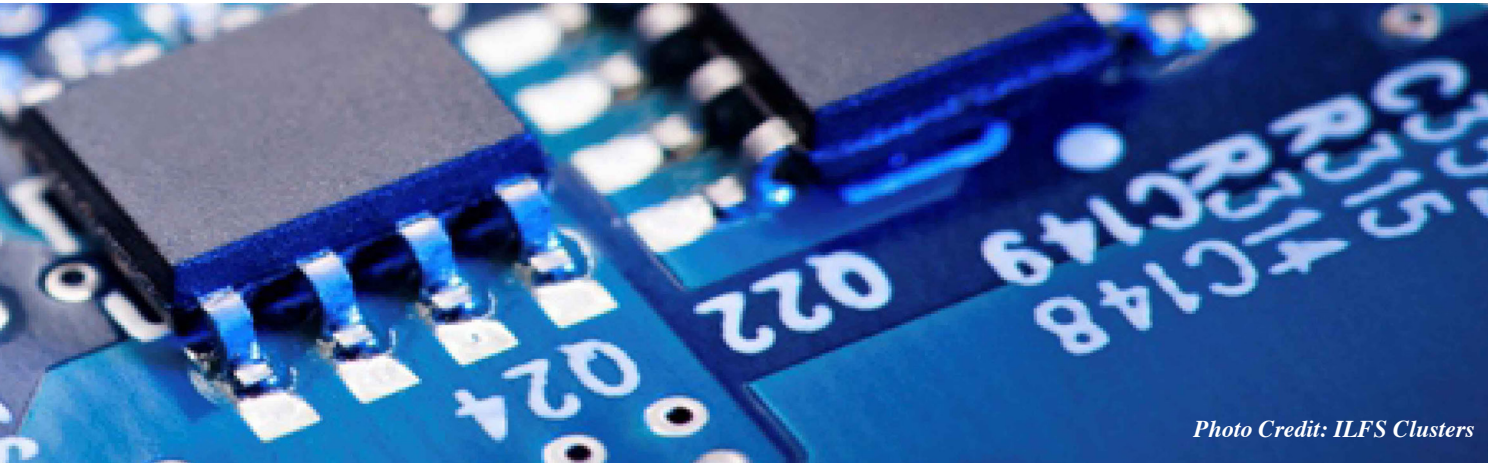


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1. Executive Summary

ELECTRONIC COMPONENTS CLUSTER

Electronics manufacturing is the most important industry of the Philippines. Electronics exports from the Philippines totaled US\$28.6 billion in 2016, accounting for more than 50% of the country's exports. The industry has been an important source of jobs and foreign direct investment, attracting multinational companies like Intel, Acer, Texas Instruments, and Toshiba to invest in the Philippines.

PHILIPPINES OVERVIEW

The Philippines has been categorized as a lower middle income country by the World Bank with a GDP per capita of US\$2,904 in 2015. This Southeast Asian nation has a young population, advantageous location, and open economy favorable for trade, but fragmented geography, natural disasters, political instability and weak institutions have hampered development.

CLUSTER PERFORMANCE

The economy of the country has transitioned from agriculture to manufacturing and now to services. In the 1980s, agriculture formed 1/4 of the economy. Agriculture now accounts for only for 10.3% of GDP, while industry and services account for 30.7% and 59% respectively. The electronics cluster, which is one of the most important industries, started developing in the 1970s when electronics manufacturers from developed countries began locating their operations in the Philippines to take advantage of cheap labor and favorable location. Historically, the cluster has been dominated by foreign multinational corporations with very little contribution of local firms.

CLUSTER COMPETITIVENESS

While electronics manufacturing is one of the Philippines' most competitive sectors, its global competitiveness has declined between 2000 and 2010, which is a cause of concern for the country. One of the major reasons for this decline is the focus of the cluster on producing low value added intermediate components as opposed to high value added finished products. Labor productivity has also not improved significantly, and continues to lag the level of other regional economies like Malaysia, Thailand, or Singapore.

RECOMMENDATIONS

The Philippines government is aware of the challenges facing the electronics cluster and plans to help it transition from low value added components to high value added products. To move up the ladder, we recommend that the government should attract highly skilled Filipino engineers and technicians from abroad through a special scheme and try to retain them in the country. It should also promote a R&D culture by increasing R&D investment and attracting leading multinationals to perform R&D in the Philippines. The cluster players, in coordination with the government, should focus on improving the perception of the Philippines' electronics products which are currently perceived to be low quality. Finally, more can be done to help the Philippines be promoted as a high quality global "brand".



2. Country Overview

GEOGRAPHY

The Philippines is an archipelago of 7,000 islands with a total area of 300,000 square kilometers between the Pacific Ocean and the South China Sea (World Bank, 2017).

The country has a long coastline with natural harbors like Manila Bay. Its land is fertile and suitable for crops like rice, corn, sugarcane and tobacco. Therefore, agriculture was the main source of livelihoods until the 1970s. There are extensive mineral deposits in the country, including metals like nickel and copper and non-metals like clay, guano, asphalt, feldspar, sulfur, talc, silicon, phosphate, and marble.

POLITICAL STRUCTURE

Politically, the Philippines is a republic with a presidential form of government. Powers are divided among the executive, legislature and judiciary. Executive comprises of the president, vice president and cabinet. The legislature is divided into Senate and House of Representatives, and is responsible for making laws. The judiciary comprises the Supreme Court and lower courts. The Supreme Court also has the power of judicial review and to declare any law, agreement or treaty unconstitutional.

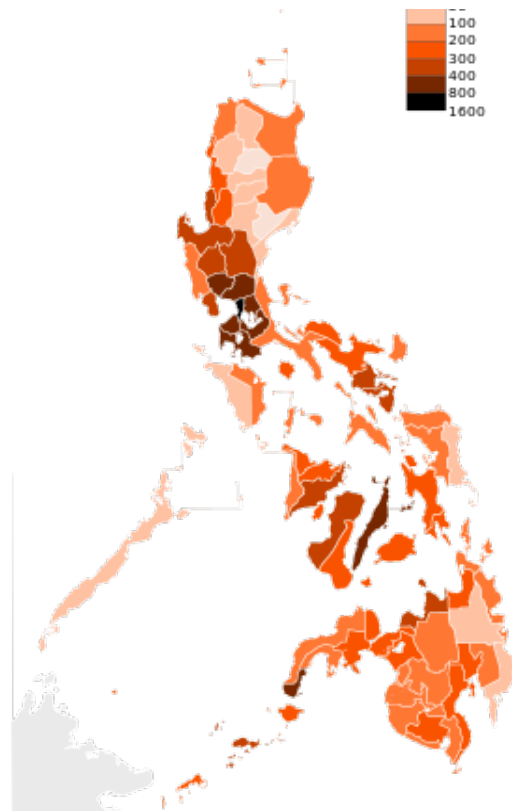


Figure 1. Population density of the Philippines (Wikipedia)

ECONOMIC OVERVIEW

During World War II, Japanese occupation destroyed much of the Philippines' economy and infrastructure. Since independence, the country has had a checkered economic performance and developed economically by fits and starts. The economy suffered from many problems common to other developing countries, such as political instability, corruption, poor macroeconomic management, external debt, over reliance on aid, inequality and crony capitalism.

100 million
population

In 2015, the Philippines had a total population of 100 million with a life expectancy of 68.4 years, which is below average for the region. However, the Philippines, unlike China, Japan and Thailand, has a young population which speaks good English. This has proven to be an asset for business process outsourcing like call centers, software development and back-office services. Furthermore, 8 million Filipinos work abroad and revenue from remittances was US\$30 billion in 2015.

The GDP per capita of the Philippines has quadrupled to US\$2,904 in 2015 from only US\$715 in 1990. However, it still lags behind other countries in the region like China (\$8,069), Indonesia (\$3,346), Malaysia (\$9,768), Thailand (\$5,814) and Singapore (\$52,888). This laggard status is particularly poignant considering that the Philippines was richer than these countries in the 1970s.

ECONOMIC HISTORY

After independence, the Philippines became dependent on the United States, its former colonizer, for reconstruction and the revival of its economy. As a consequence, the country had to open its borders to American goods in order to receive aid. This resulted

in large trade deficits that forced the government to impose capital controls, restrict imports, and follow a policy of import substitution during the 1950s.

