Journal of Philippine Development
Number 50, Volume XXVII, No. 2, Second Semester 2000

Competitiveness of the Philippine IT Industry: What Lies Ahead*

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ABSTRACT

This paper examines the competitiveness of the Philippine information technology (IT) industry vis-à-vis its emerging competitors and neighboring countries in the region. While the industry boasts of being the largest foreign exchange earner for the country, it suffers from structural weaknesses that, unless addressed, render its long-term competitiveness at risk, especially as the country's competitors are increasing their stake in the world IT market much faster than the country. Infrastructural and institutional bottlenecks and the inadequacy of the educational system to meet the human resource requirements of the industry have remained severe constraints to its long-term growth. In light of the accelerating global technology race, opportunities for the country to upgrade its competitive position have become much more difficult. In this regard, this paper identifies some cross-cutting strategies to lessen or overcome such difficulties and keep the industry's present edge.

INTRODUCTION

The development experience of the past three decades has demonstrated the strategic role information technology (IT) plays in the global economy. As an industry, IT has dominated world trade growth in the 1990s, thus contributing to the rapid growth of exports. As a generic technology, it has also revolutionized production process

* An earlier version of this paper was presented during the conference "Policy Adjustments to WTO/APEC/AFTA," sponsored by the Philippine Exporters Confederation-Trade and Investment Policy Analysis and Advocacy Support Project on 15 September 1999.
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by cutting costs and enhancing product quality and performance. The IT industry, particularly its semiconductors segment, has become essential in the development of virtually all other high-tech industries, from toys to wrist watches, computers, cars, appliances, machines, and missiles. Likewise, IT has become an indispensable infrastructure in the 1990s, having modernized traditional infrastructures such as transportation and communication.

The electronics[1] industry has catapulted Singapore, Hong Kong, South Korea, and Taiwan to their status as the newly industrializing economies (NIEs). The electronics industry has steered the NIEs along the course of their export-led growth. The unprecedented growth experienced by these economies since the late 1980s has become the envy of other developing nations. The exposure of these economies to IT started between the late 1970s and early 1980s when they became an integral part of the global production network of American and Japanese multinational companies that feed the global market with IT products, particularly semiconductors. Within a decade or so, they were able to develop their indigenous IT industry with their own brands and products. Soon each one became one of the largest global producers of key segments of the IT industry.

The Philippines, since the mid-1980s, has also become an integral part of that global electronic production network. The semiconductor industry has topped the country's exports and has weathered the adverse effects of the recent financial crisis. Nonetheless, the country's participation in the global network is threatened by its limited local activity on assembly and testing, part of the production chain that has low value-added.

The main objective of the paper is to assess the competitiveness of the Philippine IT industry and examine the factors affecting its current and future development. By definition, the IT industry covers both the manufacturing of IT products (computer

[1] By definition, under the WTO IT Agreement, the only segment of the electronics industry that is not included in the IT industry is consumer electronics.

hardware, telecommunication equipment, semiconductors) and the provision of IT services (computer software and services). However, due to the very limited data on IT services, the paper is focused heavily on IT products.

The paper is organized as follows. The next section presents an overview of the international environment for the IT industry with greater focus on the experience of the NIEs and the lessons that other developing economies, like the Philippines, can learn from their success. The third section discusses the development of the Philippine IT industry including the policies that helped shape and continues to affect the industry today. The succeeding section assesses the competitiveness of the Philippine IT industry vis-à-vis its major competitors. The second to the last section presents an analysis of the issues confronting the Philippine IT industry and its future development. The conclusion and recommendations for the Philippine IT industry for the 21st century comprise the final section.

THE INTERNATIONAL ENVIRONMENT FOR THE IT INDUSTRY

One significant agreement that greatly affects the IT industry is the Information Technology Agreement (ITA) forged during the Ministerial Conference of the World Trade Organization (WTO) in Singapore in December 1996. Under the agreement, tariffs on information technology products would be reduced to zero through equal rates of reduction in four steps: July 1997, January 1988, January 1999, and January 2000. However, an extended staging of reduction until 2005 is also allowed under certain circumstances.

The ITA covers a wide range of product categories that include computer hardware and software, semiconductors, telecommunications equipment, electronic office equipment, and manufacturing equipment, particularly for use in semi-conductor production. Excluded from the agreement, however, are consumer electronics.

The direct effect of the ITA is to increase trade in IT products, as the elimination of tariffs would make them cheaper. Having cheaper IT products has profound and far-reaching impacts on the economy. It reduces production cost, as virtually all industries use IT products. It also encourages the development of the information industry, especially in less developing countries where information exchange has always been a problem. Above all, cheaper IT products and services would further increase the diffusion of information technology in all sectors (business, industries, households, and government). Considering the speed, accuracy, and flexibility that they would bring to the production process and information exchange, cheaper IT products would enhance productivity and efficiency.

Global Production Network: the Key to IT Industry's Success

The introduction of developing economies to the IT global production network is best explained by the *flying geese phenomenon*. It started in the early 1980s when multinational companies from Japan established their affiliates in developing countries in response to shortage in labor, surge in wage rates and the appreciation of the yen following the Plaza Accord in 1985. These factors lowered the price competitiveness in the world market of products produced from Japan. This situation forced Japan to go global in its production strategy by relocating its labor-intensive industries to Asia to defend its export markets (Austria and Medalla 1996; DFAT 1998). Soon, multinational companies from the U.S. and Europe followed as part of their global strategy to remain competitive.

One of the industries that benefited from the flying geese phenomenon was the electronics industry, where part of the production process involves assembly and testing, both of which are labor-intensive. To maintain their cost-competitiveness, Japanese and U.S. firms relocated their lower end processes and products to offshore production locations in Asia, where labor is relatively cheap. Since an electronic product involves a thousand parts and components, production sites were developed around Asia, where each site would specialize in the

production of a particular part and component or subprocess. The selection of a location would depend on where each subprocess could be performed with utmost efficiency or the least cost.

The strategy resulted in the horizontal division of labor networks that link production sites, i.e., integrated production process in one or more production sites. The trend shows that more sophisticated electronic products are produced in the NIEs, where they are provided with the technology to become original equipment manufacturer (OEM[2]) suppliers. On the other hand, the relatively advanced ASEAN economies (Thailand and Malaysia) became the hosts of the production of standardized products and the labor-abundant countries (Philippines, China and India) specialized in the assembly and testing of these products (Chia 1995).

Although the availability of cheap labor in Asia was the initial force that triggered the creation of the global chain of production, what ultimately made it possible was the availability of fully equipped infrastructure for international transport and distribution and telecommunications (Mikami 1998), thus reducing the cost of production in multiple locations (Poapongsakorn and Fuller 1998). The continuing development in telecommunications, for example, has allowed firms to exchange information with overseas suppliers. Likewise, the delivery of parts and components with short life cycle is made possible by the electronic system for simplified customs procedures, as in the ports of Singapore and Hong Kong.

All this made possible the new organizational imperatives of just-in-time, total quality control, and continuous process improvement as pioneered by Japan and adopted by multinational corporations from the U.S. and Europe, which were driven by global competition (Hanna et al. 1996). Under the new imperatives, the delivery of parts is coordinated to meet the immediate demands of production. This shortens the production life cycle and increase speed of response to changing market conditions, thereby enhancing the competitiveness of multinational companies.

[2] Under OEM, a local firm makes a complete product according to the specification supplied by a foreign manufacturer, which then sells under its own brand name.

Lessons from the NIEs

The development experience of the NIEs during the past two decades has become the envy of most, if not all, developing countries. For these countries, the IT industry was the outgrowth of the local consumer electronics industry that flourished in the 1980s. Their experience in consumer electronics influenced the building of their IT capabilities.

In the 1990s, the NIEs moved away from serving as production sites of low-cost OEM supplies for transnational corporations to being primary producers selling their own brand names (Hanna et al. 1996; Hong 1997). Taiwan, for example, had no indigenous semiconductor manufacturing capability until the mid-1970s, but it became a major supplier of computers and semiconductor devices in the world market by the mid-1980s. South Korea also did not have any semiconductor manufacturing capability until the early 1980s, yet it has now become the world's third largest producer of dynamic random access memories (DRAMs), an advanced semiconductor product. Singapore was into consumer electronics products in the mid-1960s. By mid-1980s, the country had become a major producer of computer equipment.

What lessons can we learn from the success of the NIEs? The NIEs have used diverse strategies to build their IT industries. Taiwan, for example, relied more on the government to initiate the development of IT as an industry while South Korea depended more on its conglomerates[3] (Hong 1997). Singapore, on the other hand, concentrated on providing the right environment, particularly in building world-class infrastructure, to attract IT multinational companies. All of these NIEs have used similar frameworks, processes, and institutions to implement their strate gies. But their success did not come overnight. It was the result of cross-cutting policies and strategies that they adopted in the 1970s and 1980s.

[3] This is somewhat an exceptional case, since Taiwan has practiced laissez faire in most of its development period.

- *Investment in select technical manpower training in the U.S. and Japan.* Acknowledging that it does not have the technology nor the manpower to start its semiconductor industry, Taiwan invested heavily in sending people for technical training in U.S. semiconductor firms for the particular technology it wanted to develop. These individuals later became the core group in the developmental process of Taiwan's semiconductor industry. They occupied key positions in research institutes and eventually also set up their own semiconductor companies.

  South Korea also adopted the same strategy by giving incentives to encourage people to train abroad. It sent scientists and engineers to industrial establishments, research institutes, and universities in developed countries so they can learn advanced technologies.

- *Investment in secondary and tertiary training.* Taiwan, South Korea and Singapore also invested in developing their secondary and tertiary educational institutions in such a way that the education of the graduates would match the needs of industries. This was made possible by involving the industries in the design of science and technology education curriculum.

- *Establishment of vocational training institutes.* Korea established public vocational training institutes. It also provides incentives by requiring firms with more than 500 employees to provide six months of training in approved schemes. Large firms also established their own training centers where they trained at least 10 percent of their workforce.

- *Incentives for "brain re-drain."* Taiwan gave incentives to draw back the Chinese-Taiwanese who studied in the U.S. in the 1960s and 1970s and later were employed in the Silicon Valley (Swee 1996). This overseas source of technical skills not only had scientific and engineering knowledge but also production and management experience in U.S. corporations. The Taiwanese government used the alumni networks to track these

people and gave incentives to those who were selected, including tax holidays and seed money to start their own ventures, as well as well-paying jobs. As a result, more than 19,000 skilled workers returned to Taiwan from 1950 to 1988. Korea did the same. From 1968 to 1989, about 1,000 scientists returned to Korea (Hanna et al. 1996).

- *Less reliance on foreign investment for technology transfer.* Foreign investment was essential during the initial stage, as the NIEs became the assembly and packaging sites of overseas production strategy. Realizing that this left them with little room for technology transfer, they embarked on a different strategy that changed the nature of interaction between local and foreign companies (Ernst and O'Connor 1992). Taiwan sent out invitations to bid for technology imports. For the successful bidders, Taiwan entered into technology transfer contracts that often included design and production capability transfer, including information about product applications. Korea also relied on OEM and technology licensing for technology acquisition. This included agreements on outright production technology transfer or patent rights.

- *Establishment of specialized R&D institutes.* For the NIEs, research was imperative to developing new technologies and products so they could enhance their competitiveness without being dependent on foreign technology. Developing their technological capability, especially on product design, was their priority. This compelled them to establish research institutes specializing in IT.

  Thus, Taiwan has the Industrial Technology Research Institute (ITRI) and the Electronic Research Service Organization (ERSO). The ITRI undertakes applied research for the development of industrial technologies. The ERSO, as the main research organization for the electronics industry, develops various semiconductor technologies, which it will then transfer to the private sector for commercial production. All research in these two organizations is funded by the government.

Korea has several research institutes responsible for electronics research and promotion, namely, the Korea Institute of Science and Technology, the National Industrial Research Institute and the Fine Instrument Center, and the Korea Institute of Electronics Technology (KIET). The primary goal of the KIET is to support R&D in high-tech areas.

Singapore has the Information Technology Institute under the National Computer Board, which is responsible for R&D. Research in the institute has led to technologically advanced products sold internationally.

- *IT diffusion in the public sector.* The government played a major role in IT diffusion in the NIEs, using IT to modernize public administration. The strategy reduced transaction costs between government and business and improved the delivery of public services. At the same time, it created demand for IT products and services, thereby fostering the expansion of the IT industry.

  All the NIEs promoted public sector computerization. Of these, Singapore has been the most coherent and ambitious in its approach. In 1981, it launched its civil service computerization program to facilitate business transactions between the public and government. It specifically developed strategic IT application systems to promote "one-stop" service, and established information utilities for user communities such as health, education, law, and commerce. Today, Singapore has *SingaporeOne* system, a cyber network that interconnects every home, business, school, government agency and institution through an information network that provides a range of services to users without requiring them to leave their homes or offices. Such services include online shopping and other e-commerce transactions, distance learning and other online courseware, videoconferencing, network gaming and other entertainment-on-demand services, Internet, and public sector services round the clock.

- *IT diffusion through the private sector.* The governments of the NIEs also promoted IT diffusion in the private sector, particularly the SMEs. They accomplished this by encouraging greater automation in factories. They also provided the SMEs with technical assistance for their computerization and technology systems. Among others, IT adoption has been recognized as essential to the success of the garments industry of Singapore and Hong Kong (Hanna et al. 1996).

- *Investment in infrastructure.* The NIEs also invested in world-class key infrastructures, particularly in telecommunications and transportation, which became the target of IT-based modernization. The best example of such infrastructure is the port of Singapore. The availability of electronic systems for simplified customs is the key factor for the efficiency and stability of international transport and distribution, which is critical to the global production network strategy of multinational companies.

- *Support industries.* The availability of support industries also enabled the NIEs to establish a foothold in the global production network of multinational companies (Nagasaka 1998). It also reduced production cost, thus increasing price competitiveness. As a result, local procurement of parts and components in the NIEs rose to 80 percent.

THE DEVELOPMENT OF THE PHILIPPINE IT INDUSTRY

Compared to the NIEs, the IT industry of the Philippines is relatively young. Yet it has developed into one of the fastest growing and important industries of the country. In fact, it is now the largest foreign exchange earner for the Philippines. The IT industry has also become more than just an industry that produces output and services, having grown into an enabling technology that links businesses, industries, households, individuals, and governments, as information technology continues to pervade all sectors of the society.