This policy worked for some time and growth in manufacturing sector averaged 12% growth in the first half of 1950s and contributed 7.7% to GNP. However, manufacturing declined in

to increase minerals and agricultural exports. The efforts of liberalization by the government, however, were met with stiff resistance from industrialists and the government re-imposed tariffs in 1968 to give a boost to domestic manufacturing.

The 20 year rule of Ferdinand Marcos (1965-1986) had deleterious effects on the economy of the Philippines, especially after the imposition of martial law in 1972. Marcos promoted crony capitalism, which undermined healthy competition in business.

While the economy grew on an average of 6.4% in the 1970s, mostly on the back of increased commodity prices, this growth came at a great price for the Philippines. The total international debt of the country rose from US\$2.3 billion in 1970 to US\$24.4 billion in 1983. Debt servicing became increasingly difficult, forcing the government to renegotiate and restructure its debt several times.

Economic growth has lagged regional peers

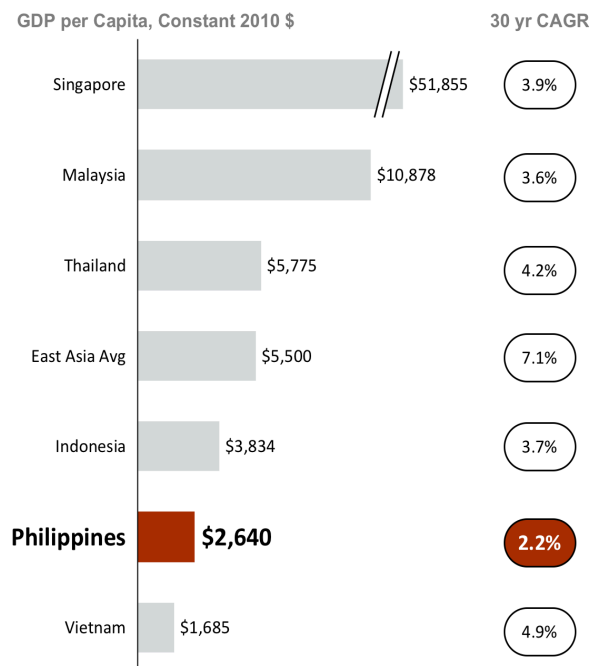


Figure 2. GDP per Capita (World Bank)

the second half of the 1950s, imports increased, and there was corruption in foreign exchange allocation.

The government was forced to reverse the policy, devalue the Peso, and reduce tariffs in 1962 to spur exports, helping

This debt crisis increased the influence of the World Bank and International Monetary Fund in the country, both of which encouraged foreign direct investment in the country. Declining prices for the Philippines' exports in the world market in the early 1980s, coupled with financial scandals and reckless borrowing of government owned financial institutions exasperated the situation.

This gave rise to an economic crisis in 1983. The murder of Senator Benigno Aquino, the chief rival of the president, also resulted in political crisis. Marcos' government never recovered from these crises and he ultimately fled from the country in 1986, giving way to

\$2,640
GDP per
capita

Corazon Aquino.

Under President Aquino, the economy briefly recovered in 1986 but again ran into difficulties in 1988 due to power shortages, trade and fiscal deficits and natural disasters like drought and earthquake. In the 1980s, the economy performed poorly and real GNP grew at an average annual rate of only 1.8%, while population growth rate was 2.5%. In 1990, the per capita GDP was only US\$715 and unemployment 8.3%. Aquino tried to revive the economy, but soon came under the influence of international creditors and a strong business community.

Aquino had to deal with two contentious issues. First was the servicing of an onerous \$28 billion debt. Some economists suggested repudiating the debt, as it may not have been possible to both service the debt and revive the economy. However, repudiation was rejected by the President due to the influence of powerful business interests and creditors. The second issue was land reforms. Economists believed that distribution of land through reforms was necessary to give a boost to domestic demand. However, the government failed to institute meaningful land reforms as Congress was dominated by large landowners.

However, her successor President Fidel Ramos (1992-98) successfully addressed many challenges faced by the economy. The power shortage was overcome and infrastructure was improved. The banking system was reformed and

(1997-98) affected the Philippines but it was able to recover more quickly in comparison to neighboring economies.

President Joseph Estrada (1998-2001) revived corruption and cronyism. However, under President Arroyo (2001-2010), the economy improved. It was in this period that exports of electronics equipment from the Philippines picked up. Companies like Texas Instruments

after briefly slowing down in 2009, the economy grew at an average of 6.2% annually between 2010 and 2015 under Benigno Aquino III.

BUSINESS ENVIRONMENT

According to the World Economic Forum's Global Competitiveness Report, the Philippines is ranked 57th out of 138 countries for competitiveness. These

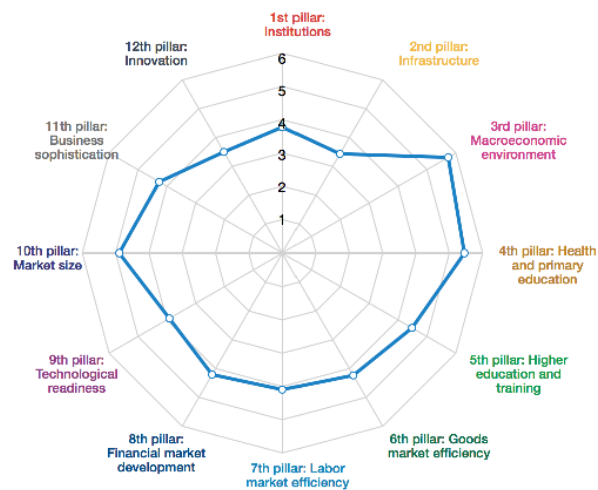


Figure 3. Philippines rankings on competitiveness (World Economic Forum)

and Toshiba located operations in the Philippines, preferring it over China. The country started exporting disks, computer parts, and microchips.

GDP grew by more than 5% for three consecutive years before the Global Financial Crisis hit the Philippines' economy in 2008. At that time, two thirds of overseas sales from the country

findings reinforce the constraints that our team has identified within our Porter Diamond analysis.

Institutions

Institutions are considered weak in the Philippines, as corruption is a major problem, public trust in politicians is low, and the legal system is inefficient. Investors are poorly protected and police services are unreliable. Terrorism, crime, and violence also impose considerable costs on business.

Infrastructure

The quality of roads, railroads, and air transport is poor.

Macroeconomic Environment

The Philippines has a stable macroeconomic environment, as inflation and the budget deficit are under control, and the country's credit rating is good.

The Philippines is ranked 57th out of 138 countries for global competitiveness

monopolies were broken. It was during this time that electronics companies like Acer and Intel invested in the Philippines. GDP growth averaged 5% and inflation came down from 25% to single digits. The East Asian Financial Crisis

was comprised of electronics components. The Crisis resulted in reduced demand for microchips and electronics components, and the Philippines' economy suffered badly along with other East Asian economies. However,



Figure 4. Porter Diamond for Philippines (Team Analysis)

Education

While the Philippines has a large English-speaking population, the overall quality of education is low and the country has no higher education universities that are globally ranked.

Goods Market Efficiency

Many markets are inefficient in the Philippines and anti-monopoly policies are not effective. It takes 29 days to start a business due to excessive procedures and customs clearance is difficult.

Financial Market Development

The Philippines lags behind Singapore, Thailand, India, Indonesia, and Malaysia

in terms of financial markets development.

Technological Innovation

The country is ranked at 83 and 62 for technological readiness and innovation respectively. For technological readiness, it is better than Indonesia and India, but lags behind China, Malaysia, Singapore and Thailand. It is behind all these countries in innovation.

COMPOSITION OF ECONOMY

According to the World Bank, agriculture accounts for 10% of the Philippines' economy, while industry and services account for 31% and 59% respectively.

Agriculture

In 1980, agriculture comprised 1/4 of the Philippines' GDP, with rice, sugarcane, bananas, pineapple, coconuts, corn, fish, eggs, pork and beef being the main agricultural products. Over the years agriculture has lost its prominence to services and industry and now accounts only for 10.3% of GDP (Prableen Bajpai, 2017). However, agriculture still employs around 30% of the labor force.

Industry

The industrial sector has been a major contributor to the Philippines' economy. From 1980 to 2014, it averaged 34% of GDP. In 2015, it accounted for 30.7% of the GDP and employs 16% of the workforce. The electronics industry, which is the country's major source of exports, started in the 1970s and attracted investment from developed countries due to the benefit of low cost production offered by the Philippines.

Services

Services have overtaken the industrial sector in the Philippines, now accounting for 59% of the GDP and employing 54% of labor. Within services there are three major segments: business process outsourcing, tourism, and export work services.

Business process outsourcing thrived in the Philippines due to the English and technical skills possessed by its workforce. However, Tourism has not been able to tap its full potential, and lags Singapore, Thailand and Malaysia due to the poorer quality of services to tourists. Export work services has become an important segment, as the remittances from Filipinos in other countries comprise 10% of GDP.

PRODUCTIVITY

According to the International Labor Organization, labor productivity in the Philippines is low compared to China, Malaysia, Indonesia, Singapore, and Thailand (ILO, 2017). The Philippines' productivity has increased by only 22% over the past 7 years.



Photo Credit: Singapore Business Times

3. Electronics Cluster

CLUSTER PROFILE

Electronics and electrical equipment (E&E) is a huge global market, encompassing a range of different products in industries such as automotive, medical, aerospace, defense, industrial equipment, as well as consumer electronics, communication, storage and office equipment, and consumer appliances. According to UN Comtrade, total world exports of electronic and electrical equipment was approximately US\$2.3 trillion in 2015.

The industry is heavily standardized both in terms of product and process by engineering bodies such as Institute of Electrical and Electronics Engineers, or industry standardization body such as Electronic Industry Alliance. Such standards allow for the fragmentation of the manufacturing process, so that different electronics and electrical components can be manufactured in different locations. Our report will focus on the electronics and electrical components sub-sector in the Philippines.

The type of products in E&E components include passive electronic components (capacitors and resistors), semiconductors (wafers, integrated circuits), printed circuit boards, and transmission and distribution devices (transformers, switchgear, storage component). Residing in the middle in the value

chain, the sector receives inputs such as raw materials or more upstream electronic components, and produces components that serve either large electronics players downstream (Apple, Samsung, Sony, etc) that own the marketing, retail and distribution of final products, or original equipment manufacturers such as Foxconn.

CLUSTER TIMELINE

The industry is highly driven by foreign direct investment, starting in the early 1970s with investment from Intel. After the initial wave of investment led by American and European companies, Japanese companies began their investment in the mid-1980s, while Korean investments began in the 2000s. Today, foreign investment in the E&E components account for almost 72% of the industry.

Foreign companies that invested in the E&E industry mostly stayed for the long term, with many operations dating back to the 1970s or 1980s. However, the 2008-2009 global financial crisis led to lower demand for electronics components. The lower demand, coupled with the exit of Intel in 2009, impacted industry growth negatively. However, 110 new investments were made during 2010-2015, a sign that the industry has started to recover again.

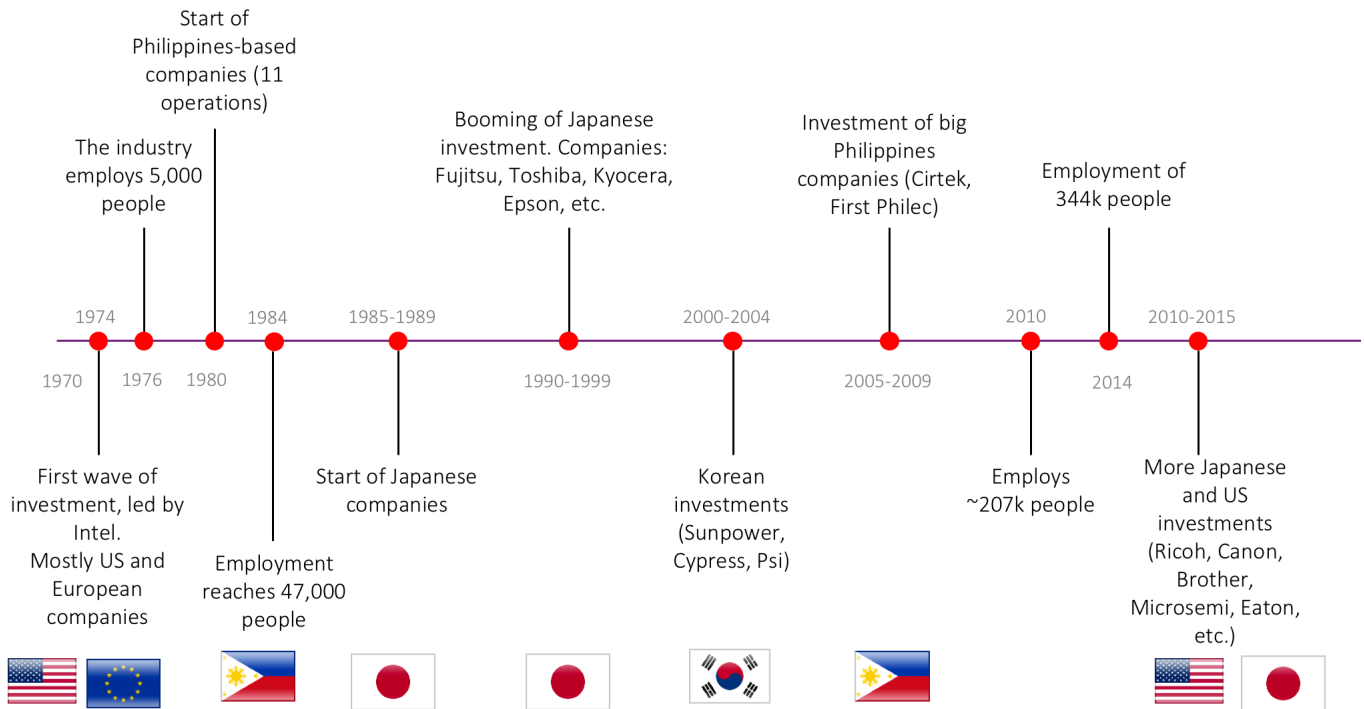


Figure 5. Timeline of cluster development (Duke University; Team Analysis)

Electronic and electrical component manufacturers

At the center of the cluster are the electronic component manufacturers themselves. The Semiconductor and Electronics Industries in the Philippines Foundation (SEIPI) records membership of 261 companies from an approximately total number of firms of 926, which mostly resides in north western area of Philippines. The industry employs approximately 2.2 million workers.

Supporting institutions

At the bottom of the map are 4 key groups of institutions that support the cluster.

1. Educational institutions (universities and technical high schools)

Production workers account for 77% of total employment (Philippines NSO, 2013). Typically, production workers are graduates from technical/vocational high schools that specialize in training for the electronic and electrical field. Newly hired workers then undergo

short training programs (~2 months), often conducted by the company or the industry association (SEIPI).

Other than the production workers, the industry also attracts graduates from local universities, both engineering and non-engineering. Several universities with engineering and management program, such as Batangas State University, Ateneo de Manila University, Central Luzon State University, Mapua Institute of Technology, and De La Salle University serve as talent pools for the industry.

SEIPI estimates that there are approximately 500,000 graduates every year that are readily employable in the industry. They are competitive, trainable and usually English proficient workers[8]. The workers in the industry enjoy approximately 17% higher compensation than their peers in other industries (Philippines NSO, 2013).

2. Research institutions

In 2007, concerned about the lack of engineering and research talent among Filipinos, seven deans of the top

engineering programs in the Philippines established the Engineering Research and Development for Technologies (ERDT). The ERDT is a consortium of eight universities that provide graduate level engineering education, focused on research and development.

Key members of this consortium include Ateneo de Manila University (ADMU), Central Luzon State University (CLSU), De La Salle University (DLSU), Mapua Institute of Technology (MIT), Mindanao State University – Iligan Institute of Technology (MSU-IIT), University of the Philippines (U.P.) Diliman, and U.P. Los Baños and University of San Carlos (USC).