Approximately 518 IT firms in the country are registered with the Board of Investments (BOI) and the Philippine Export Processing Zone Authority. These are mostly located in Metro Manila and in the export processing zones and industrial parks in various parts of the country (BETP 1998). The computer industry, on the other hand, is made up mostly of foreign-owned subsidiaries, local distributors, dealers, importers and traders of computer hardware and peripherals. Although there are over a hundred companies in the computer industry, less than 10 have a semblance of computer hardware manufacturing and/or computer component assembly work.

Domestic policy environment

A number of factors changed the overall domestic policy environment in the country in the 1990s. There was a general policy of openness, as shown by the lowering of tariffs and other trade barriers; expansion of areas (particularly services and infrastructure) opened doors for foreign investments; and foreign exchange deregulation. Another was the country's strong macroeconomic fundamentals (i.e., low inflation rate and interest rate), which enabled it to weather the financial crisis that hit the Asian region in 1997. Below are the policies that have benefited the country's IT industry.

Trade liberalization through the ITA. Under the ITA the Philippines has committed to bind tariff rates to zero on 188 IT product lines by 2000, and 47 product lines by 2005. Most of the products committed to zero tariff rate by 2000 belong to the 10 percent tariff level in 1998. On the other hand, those committed to an extended staging of reduction until 2005 have tariff rates between 20 percent and 40 percent in 1998.

With tariff rates declining to zero, imports of IT products are expected to become cheaper and hence exposes the domestic industry to greater competition and provides a wide variety of product choices for the consumers. Nonetheless, greater

competition promotes efficiency in the economy. Furthermore, while the country's exports will also be exposed to greater competition abroad, tariff reduction in other countries would mean greater market access for the country's IT products.

Deregulation of the telecommunications industry. The deregulation of the industry became possible with the issuance of Executive Order (EO) No. 59 in February 1993. The EO called for the compulsory interconnection of all authorized telecommunication facilities, effectively abolishing the monopoly held by the Philippine Long Distance Company (PLDT) since 1928. In July of the same year, EO 109 was issued, requiring all cellular telephone system and international gateway facility operators to install at least 400,000 and 300,000 new phone lines, respectively, within five years. As of 1998, 78.7 percent of the total required telephone lines had been installed (NTC 1998).

The deregulation of the industry created an environment conducive to growth and investments. New players entered, resulting in promoting greater competition within the industry. Firms expanded their networks and introduced new technologies and services. All these resulted in a sharp increase in investments in the industry and in the number of service providers and users. In short, an increase in the demand for telecommunication equipment and products ensued.

Investment incentives. A comprehensive system of incentives exists for both domestic and foreign investment in the Philippines. The electronics industry, identified as an export winner, has always been included in the list of areas covered by the country's Investment Priorities Plan (IPP). As such, enterprises in the industry are qualified for the incentive package under the 1987 Omnibus Investment Code (OIC) administered by the BOI.

Incentives under the 1987 OIC include income tax holiday, tax and duty exemptions on imported capital equipment, tax credits on domestic capital equipment, and some non-fiscal incentives

like simplified custom procedures, access to bonded warehouses and employment of foreign nationals in supervisory, technical or advisory positions.

Establishment of export processing zones and technology parks. To promote industrialization in regions outside Metro Manila, the government facilitates the establishment of export processing zones, industrial estates, and free port zones. Firms operating in such zones and industrial estates enjoy an integrated package of incentives, and access to streamlined government procedures, infrastructure services, and good transport links to ports and airports, which are not available outside the zones. The incentives include duty-free import privileges and generous local taxation arrangements.

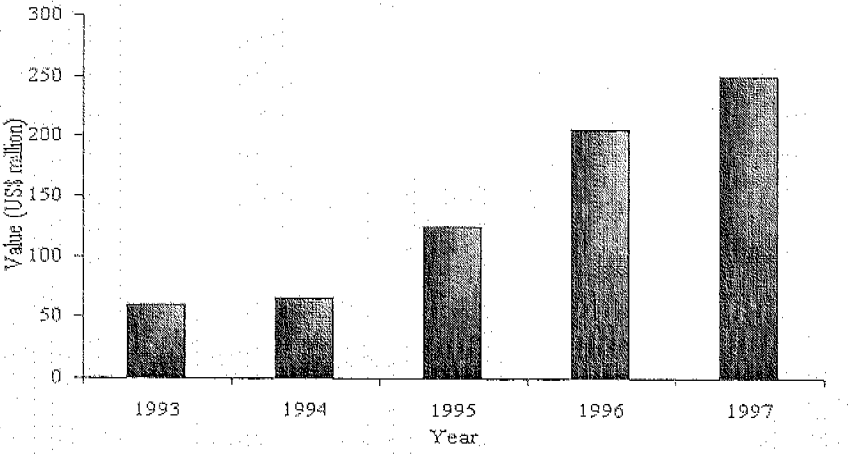
Trade performance

Export of IT services. The Philippines is now known as the second largest producer of computer services in Asia, the first being India. Exports of the industry increased from a measly US$60 million in 1993 to US$250 million in 1997, or an average annual growth rate of 43 percent during the period (Figure 1). The U.S. accounts for about 80 percent of the industry's exports. Recently, however, the industry began expanding its services to Japan, Middle East, and the Association of SouthEast Asian Nations (ASEAN).

The Y2K problem opened huge opportunities for the industry, as more and more U.S. and Japanese companies have since used Manila as their major outsourcing center for software development, conversion, maintenance, and other Y2K-related tasks. Most of these services are provided offshore.

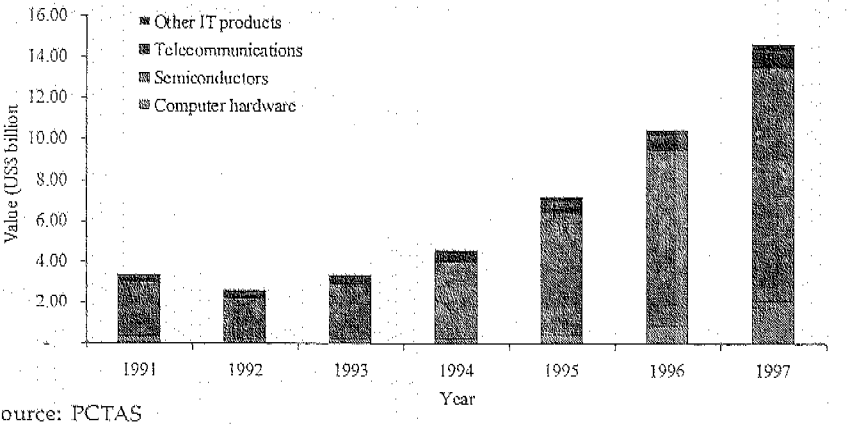
One great comparative advantage of the industry is the capability of the country's IT professionals to provide high-quality service at a lower price than those of their counterparts in the U.S. or Europe.

Export of IT products. The IT product industry boasts of being the largest foreign exchange earner for the country in the 1990s, with an export value of US$14.7 billion in 1997, up from US$3.4 billion in 1991 (Figure 2), or an average real growth rate of 25 percent per year during the period. Its share in the total Philippine exports went up from 38 percent in 1991 to 58 percent in 1997. About 81 percent of IT exports consist of semiconductors.



Source: BETP (1999)

Figure 1. IT services export performance, 1993-1997 (in US$ million)



Source: PCTAS

Figure 2. Philippine exports of IT products, 1991-1997 (in US$ billion)

A detailed analysis of the five-digit Standard International Trade Classification (SITC) commodity composition of the industry's exports reveals the structural weaknesses of the industry. Exports are concentrated to 11 products out of the 81 IT products exported by the country. Together, these products account for an average of 93 percent of the total IT exports (Appendix Table 1). Of the 11 products, semiconductor products manufactured from materials imported on consignment basis (SITC 931-02.22)[4] accounted for the largest share of 54 percent of the total IT exports.

The above finding confirms what is often said about the industry, that is, high import content and capability is limited to the assembly and testing of imported parts and components. A World Bank study (1997) in fact shows that the average local content is only 20 percent in semiconductors, 25 percent in simple circuit products, and 15 percent in more complex products. High import content implies that foreign exchange earnings are far less than the gross level. It also means that the industry does not create direct forward and backward linkages to the economy. Furthermore, considering that assembly and testing belong to the lower segment of the IT production chain, the upper segment being product design and fabrication, the value-added of the industry is therefore very low, if not limited to mere labor. Assembly and testing also do not require any sophisticated manufacturing technologies. Thus, technology transfer is minimal.

The high concentration of IT exports to a few low value-added products is very risky, especially since the country relies on the industry for its major foreign exchange earnings. For one thing, it makes the country vulnerable to cyclical demand downturns. For another, there will always be competing locations for these types of products, as the labor cost in the country becomes relatively more expensive (as is already evident among its emerging competitors like China, Vietnam, India, and even Mexico). More importantly, the lower-level assembly characteristic serves as a

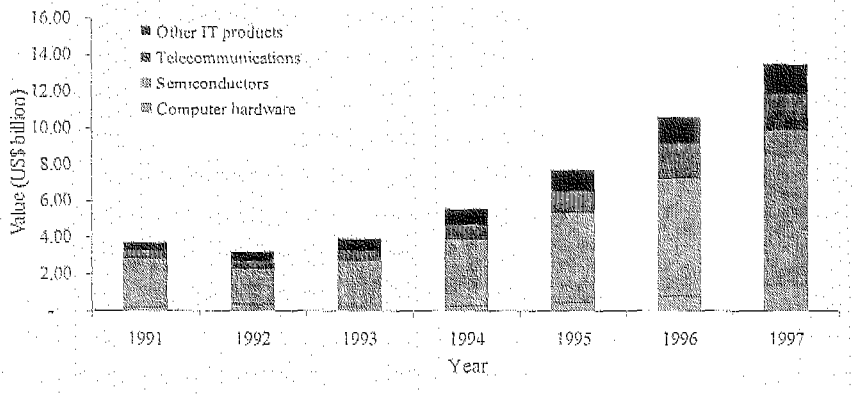
[4] This includes SITC 931-02.21, 931-02.22, 931-02.23, 931-02.24 and 931-02.29

constraint in itself in terms of absorbing new and more advanced technologies, which are the critical factor nowadays in maintaining one's competitiveness amid the rapid technological change. Unless this problem is addressed, it would put a severe constraint to the long-term growth of the industry.

Imports. The country's imports of IT products have grown from US$3.7 billion in 1991 to US$13.5 billion in 1997, which is accounted for mainly by semiconductors (Figure 3). The share of IT in the country's total imports has been consistently increasing since 1991, reaching 35 percent in 1997.

Like exports, imports are highly concentrated to a few products. Semiconductor items imported on consignment basis (SITC 93102) formed the bulk of the country's imports, accounting for an average share of 44 percent per year during the period 1991 to 1997 (Appendix Table 2). Again, this is consistent with the foregoing finding that IT exports are dominated by products manufactured from materials imported on consignment basis.

Imports of IT products grew on the average by 21 percent per year during the period 1991 to 1997. Driving the growth of imports are computer hardware (33.2 percent) and telecommunications



Source: PCTAS

Figure 3. Philippine imports of IT products, 1991-1997 (US$ billion)

equipment (28.2 percent). The sharp increase in the imports of telecommunication equipment is due to the deregulation of the telecommunication industry in 1993. Since the country does not have a telecommunication equipment manufacturing industry, it has to rely solely on imports. On the other hand, the increase in the imports of computer hardware is due to the growing proportion of all sectors of the society using computers.

Trade balance. The IT industry registered a trade surplus (US$1.2 billion) only in 1997 (Figure 4). However, a more detailed analysis of five-digit SITC products reveals that a few IT products have been net foreign exchange earners since 1991. These include input or output units, whether or not containing units in the same housing (SITC 75260); diodes, other than photosensitive or light-emitting (SITC 77631); transistors with dissipation rate of less than 1 W (SITC 77632); other semiconductor devices (SITC 77639); digital monolithic integrated circuits (SITC 77641); electronic micro-assemblies (SITC 77649); brakes and servo-brakes (SITC 78433); materials imported on consignment basis for the manufacture of semiconductors (SITC 91302); line telephone sets with cordless handsets (SITC 76411); transmission apparatus (SITC 76432), radar and remote control apparatus (SITC 76483); line telephone handsets (SITC 76424); other inductors for power supplies for automatic data processing machines (SITC 77125); and other fixed resistors for power handling capacity (SITC 77232).

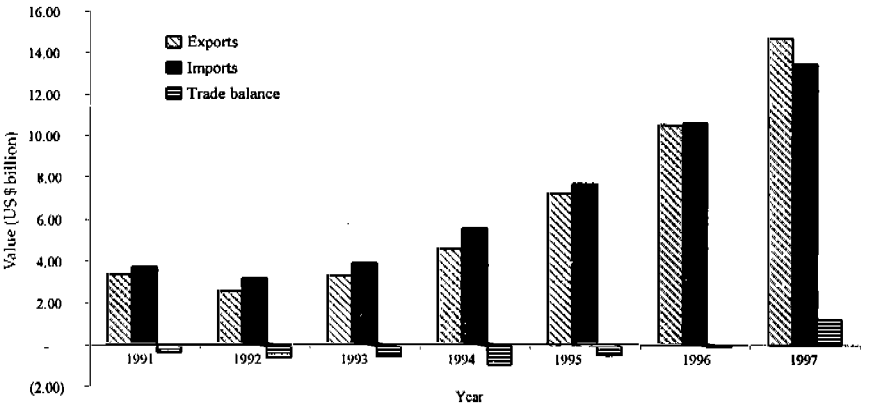
ASSESSMENT OF THE COMPETITIVENESS OF THE PHILIPPINE IT INDUSTRY

The competitiveness of the Philippine IT industry in the world market is the key to its sustained growth in the next millenium. This section of the paper discusses how the country's IT industry compares with those of its competitors in the region.

Among the countries in the region, the Philippines is the only one where the IT industry is highly concentrated to just *one* major IT segment, i.e. semiconductors (Table 1). In contrast, the other countries have two or three: Malaysia has semiconductors and

computer hardware, and so do Thailand and Singapore. Indonesia has telecommunication equipment, computer hardware, and other IT products; so does China. Mexico has computer hard ware and other IT products. Hong Kong has the best structure, as its exports are fairly distributed among the four major IT segments.