3. Industry groups

The Semiconductor and Electronics Industries in the Philippines Foundation (SEIPI) was established in 1984 to promote business interests of its members, to act as the industry representative to coordinate with the Philippines government, and to enable sharing of knowledge and best practices among its members. It is now the largest organization for foreign

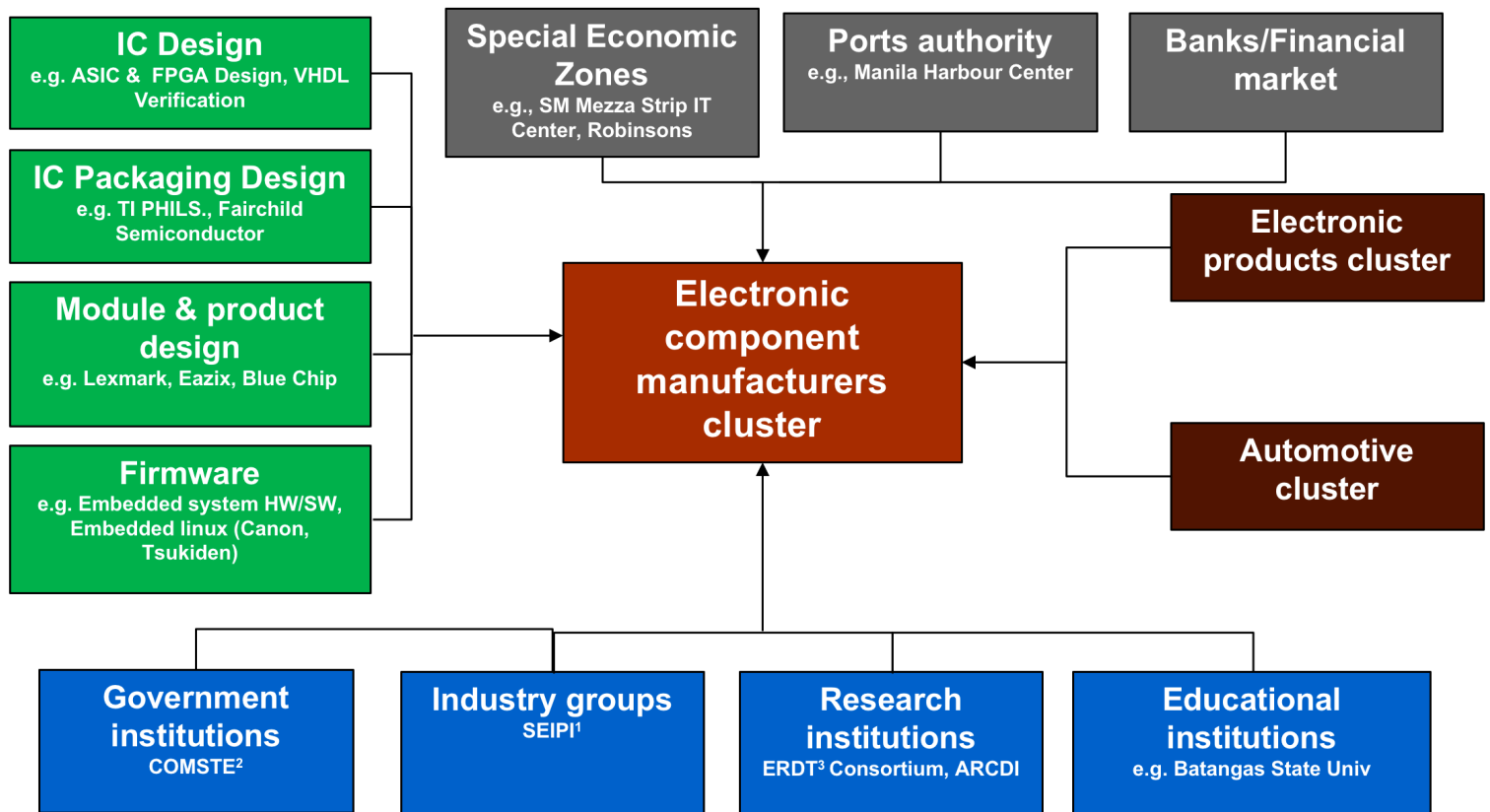


Figure 6. Map of the Philippines' electronics components manufacturing cluster (Team Analysis)

and local electronics companies in the Philippines, and is considered the most organized industry association in the country.

The organization boasts a total membership of 264 companies, including large multinationals as well as local Filipino companies. It provides services in the areas of Training, Research and Development, Advocacy, Information, Networking and Services (T.R.A.I.N.S.) [13]. It provides industry publications, industry events, and training program such as Teen for Work Scholarship Program (TWSP), which grant scholarships and training for high school graduates to undergo two weeks of training before being deployed to electronic companies.

4. Government institutions

Various government institutions support the industry. Congressional Commission on Science, Technology

and Engineering (COMSTE), a bicameral committee created by a joint resolution of the 13th Congress (starting on July 2004), advance innovative programs and legislation to improve Philippines' competitiveness in science and technology. One of the special panels in the COMSTE is the electronics and semiconductor panel. The Philippines Economic Zone Authority (PEZA), part of the Department of Trade and Industry, promotes and administers the country's Special Economic Zones, where many of the electronics manufacturers are located.

Design and Firmware

Although still nascent, there is a growing silicon design and development industry in the Philippines (at the left of the cluster map). The sector sits higher up in the value chain, typically requires more technical and engineering backgrounds, and has a higher value added than components

manufacturing.

Young (2010) notes that below design companies are presence in Philippines:

Integrated Circuit design: Application Specific Integrated Circuits (ASIC) and Field Programmable Gate Arrays (FPGA) design, VHDL (VHSIC Hardware Description Language) verification, conducted by companies such as Intel, Sanyo Semiconductor, Eazix, Symphony, Bltmicro

Integrated Circuit Packaging design, operated by TI Phils, and Fairchild Semiconductor

Module and product design, with companies such as Lexmark, Eazix, Blue Chip

Firmware: embedded system both hardware and software, such as Canon IT and Tsukiden.

Enabling Institutions

Three type of institutions at the top of the cluster map serve as enabling institutions for the electronic cluster. Special Economic Zones (SEZ), operated by the private sector and/or the government, allow manufacturers to start and operate operations more smoothly.

Most of the factories are located in the SEZ, and benefits from incentives such as income tax holidays, tax and duty

cluster is able to take advantage of 27 major shipping ports operated under the Philippines Port Authority, a government-owned enterprise under the Department of Transportation and Communications. Private port companies, such as Harbour Centre Port Terminal, often also jointly operate a Special Economic Zone and port, providing smooth supply chain from raw materials importing to manufacturing to export/shipping.

cluster and the electronic products cluster. The electronics component cluster supplies components such as navigation sensors, automotive wire and cables, and electric motors to the automotive cluster in the Philippines. Although the size of automotive industry is still relatively small compared to peers, with an annual capacity of only 250,000 units compared to 1.5 million units in Thailand, the industry still enjoyed double digit growth in 2015