The implication of this becomes more serious when one considers the country's high dependence on IT for its export earnings, again in contrast to its neighbors, except for Singapore (Table 2). This implies that the total exports of the country are highly vulnerable to the global situation of the IT industry, unlike the other countries which will have products other than IT to rely on for their exports when the global market for IT products becomes unfavorable to them.



Source: PCTAS

Figure 4. Trade balance in Philippine IT, 1991-1997 (US$ billion)

Table 1. Structure of IT in the total exports of selected countries, 1991-1997 (percent)

Country	Computer hardware	Semi-conductors	Telecomu-nications	Other IT products	Total IT
Philippines	8.2	80.6	9.2	2.0	100.0
Indonesia	25.2	12.1	39.0	23.7	100.0
Malaysia	24.5	54.4	18.5	2.7	100.0
Thailand	44.0	29.0	14.2	12.9	100.0
Singapore	49.1	29.6	12.2	9.1	100.0
South Korea	19.2	52.0	14.6	14.3	100.0
Hong Kong	23.8	34.4	20.7	21.2	100.0
China	25.5	9.7	29.8	35.0	100.0
Mexico	23.5	13.4	19.5	43.6	100.0

Note: Data are not available for the following: Malaysia and Korea, 1997; China and Hong Kong, 1991; Thailand, 1996.

Source: PCTAS

Table 2. Share of IT in the total exports of selected countries, 1991-1997 (percent)

Country	1991	1992	1993	1994	1995	1996	1997	Average
Philippines	38.0	26.3	29.4	34.5	41.8	51.1	58.3	39.9
Indonesia	0.7	1.4	1.5	2.7	3.0	4.2	3.9	2.5
Malaysia	22.8	24.2	27.4	30.1	33.3	37.2	-	29.2
Thailand	14.9	16.2	16.8	19.1	20.7	-	22.1	18.3
Singapore	31.5	43.6	39.2	51.6	50.3	52.7	53.0	46.0
South Korea	17.4	18.4	18.7	21.1	24.1	23.3	-	20.5
Hong Kong	-	21.5	22.1	22.3	23.6	22.6	22.1	22.4
China	-	5.6	6.5	8.0	9.6	10.9	11.7	8.7
Mexico	4.8	14.9	15.1	16.8	16.3	16.3	18.3	14.6

Note: Data are not available for the following: Malaysia and Korea, 1997; China and Hong Kong, 1991; Thailand, 1996.

Measures of competitiveness

Two measures of competitiveness are used here: (i) success in expanding world market shares and (ii) revealed comparative advantage (RCA). The latter is measured as the ratio of a product's share in a country's exports and the product's share in world trade[5]. A ratio of greater than 1 indicates that a country has a comparative advantage in that product while a ratio of less than 1 indicates the opposite.

Market share. In terms of market share, the Philippine IT industry has yet to create its niche. In view of this, concern for its long-term growth prospects understandably becomes more critical. The country's market share remained at 1 percent during the period 1990 to 1997, in contrast to China's and Mexico's share of 2 percent each (Table 3). These two countries are increasing their stakes in the IT market much faster than any of the ASEAN-Four. This is further shown by the much rapid growth of exports from these two countries compared to the Philippines (Table 4).

Table 3. Market share in IT exports of selected countries, 1991-1997 (percent)

Country	1991	1992	1993	1994	1995	1996	1997	Average share 1991-1997	Change 1997-1991
Philippines	1.0	0.7	0.8	0.9	1.1	1.6	2.2	1.2	1.2
Indonesia	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.2	0.3
Malaysia	2.4	2.6	3.1	3.5	3.9	4.3	-	3.3	2.0
Thailand	1.3	1.4	1.5	1.7	1.8	-	2.1	1.6	0.8
Singapore	5.6	7.3	7.1	9.9	9.5	9.5	10.4	8.5	4.8
South Korea	3.8	3.7	3.8	4.0	4.8	4.3	-	4.1	(3.8)
Hong Kong	-	1.7	1.6	1.3	1.1	0.9	0.9	1.2	(0.8)
China	-	1.3	1.5	1.9	2.3	2.4	3.2	2.1	2.0
Mexico	0.4	1.8	1.9	2.0	2.1	2.3	3.1	1.9	2.7

Notes: Data are not available in the following: Malaysia and Korea, 1997; Thailand, 1996; Hong Kong; and China, 1991
Source: Estimates of the author using PCTAS

[5] $RCA_{ij} = (x_{ij}/X_{ij}) / (X_{iw}/X_{ww})$, where x_{ij} refers to product i exported by country j; X_{ij}, the country's total exports; and w subscripts, the world totals.

Table 4. Average real growth rate of IT exports in selected countries, 1991-1997 (1990 prices) (percent)

Country	Computer hardware	Semiconductors	Telecommunications	Other IT products	Total IT
Philippines	32.6	24.5	15.4	35.4	24.9
Indonesia	79.5	26.3	33.8	41.1	44.2
Malaysia*	44.1	19.7	18.1	102.5	26.9
Thailand	22.3	19.3	9.9	15.8	19.0
Singapore	20.5	25.9	11.4	27.2	21.4
South Korea	11.9	19.1	14.6	8.8	15.3
Hong Kong	(20.4)	16.3	(6.4)	(9.9)	(3.8)
China**	52.1	41.0	27.0	20.5	31.9
Mexico	41.5	70.6	81.2	54.9	54.3

Note: Compounded growth rate was computed for the following periods as follows: * - 1991-96; ** - 1992-97

Source: PCTAS

The Philippines also had the least percentage (41 percent) of products that managed to increase their market shares during the period 1991 to 1997 (Table 5). Again, very significant here are Indonesia, China and Mexico. Although the market share of Indonesia is a lot smaller than that of the Philippines (Table 3), 87 percent of its products are increasing their market share, in contrast to the Philippines' 41 percent. Also, China's and Mexico's respective market shares are not only higher and growing much faster than those of the Philippines, but 83 percent of China's and 73 percent of Mexico's products have improved their market shares (Table 5).

The above finding is not surprising. Given that these countries are also low-wage countries and given the increasing wages in the Philippines, they serve as alternative locations for the labor-intensive segment of the IT production chain. This should serve as a clear signal that unless the country moves away from labor-intensive assembly type of IT products, it would lose its share in the IT market. Competition from low-wage countries would

Table 5. Percentage of products with improved competitiveness, 1991-1997 (five-digit SITC)

Country	Total no. of export products	Market share		Revealed comparative advantage	
		No. of products with increased market share	% of total	No. of products with increased RCA	% of Total
Philippines	81	33	40.7	29	35.8
Indonesia	100	87	87.0	87	87.0
Malaysia	131	109	83.2	101	77.1
Thailand	121	94	78.0	78	64.5
Singapore	131	104	79.4	95	72.5
South Korea	127	64	50.4	62	48.8
Hong Kong	114	31	27.2	48	42.0
China	132	109	82.6	85	64.4
Mexico	129	94	72.9	109	84.5

Source: Estimates of the author using PCTAS

eventually erode the country's comparative advantage unless its IT industry shifts to technology-intensive products. The problem does not so much lie in rising wages, as shown by the experiences of Malaysia, Thailand and the NIEs, which attained high economic growth rates despite rising wage rates, as in producing and selling the right products in the market.

Is the Philippines ready to embark on the expected shift? The succeeding section of this paper addresses this question.

Revealed comparative advantage. The revealed comparative advantage indicator shows that the country is competitive in IT, i.e., RCA is greater than 1 (Table 6). Nonetheless, there was a decline in the country's competitiveness between 1991 and 1997. On the other hand, while China and Indonesia are not competitive yet, their competitiveness improved during the same period. This explains their increasing market shares, as discussed earlier. Mexico is competitive, and its competitiveness is increasing much faster than that of the Philippines.

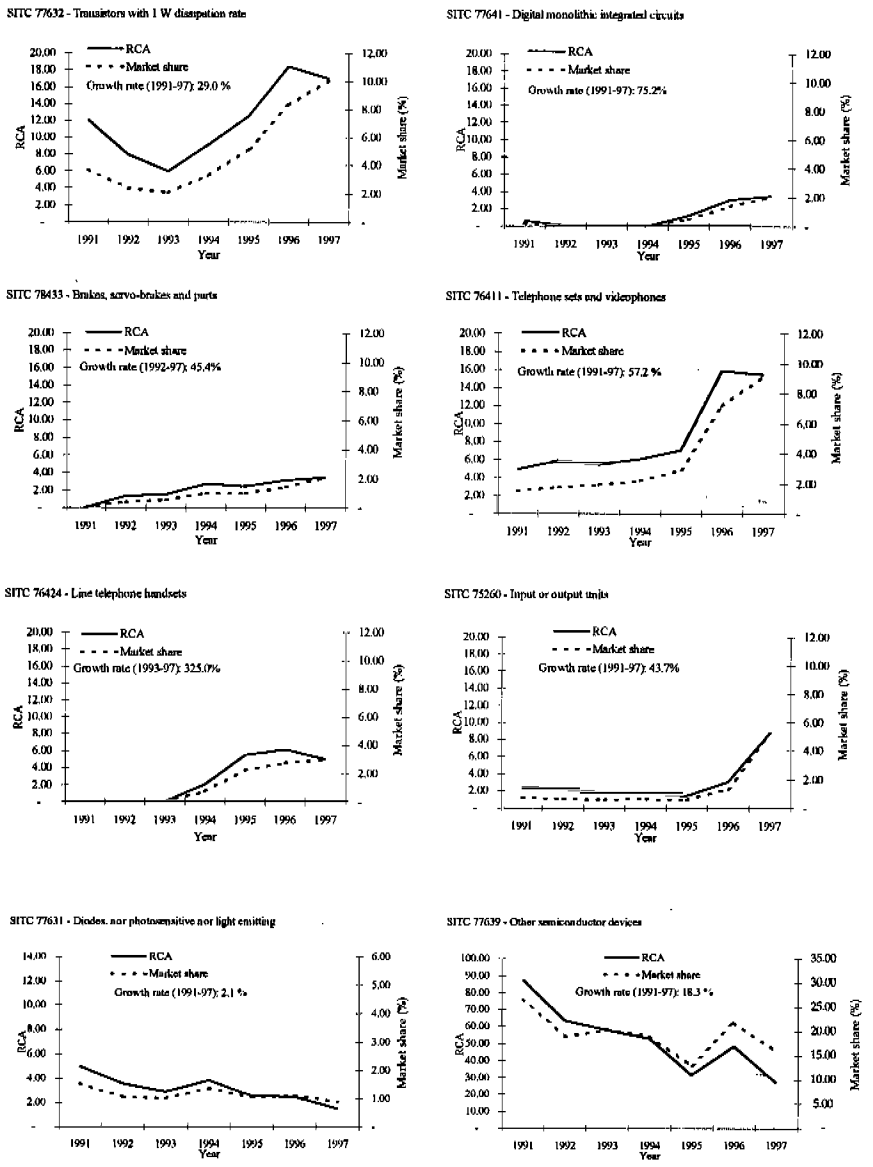
Table 6. Revealed comparative advantage of IT exports in selected countries, 1991-1997

Country	1991	1992	1993	1994	1995	1996	1997	Change 1997-1991
Philippines	2.1	1.0	1.1	1.1	1.1	1.4	1.6	(0.4)
Indonesia	0.1	0.1	0.1	0.2	0.2	0.3	0.2	0.2
Malaysia	2.0	2.1	2.2	2.2	2.2	2.5	-	0.5
Thailand	1.3	1.4	1.3	1.4	1.4	-	1.4	0.1
Singapore	2.7	3.8	3.1	3.8	3.4	3.5	3.4	0.7
South Korea	1.5	1.6	1.5	1.5	1.6	1.6	-	0.1
Hong Kong	-	1.9	1.8	1.6	1.6	1.5	1.4	(0.4)
China	-	0.5	0.5	0.6	0.6	0.7	0.8	0.3
Mexico	0.4	1.3	1.2	1.2	1.1	1.1	1.2	0.8

Notes: There are no reported data for the following: Malaysia, 1997; Thailand, 1996; Korea, 1997; Hong Kong, 1991; and China, 1991

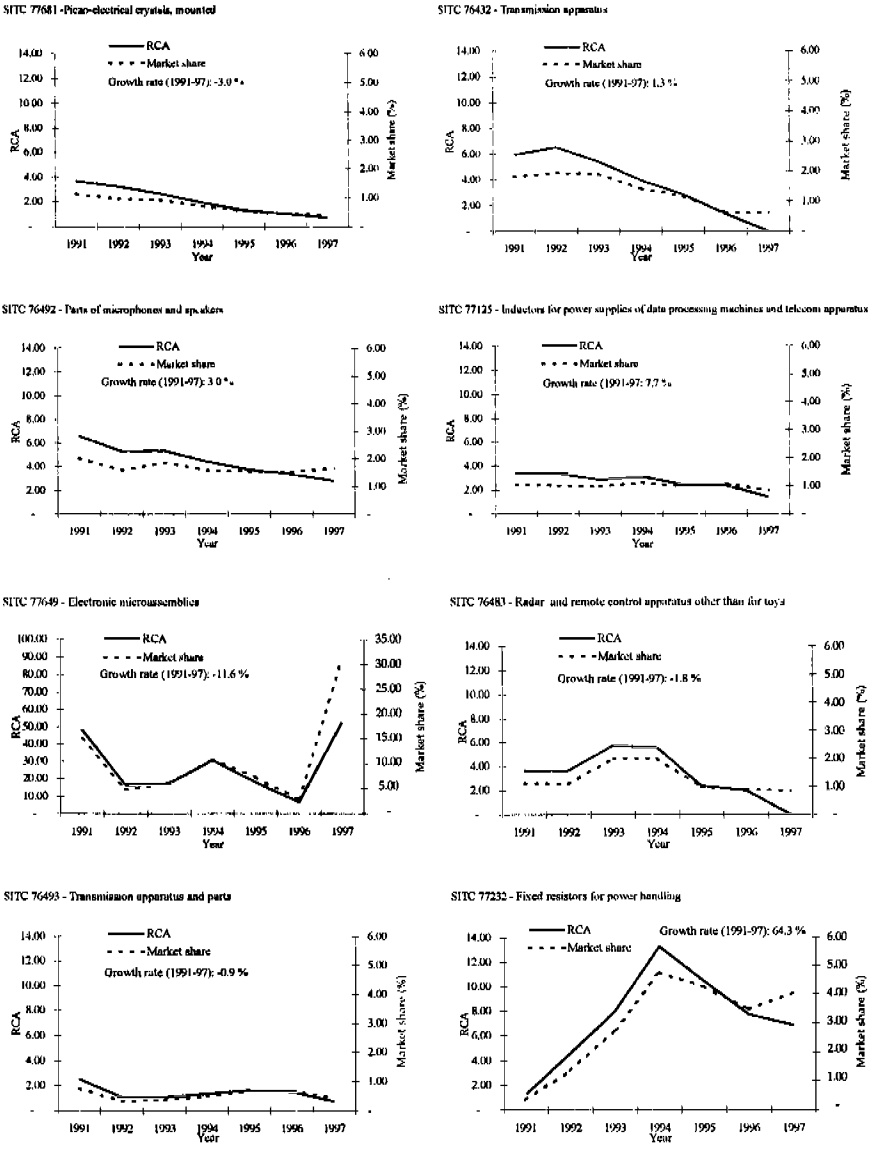
Source: Estimates of the author using PCTAS