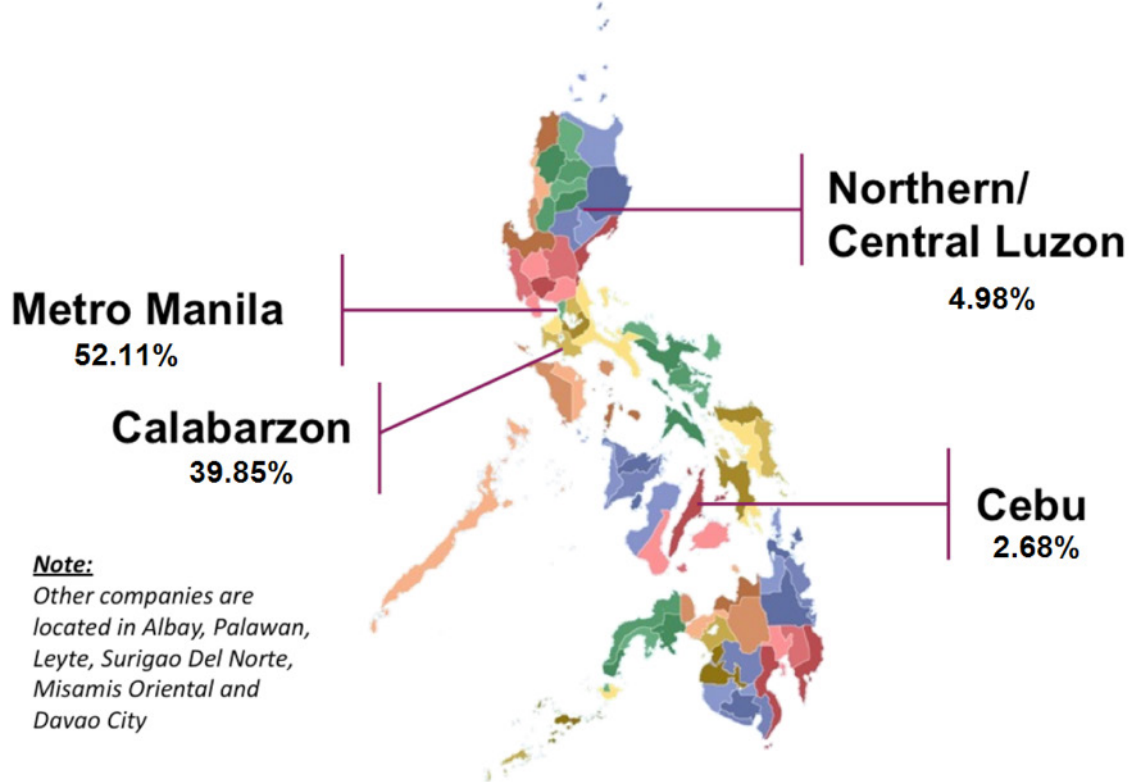


Figure 7. Geographic distribution of the cluster (PEZA)

free importation of raw materials, VAT zero-rating of local purchases, simplified import-export procedures and special immigrant and non-immigrant visa process.

The authority overseeing the SEZ, PEZA, promises fast turnaround especially for electronics manufacturing of four days to complete a production cycle, consisting of one day of receiving and custom processing of raw materials, two days for manufacturing, and one day for import process.

Being an archipelago, the electronics

Although most of the investment in the electronic components cluster is Foreign Direct Investment, 28% of the cluster is comprised of Filipino-owned enterprises that benefit from financing provided by various Filipino banks and financial institutions, such as BDO Unibank, Metropolitan Bank and Trust Company (Metrobank), Bank of the Philippines Island (BPI).

Other Clusters

The electronics component cluster also benefits from the growing demand of other clusters, such as the automotive

(27.6%) and 2016 (24.6%).

The finished electronic products cluster is also a big sector in the Philippines. The sector, which is comprised of consumer/communication sector, computer/storage/office equipment, industrial equipment, consumer appliances, and medical equipment, accounts for US\$ 10.5 billion in 2014 export and consists of approximately 320 firms. The sector provides local demand for the electronic component cluster, aside from final demand from final products manufacturers or OEM plants abroad.

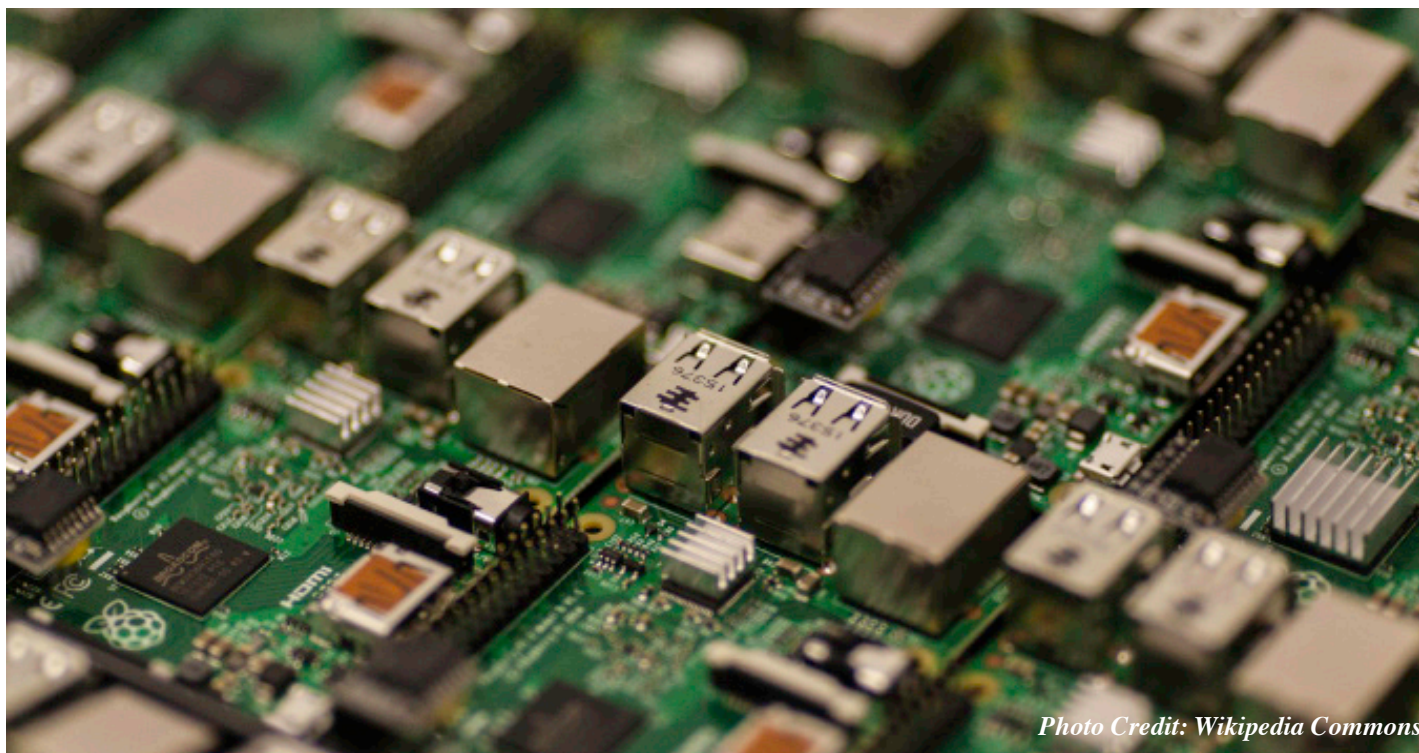


Photo Credit: Wikipedia Commons

4. Cluster Competitiveness

HISTORICAL PERFORMANCE

The electronics cluster has been the Philippines' economic backbone and icon of economic transformation since the mid 1970's. Before the growth of the electronics sector, the country was sustained on exports of agricultural and forestry products with limited value-add such as coconut oil, copper metal, and plywood for much of the last century.

Since then, the electronics industry has grown rapidly and has become the country's top export with total receipts of \$2.47 billion, accounting for 51.6% of the total exports revenue by 2017. Among electronics products, semiconductors constitute the largest share with 35.9% of total electronics production.

The electronics industry is also an important source of employment due to its labor-intensive operations. In 2014, the sector directly employed 344,450 workers through 258 firms and contributes around 1.9 million indirect jobs. The industry also is the largest source of FDI in the Philippines due to the dominance of foreign multinational corporations.

ECONOMIC IMPACT

The multiplier effect of the electronics cluster is also large, indicating its significant impact on the Philippines' economy. According to SEIPI, every 1 peso increase in export sales

generates at least 0.12 cents in additional indirect taxes for the economy and 0.11 cents to 0.25 cents of additional household income in the economy. Its impact is also high on employment, with every 1 billion peso increase in investments creating between 620 to 1,408 additional quality jobs in the economy.

PERFORMANCE CHALLENGES

Despite a significant growth in share of electronics exports from 22% in 1991 to 42% in 2014, the Philippines' cluster's growth has been unimpressive compared with the world rate. The cluster has shown a negative export CAGR of -2% since 2007, compared to a world rate of 4%.

During this period, exports suffered from economic crisis of 2008, followed by Intel's exit from the Philippines. According to the Philippines Statistics Authority (PSA), the cluster's export earnings fell from a peak of \$32.2bn, or 21.6% of GDP, in 2007 to \$26.6bn, or 9.8% of GDP, in 2013. However, an improving investment climate and strengthening global demand has helped the industry pick up again since 2014.