Only 16 products out of the 81 five-digit SITC products being exported by the country are shown to be competitive (see Appendix Table 3 for the list of competitive and non-competitive products). Of those products, six are consistently improving their competitiveness (Figure 5), while 10 are in danger of losing their competitiveness as shown by their deteriorating RCAs (Figure 6).



Source: Estimates of the author using PCTAS

Figure 5. Philippine export products with increasing competitiveness, 1991-97



Source: Estimates by the author using PCTAS

Figure 6. Philippine export products with decreasing competitiveness, 1991-97

Compared to the other previously mentioned countries, the Philippines had the least percentage (36 percent) of products that registered improvements in competitiveness between 1991 and 1997 (Table 5). Improving and sustaining the competitiveness of the country's products are critical to increasing the market share of the country. As shown in Figures 5 and 6, the competitiveness of a product moves in the same direction as its market share. Likewise, as indicated in the figures, products with increasing competitiveness registered very high export growth rates while those experiencing a decline in their competitiveness registered very low, if not negative, growth rates.

Market positioning

For a better understanding of why the Philippines is not increasing its competitiveness and market share as fast as the other countries covered by the study, an analysis of the country's market positioning of its exports is next examined. Based on the World Bank study (1997), a country is considered competitive in a product if its world market share is growing, and a product is considered dynamic if its trade is growing faster than the average for all products. As shown in Table 7, this results in four types of commodity classification. Quadrant I is the optimal position, since a country is increasing its market share in dynamic products; Quadrant II is the worst position, since a country is losing market shares in dynamic products; Quadrant III is a vulnerable position, since a country is increasing its share in a stagnant product; and Quadrant IV is a position where a country needs some restructuring away from the stagnant products.

The high level of concentration in one product would not be a problem for exporting so long as the demand for that product is growing (World Bank 1997). Unfortunately, this is not true of the Philippines. Table 8 shows the products under each category above for the country. Herein lies another danger signal for the country. Much of its exports (44 percent) are accounted for by IT products that are deteriorating in world trade relative to other products.

Table 7. Market positioning classification

Share of the country's exports in world trade	Share of products in world trade	
	Rising (dynamic)	Falling (stagnant)
Rising (competitive)	I Optimal	III Vulnerable
Falling (non-competitive)	II Lost opportunity	IV Restructuring

Source: World Bank (1997)

This means that the country is increasing its share in products whose shares in world trade are falling. Only 42 percent of exports are generated from products that are growing and dynamic in world trade; 12 percent are generated by products whose share in world trade are increasing but for which the country is losing its market share; and 1.5 percent are generated by products that need some restructuring. And while the latter looks small in percentage, the amount of resources involved could be large. Efficiency in the economy could therefore be improved by moving away from the production of these products and reallocating the resources to where they could be used more efficiently.

A comparison with the other countries also shows that the country is not positioning its markets as best as the others (Table 9). The majority of the exports of the other ASEAN members, the NIEs, China, and Mexico consist of products that are growing in world trade. In short, they are exporting the right products.

Table 8. Market positioning of IT products, Philippines, 1991-97

Optimal		Lost Opportunity		Vulnerable		Retreat	
Code	Description	Code	Description	Code	Description	Code	Description
75290	Other units of automatic data processing machines	75220	Printed circuits	75260	Input or output units	77635	Thyristors, diacs and triacs
75997	Parts and accessories of heading 752	77631	Diodes, other than photosensitive or light emitting	77220	Printed circuits	77688	Parts of mounted piezo-electric crystals
77632	Transistors with a dissipation rate of less than 1 W	77633	Transistors with a dissipation rate of 1W or more	77649	Electronic microassemblies	76383	Sound reproducing apparatus, cassette type
77641	Cards incorporating electronic integrated circuits	77637	Photosensitive semiconductor devices	73591	Parts of focused iron beam milling machines	76384	Magnetic tape recorders, cassette typr
77689	Parts of electronic integrated circuits and microassemblies	77639	Other semiconductor devices	74190	Parts of chemical vapor deposition apparatus for semiconductor production	76419	Other apparatus including entry-phone system
78433	Brakes and servo-brakes	77643	Other monolithic integrated circuits	74391	Parts of spin dyer for semiconductor wafer processing	76483	Radar and remote control apparatus
76411	Line telephone sets with cordless handsets	77645	Hybrid integrated circuits	75131	Electrostatic photocopying apparatus	72819	Parts of machines used for semiconductors wafers
76491	Parts of electrical apparatus for line telephony and telegraphy	77683	Mounted piezo-electric crystals	77231	Fixed carbon resistors, composition or film types	72842	Encapsulation equipment for assembly of semiconductors
75995	Parts and accessories of machines of sub-heading 751.2	76415	Telephonic or telegraphic switching apparatus	87131	Electron beam microscopes	72852	Parts of encapsulation equipment
76421	Microphones having a frequency range of 300 Hz to 3.4 KHz	76432	Transmission apparatus incorporating reception apparatus	87449	Parts and accessories of products of heading 8744	74133	Apparatus and parts of the manufacture of semiconductor devices
76423	Loudspeakers, without housing	76493	Aerials and antannae and parts used for radio telephony and radio telegraphy	88136	Parts and accessories of the apparatus of heading 88135	74189	Chemical vapor deposition apparatus for semiconductor production
77121	Static converters for automatic data processing machines and telecommunications	76499	Magnetic type sound heads and parts for recording	75910	Parts and accessories of photocopying apparatus	74359	Spin dryer for semiconductor wafer processing
77232	Other fixed resistors for power handling capacity	72855	Parts of apparatus for the assembly of semiconductors	76424	Line telephone handsets	77868	Variable or adjustable (pre-set) apparatus
77255	Electronic switches	74918	Parts of automated machines for transport of the manufacture of semiconductor devices	77885	Parts of apparatus of sub-heading 77884	87426	Parts and accessories of optical instruments
77258	Plugs and sockets for co-axial cables and printed circuits	77125	Other inductors for power supplies for data processing machines			87439	Parts and accessories of instruments of heading 759.1
77259	Connection and contact elements for wires and cables	77314	Electronic conductors			87443	Spectrometers, spectrophotometers and spectographs using optical radiations
77865	Ceramic dielectric, multilayer fixed capacitors	77315	Other electronic conductors			87446	Other instruments and apparatus under healing 8744
77867	Other fixed capacitors	77863	Aluminum alectrolytic fixed capacitors			88135	Apparatus for making circuit patterns for semiconductor wafers
77869	Parts of capacitors	77878	Proximity cards and tags			89845	Magnetic tapes of of a width exceeding 6.5mm
87435	Instruments for measuring or checking pressure	77884	Indicator panels incorporating LCD or LED			76492	Parts of amplifiers, microphones and loudspeakers
89879	Other media for reproducing phenomena	87425	Optical instruments and appliances			77235	Other variable resistors
		87478	Instruments and apparatus for semiconductor wafers			77238	Parts of variable resistors
		89859	Other magnetic tapes and discs			89867	Media for reproducing phenomena other than sound or image
Average annual value of exports (US$ million)	1,788.60		521.2		1,833.20		81.5
% Share	41.7		12.2		44.2		1.9