In addition, the cluster's low value add focus is suppressing the potential growth of the industry. According to the PSA, the sector produced just \$8 billion of gross value added in

2014, or 2.8% of GDP. That was up from \$7.4 billion, or 2.9% of GDP, in 2013 and \$7.3 billion, or 3.1% of GDP, in 2012. Philippines is heavily focused on back-end testing and assembly, lacking the manufacturing capability for semiconductor wafer fabrication, which is a major step in moving up the value chain.

power costs, lack of technological and product innovation, lack of financing, and limited SME product development initiatives.

RELATIVE COMPETITIVENESS

The Philippines' share in global exports is being threatened by the high cost of production, lack of infrastructure coupled, and absence of product diversification.

The country's electronics export accounts for just 1% of global E & E exports in 2014, while the top ten electronics producers comprise 79% of the global total.

SEIPI has identified a deteriorating trade off between costs and productivity that

provides a chance for new players, such as Vietnam, to enter the market. Among the major constraints pressuring competitiveness, poor infrastructure, especially the slow pace and high cost of moving goods, ranked as the highest concern among investors.

Asian Competition

Most competition for the cluster comes from Asia. The world super star performers among electronics components exporters are China/Hong Kong and South Korea, while other exporters from Asia such as Malaysia and Thailand have performed significantly better than the Philippines. With rising costs in the Philippines, threats may increase from Vietnam or other countries that offer lower labor costs.

Furthermore, the structural shift away from PCs towards smartphones and tablets may explain why Taiwan and South Korea are performing better than Southeast Asian countries in electronic exports. The poor performance of the Filipino and Singaporean electronics clusters is driven by a greater focus on slower growing sectors such as hard disks, PCs, and semiconductor production. According to Credit Suisse, tablets and smartphones will continue to be the drivers of growth in electronic shipments. This may be a negative sign for the future growth prospects of the Philippines' electronic industry.

Value Add

The Philippines has significantly lagged behind its Asian peers due to a relative lack of value added production.

In particular, other Southeast Asian

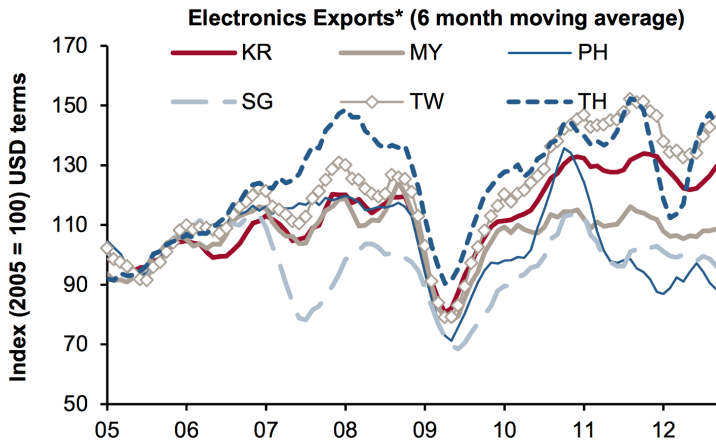


Figure 8. Trends in electronics exports (Credit Suisse)

Although SEIPI identifies several industries such as Medical/Industrial Instrumentation, Automotive, Consumer Electronics and Office Equipment that have high growth potential, no action has been taken by the government. In practice, most of the value add within the electronics sector derives from semiconductor research and chip design that does not exist in the Philippines.

Currently, IC design, wafer fabrication, and R&D in the upstream section are considered as the largest gap in electronics production value add. Lack of diversification in manufacturing in the downstream sector is also contributing to the lack of competitiveness in the electronics industry. Constraining the development of both upstream and downstream activities are the lack of a highly skilled workforce, high

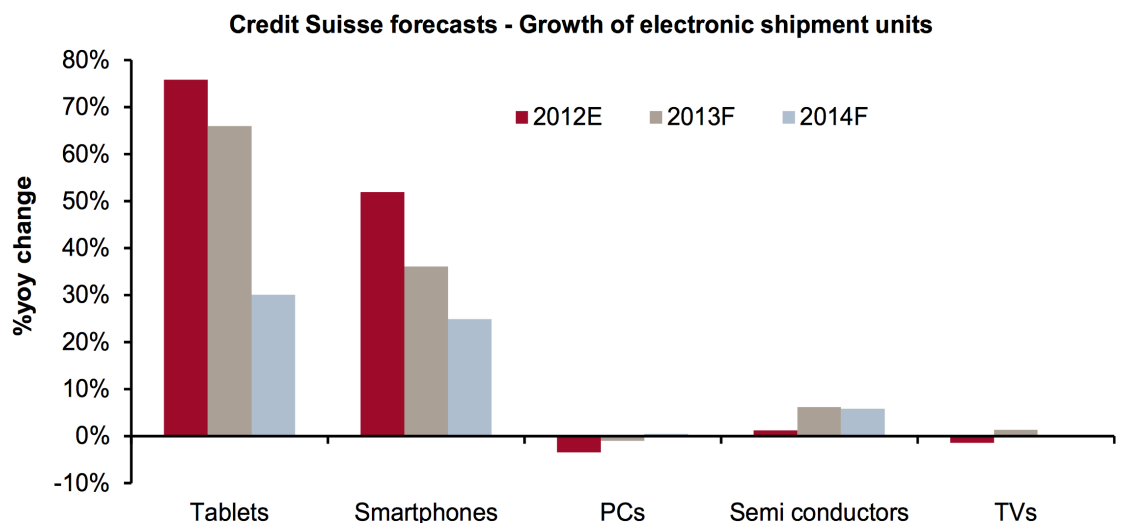


Figure 9. Shifts in end-product demand (Credit Suisse)

	Philippines	Malaysia	Vietnam	Singapore
Product focus	Electronics components	Diversified product portfolio including electronics' component- lots of effort to stimulate functional upgrading in to chip design and R&D support activities and backward linkages to wafer	High value add with majority of the export in final products & specific parts	Semiconductor dominant
Value add	Almost non-existent/Low value	Pushing to semiconductor wafers and focused to entice partnerships in R&D, design, and wafer fabrication and supported development via strong basic infrastructure and consistent promotion incentives, tax holidays, and investment tax credits for a period of five years.	Pushing to semiconductor wafers and investment climate significantly favourable to investors	Low to high
Government incentives	Focused on improving ease of doing business		The Law on High Technologies was passed in 2008 with the aim of spurring development in high tech industries	Strong promotion of high-value-added activities, developing of R&D capabilities, and train skilled workers in electronics/semiconductor field
Export Performance	1% of World's E&E export	4% of World's E&E export	Less than 1% of World's E&E export	9% of World's E&E export
Competitive Advantage	English-speaking, relatively highly skilled workforce	(b) Government supports local suppliers' competitiveness including workforce training, establishment of local brand and fostering R&D for local firms via research institution	(a) Cheap labour in labour-intensive manufacturing sector (b) Attractive tax holidays for foreign investors (c) proximity to regional suppliers and China	(a) Favourable business and investment environment (a) Highly focused talent development in all parts of the value chain (c) High level of investment in R&D
Weaknesses	(a) lack of backwards linkage (b) Highly focused on slow developing products	(a) Limited supply of human capital constrained the effort of software activities rated to developing chip designs (b) Continuous losing of FDI to more attractive manufacturing sites for labor-intensive operations in China & Vietnam	(a) lack of backwards linkage (b) Still nascent in E&E industry with little production	(1) Rising cost including high labor cost (b) Rising competition from low cost ASEAN countries (b) Highly focused on slow developing products

Figure 10. Comparison Table of Electronics Manufacturing Clusters in Asia (Team Analysis)

clusters have been helped by their home governments dedicating significant effort in policy and financing to support value add in local electronics production.

Electronics clusters in Malaysia, Singapore, Taiwan and Thailand benefit from local semiconductor production, functional upgrading to chip design, and linkage of backwards production. As a result, product mixes are more diversified for these countries, allowing

them to win higher global market shares than that of the Philippines.

The governments of Malaysia, Vietnam, Taiwan and Thailand also concentrate heavily on localizing R&D for domestic producers, attracting investment in high value add products via favorable tax and regulatory incentives, and developing local talent by involving domestic universities and schools.

Such government policy has been less

present in the Philippines. In addition, foreign investors may increasingly shift their focus from the Philippines to Vietnam for labor-intensive electronics manufacturing.

Therefore, the Philippines' competitive advantage in its current product mix is at risk from other competing clusters, suggesting that the Philippines will have to move up the value chain in order to preserve the viability of its electronics manufacturing cluster.

	Rankings* (shift-share) (2008 to 2011)	Semi-conductors	Disk drives and PCs**	Mobile Tablets**	Telecom (including smartphones)	Printed circuit board and soundcards	Radios and TVs	Printers
Taiwan	1	√		√	√			
Thailand	2		√			√	√	√
Malaysia	3						√	√
South Korea	4			√		√		
Singapore	5	√	√					
Philippines	6							

√ indicates that the country is competitive in that product category relative to other Asian electronic exporters

Figure 11. Competitiveness assessment of selected cluster by product (Credit Suisse)

Finally, the Philippines needs to improve its macroeconomic and political environment to increase its competitiveness. Given the ASEAN region has similarities in product mix across the electronics sector, the macro environment of each country plays an important role in shape their competitiveness in attracting companies and talent.

COMPETITIVENESS ASSESSMENT

The Philippines' share of global electronics component exports was stagnant between 2007 and 2014, while China was able to increase its share in the sector from 21% to 31% over the same time period. More worryingly, the overall size of the Philippines' components exports did not grow between 2007 and 2014, matching only France in terms of poor performance and lagging behind other Asian countries that were able to grow their component exports between 3 and 5%.

This poor performance suggests that the Philippines' electronics components manufacturing cluster will have to think carefully about how to redefine its global value proposition, particularly as the historical drivers of growth may be changing in the future given the high level of innovation and competitiveness in other competing clusters.

CLUSTER STRENGTHS

1. Low Cost, English-speaking Workforce

The electronic components cluster began in the Philippines as foreign multinationals searched for low-cost production centers that could slot easily into their global supply chains. This low cost, ready supply of relatively productive labor remains a key attraction for investors.

For front-line production workers, foreign companies surveyed by Duke University cite English language skills, stability and availability of supply, low cost, loyalty (low turnover rates), and openness to training as being core advantages of hiring Filipino workers.

The Philippines has also been able to maintain a low cost position relative to other major global electronics producers. The Philippines' hourly compensation costs within the computer, electronic, and optical products sector is still one of the lowest levels in the world, alongside China and India. Moreover, this data masks the large rates of wage growth that has occurred in China's coastal areas, which has historically been China's hotbed of electronics manufacturing.

However, while this low cost position has historically allowed the Philippines to attract foreign investment in the past, it may be not a sign of true cluster competitiveness in the future. This is particularly true if the Philip-

pines wants to retain the high quality engineering and business management talent needed to move to higher value parts of the supply chain.

2. Competence of the Philippine Export Zone Authority (PEZA)

Most foreign investors have located their manufacturing plants in the Philippines' special economic zones (SEZs), due to the lower overall costs of manufacturing and greater ease of doing business. These SEZs are managed by the Philippine Export Zone Authority (PEZA), which has been rated by foreign investors in a Duke University survey as being responsive to their needs and organizationally stable, a critical consideration for investors. This has encouraged foreign companies to

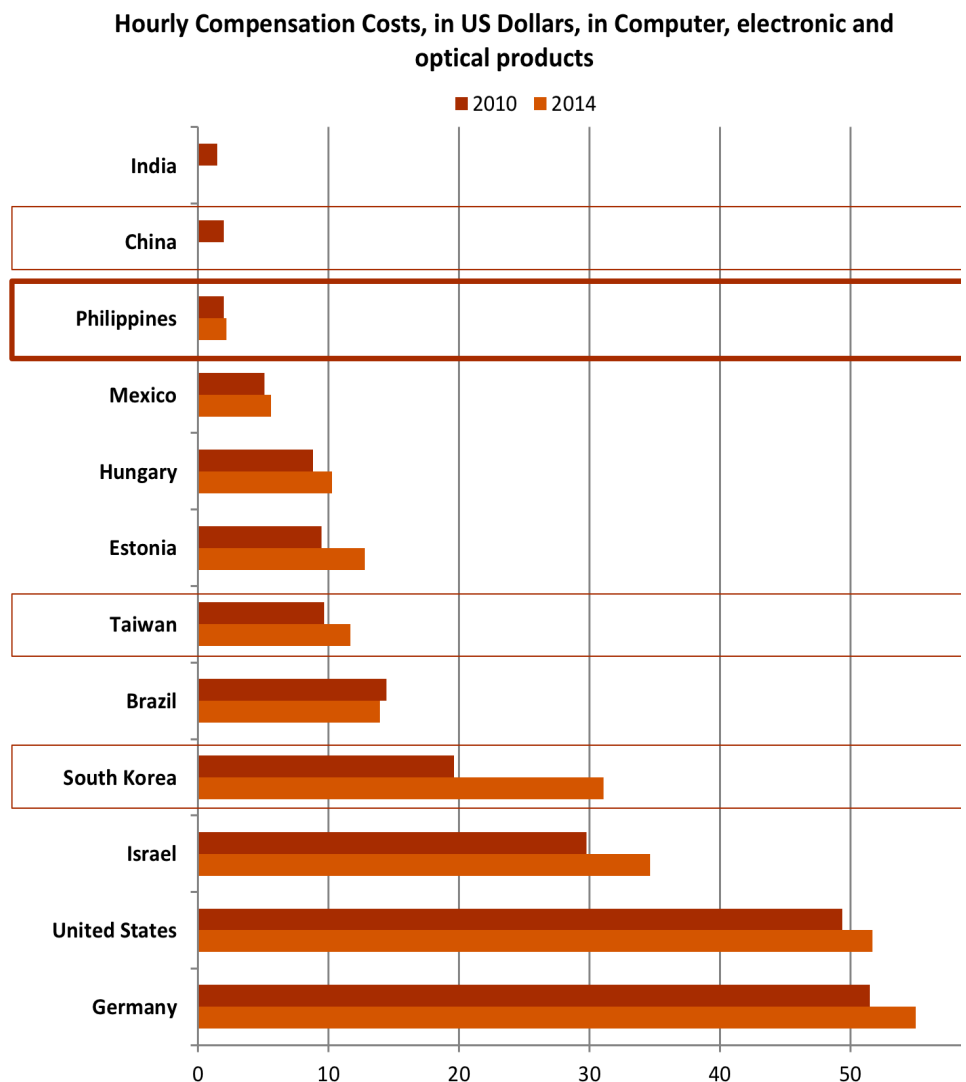


Figure 12. Labor cost comparison by country (US Bureau of Labor Statistics)

continue expanding their operations in the Philippines, which has led to sustained growth in both exports and employment in the SEZs.

3. Geographical concentration

90% of the electronics manufacturing cluster is located in just two geographically close areas, Metro Manila and Calabrazon. This geographical concentration gives the Philippines cluster the potential to gain from the benefits of agglomeration in diffusing knowledge and experience.

**90% of firms
located in
just 2 areas**

The highly foreign composition of the Philippines electronics cluster may also generate unexpected agglomeration benefits, since PEZA has also found that it is common for firms from the same country to cluster in the same industrial park.

3. May benefit from ASEAN regional integration and shift of electronics demand to Asia

There is an increasing shift towards regional instead of global manufacturing chains as demand for finished electronics increases in Asia. Moreover, there continues to be progress towards harmonizing trade tariffs and removing barriers as part of the (albeit slow) efforts to create a common ASEAN economic community.

This may create an opportunity for the Philippines to capture manufacturing share from China in the future as Chinese living

standards and wage levels continue to rise, particularly within the lower value added segments of the value chain that Chinese firms may increasingly exit or outsource.

The Philippines is potentially well placed to benefit from this trend, as 61% of its component are already exported regionally within East Asia.

Furthermore, integration can help generate major productivity gains in the cluster. The McKinsey Global Institute estimates that manufacturing scale benefits, inventory efficiencies, and logistics cost reductions from regional trade integration can help drive cost savings and productivity gains between 10-20% of the total cost base in the electronics sector.

CLUSTER WEAKNESSES

1. Brain drain of engineering and management talent

Companies in the cluster surveyed by Duke University's Center on Globalization, Governance & Competitiveness are particularly concerned about their ability to retain engineers with 3+ years of experience, as once engineers gain experience, they are inclined to go abroad for higher wages.

Highly skilled engineers typically accounted for between 8-12% of the overall workforce in electronics manufacturing. While this is a relatively small proportion of the total labor force,

High turnover for skilled engineers that have just gained enough experience to be truly productive hurts both individual companies and the cluster as a whole, as companies may become reluctant to invest in training and supporting their staff.

This vicious brain drain cycle also makes it difficult for the country to retain its most talented engineers and business managers, potentially constraining the country's ability to increase manufacturing productivity, grow domestic businesses, and move up in the value chain.

This cycle also tends to self-perpetuate and reinforce itself, as a shortage of top talent hinders the ability of the Philippines to produce the high quality jobs that would keep these highly mobile top performers in the country.

2. Low tech, low productivity

Most manufacturing operations in the cluster are focused on low productivity, labor-intensive manufacturing processes. There is significant scope to implement better management practices, data analytics, and technology to increase the productivity of many Filipino electronics manufacturing plants. However, McKinsey notes that a key constraint on the Philippines' ability to implement these productivity-enhancing business improvements is the skills gap in areas such as data

Table 18. Philippines Top Export Destinations, Select Products, 2007-2014

Export Destination	Value (US\$, Billions)				Partner's Share of Exports (%)				CAGR (%)
	2007	2010	2012	2014	2007	2010	2012	2014	
World	15.8	6.4	9.6	12.2					-3.7
China/Hong Kong	5.1	1.5	2.9	3.5	32	23	30	29	-5.1
Singapore	1.8	0.8	2.5	2.6	11	13	26	21	5.3
Other Asia, nes	1.2	0.4	0.8	1.4	8	7	8	11	1.5
Germany	0.8	0.8	0.4	0.9	5	13	4	8	3.0
Top 5 (in 2014)	8.9	3.6	6.5	8.4	56	55	68	69	-0.8

(A) Electronic Integrated Circuits and Microassemblies

Figure 13. Export Destinations for Philippines electronics components exports (Duke University)

engineers are key drivers for productivity and value added innovation.

analytics, management, and technology personnel that can think strategically.

3. Weak brand & perception

The low tech nature of the Philippines' cluster also leads to a self-fulfilling cycle in which firms regard the country as an ideal location for lower tier production, but as unsuitable for higher value added manufacturing.

Of the three main players in the electronics value chain – lead firms, contract manufacturers, and component suppliers – more than 67% of Filipino firms are in the less value added component supply part of the chain according to Duke University.

Philippines regarded as Tier 3 producer

The contract and components manufacturing space is divided into 3 main tiers in terms of value added complexity and production capabilities, with competing clusters in China being in Tier 1, and Malaysia and Thailand occupying Tier 2. The Philippines is seen as participating in Tier 3, alongside other low value added locations such as Indonesia, Vietnam, and Myanmar.

67% of Filipino firms are in the less value added component supply part of the chain

This weak country brand perception may hinder the Philippines' ability to attract higher value added investment, as foreign multinationals may only view the country as a suitable investment destination for low cost outsourcing, and not as a potential center for more value added business processes.

This sentiment can be seen in a 2014 McKinsey survey of foreign investors within major sectors on how different manufacturing clusters in South-east Asia rank on "Cost" and "Quality". Respondents consistently rated the Philippines highly in terms of "Cost", but rarely in terms of "Quality".

This leads to a low weighted average in which other destinations within South-east Asia appear more attractive than the Philippines to investors looking to locate operations that will require more capabilities than just low cost.

4. Weak supplier base and linkages to non-manufacturing segments

The local Filipino supporting industries that contribute to the components manufacturing cluster tend to be small, unproductive, and poorly managed. While the foreign multinational companies at the core of the cluster are large and have global management practices, local Filipino suppliers tend to be predominately small and with have investment in technology, automation, or managerial talent.

This constrains the ability of the country to reap all the potential benefits from attracting so much foreign investment, and hinders the ability of the cluster to move to more advanced manufacturing in the future.

5. Reliant on "branch" plants of foreign multinationals

It will be also difficult for the Philippines to actively move towards a higher value add value chain position when 72% of the industry is comprised of subsidiaries of large multinational firms, which may have little strategic control.

As lower value added "branch" plants, most of the foreign operations in the Philippines have their operational direction set by managers in corporate headquarters, who have little incentive to consider the future viability of the Philippines cluster as a whole.

This lack of local plant autonomy may also make it difficult for the Filipino government to coax or incentivize companies to move to higher value added sectors upstream or increase local productivity, as there are few clear cluster leaders to champion reform efforts.

6. Government policies have been poorly implemented

The Philippines routinely ranks low on global indicators for ease of doing business and political institutional strength. Deloitte has identified numerous areas in which the Philippines government can reduce corruption, and the World Bank's Ease of Doing Business report highlights how the Philippines trails other Southeast Asian countries on key criteria that foreign investors look at.

Unfortunately, the Philippines' government has made little progress in driving improvement in many of these core problems. Over the past 5 years, the Philippines has made marginal progress in improving the ability of companies to get credit. However, there has been almost no improvement in starting a business, getting electricity, getting permits, protecting minority investors, paying taxes, trading across borders, or enforcing contracts.

The government's lack of progress on improving the local business environment is particularly poignant given the increasing competitiveness of other investment destinations in Southeast Asia. This inability to improve relative to its peers may thus hinder the Philippines' ability to improve its electronics manufacturing cluster in the future.

5. Recommendations

1. Improve value add by attracting talent and smart investment

The Philippines currently produces low value added electronics components. The electronics cluster needs to move to the next stage of higher value added products, which will require a greater number of highly trained engineers and technicians.

Additionally, market demands are shifting to handheld electronics product such as cellular phones and tablets, while the Philippines electronic cluster is still producing components for desktop computers and appliances. The cluster should make an active effort to shift to producing for faster growing end sectors.

For the government

The government should try to attract highly skilled Filipino engineers and technicians working abroad, and provide incentives to retain them in the country.

The government should focus on centers of excellence in local universities to promote research and development.

The government should allocate a higher R&D budget for electronics. It can also provide tax incentives for R&D.

The government should invite leading multinationals to invest in R&D in the Philippines

through incentives, such as tax incentives for opening new R&D centers in the Philippines and simplify administrative process for highly skilled engineers to work in the Philippines.

The government should encourage the development of local suppliers via incentives such as lower tax for companies with a certain percentage of local content, tax holidays for local suppliers in the early years of operation, and connecting local suppliers to other advance suppliers via bilateral collaborations.

For the cluster

The cluster should invest more in human capital. This can be through providing training or exchange programs with partner companies abroad.

The cluster should invest more in R&D via collaboration with educational institutions such as the Engineering Research and Development for Technologies (ERDT).

The cluster should actively build a guiding coalition of 7-10 key players to spearhead the effort of moving up in the value chain and shifting to faster growing end products.

2. Improve perception of the cluster

The Philippines' electronic cluster consists mainly of Tier 3 suppliers, producing only components for other OEM and final product manufacturers with no brand recognition. As a





result, they are easily replaceable. To address this issue, the cluster in collaboration with the government, should focus on changing the perception of the the Philippines “brand”.

For the government

The government should actively support the clusters’ effort in brand building by assisting in international trade shows and international efforts to promote the Philippines’ brand

For the cluster

The cluster should invest in brand building and marketing, potentially using funding from the government.

3. Improve business environment through better government delivery

The Philippines’ poor business environment factors, such as its high corporate tax rate, inefficient bureaucracy, and underdeveloped infrastructure, make the country less attractive to investors compared to its peers in Southeast Asia. A key reason for this has been the government’s inability to deliver on its promises of improved service delivery for the cluster. Improving government service delivery can thus be a key way to help the cluster regain competitiveness.

For the government

The government should reduce the amount of cluster initiatives it has proposed in order to focus and prioritize on key issues, particularly regarding talent retention and the ease of doing business.

The government should focus on improving service delivery by taking lessons from the UK Delivery Unit and Indonesia’s reform of its Investment Board on how to make the government delivery chain more effective.

The government should continue to pursue structural reforms over the medium term, such as shortening the processing time for permits, ensuring law enforcement, and reducing the burden of tax compliance.

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