A further analysis of the products for which the Philippines is losing market opportunities shows that these are the same products for which the country's competitors (Indonesia, Mexico and China) are gaining market shares. Unless the country regains or improves its competitiveness on these products, its competitors will eventually eat up whatever small market share remains for the country.

Table 9. Market positioning of the IT products in selected countries, 1991-1997 (percent)

Country	Optimal	Vulnerable	Lost opportunity	Retreat	Total
Philippines	41.7	44.2	12.2	1.9	100.0
Indonesia	72.0	22.0	4.3	1.7	100.0
Malaysia	54.8	33.7	11.2	0.2	100.0
Thailand	57.5	17.8	22.7	2.0	100.0
Singapore	74.4	4.7	7.2	13.7	100.0
South Korea	51.5	21.8	24.9	1.8	100.0
Hong Kong	26.8	23.0	42.4	7.8	100.0
China	64.9	31.1	3.2	0.8	100.0
Mexico	82.1	15.8	1.9	0.2	100.0

ISSUES CONFRONTING THE PHILIPPINE IT INDUSTRY AND ITS FUTURE DEVELOPMENT

What are the reasons behind the worrisome prospects for the Philippine IT industry? Below are a number of factors that may explain the industry's present situation, some of which are systemic in nature.

- *Lack of political will to implement a comprehensive policy to promote IT as an industry.* IT can be viewed from three perspectives. One, as a strategic industry producing products for exports and domestic use, either for consumers or downstream industries. Two, as a generic technology using IT in the production process to improve productivity and performance. Three, as an advanced infrastructure, like in telecommunications and transportation, to improve the delivery of services (Hanna et al. 1996).

As an industry, semiconductor has been identified as an export winner in the country. But apart from the BOI incentives for semiconductor firms, there is no comprehensive and clear policy to promote IT as an industry. This is very evident under Section 1 of EO 125, which states:

> "[It has been] declared the policy of government in furtherance of national development to create the appropriate policy and institutional environment to rationalize and accelerate the use, application, and exploitation of IT as a productivity tool and as a development strategy for modernization and economic development."

It is clear from the above policy declaration that the Philippines is promoting IT as a generic technology (to improve productivity) and as an infrastructure (for modernization and economic development) but not as an industry. This is in contrast to the experience of the NIEs, which have explicit policies to promote IT as an industry.

The lack of political will to implement IT as an industry is made more evident by the following:

- *IT21 unrealistic.* IT21, launched in early 1998, outlines the country's vision and goal of transforming itself into "Asia's Knowledge Center" under a three-phase strategy. Phase I: the infrastructure for every sector of the economy to have access to IT should have been laid by 2000; Phase II: by 2005 the use of IT should have become pervasive in daily life while the country should have produced competitive IT products for world market; and Phase 3: the vision should have been realized within the first decade of the 21st century (NITC 1997).

  The plan lacks focus. The vision, while ambitious by itself, is not realistic considering the current state of the industry. For example, Phase I has yet to materialize. The government has also been identified as the lead user of IT but the whole bureaucracy is not even interconnected to this day.

- *Fragmented government efforts in promoting IT.* Several offices are in charge of policymaking and promoting IT in the country. One of these is the National IT Council (NITC), which was set up during the Ramos administration as the highest planning and policy advisory body on IT, with the National Computer Council (NCC) as its technical arm. Under the Estrada administration, the Y2K Commission and the Presidential Consultant on IT and Communication were established as additional policymaking bodies. The Y2K Commission was in charge of monitoring the government and industry's preparedness to deal with the millenium bug. Today, the existence of several IT offices has made the functions of NITC redundant, making the coordination of government efforts on IT difficult.

- *Inadequate investments in R&D.* There is a general consensus that for high-tech industries, investment in R&D is at least equally important as those related to production (Ernst and O'Connor 1992). Investment in R&D has become a source of competition for IT firms considering the fast speed of technological obsolescence in recent years, which is one year for some IT products. Product development has therefore become an essential factor to remaining competitive and a source of temporary technological monopoly rents until new technologies become obsolete or better technologies are developed.

  The NIEs have invested a lot in R&D to develop their technological capability. South Korea had an average ratio of investment to GNP of 2.3 percent per year during the period 1990 to 1995; Singapore had 1.1 percent, and Taiwan 1.7 percent (NAPES database). In contrast, a study by Cororaton (1999), using the UNESCO data, shows that the Philippines' ratio of investment to GNP—at 0.2 percent in 1992—is far below the maximum of 3 percent among the countries studied.

- *Lack of specialized skills for high value-added IT products.* The skills requirements for work beyond final assembly have become greater. However, the country's engineers do not have the specialized skills for high value-added IT products. Companies have to spend a substantial amount to send their manpower to the United States for training. Such a high cost erodes their price competitiveness. Compounding the situation is the fact that the average stay of this kind of manpower is only two years, since they are being pirated by companies overseas.

- *Infrastructure and institutional bottlenecks.* Inadequate infrastructure, particularly in transportation and telecommunication, and congestion in the metropolis, have been perennial problems of the country. There is also the high cost of doing business caused by delays in the processing of papers and graft and corruption. High infrastructure costs and delays erode profitability and competitiveness.

  One clear institutional bottleneck affecting the industry is the apparent absence of a complete and accurate database for IT services and software. Exports and imports of IT services are recorded under the "services" account classification of the Bangko Sentral ng Pilipinas (BSP), which includes all other types of services. Other official statistical gathering bodies like the National Statistics Office (NSO), National Statistical Coordination Board (NSCB), and the Department of Trade and Industry (DTI) also do not distinguish IT services and software from other services under their existing classification of accounts or industries. The absence of such database makes industry analysis difficult, if not impossible.

- *Inadequate support industries, including those providing support services.* The high import content of the country's IT industry is also caused partly by inadequate support industries and services in the country that are supposed to allow the primary production activities to take place without interruption and to adapt and expand.

- *Demand for IT applications: is there a solid domestic market base?* Despite the growth in demand for IT products as a result of the increased per capita income in recent years and the deregulation of the telecommunication industry, the current domestic market has remained small. However, it has a great potential for expansion. The public service sector can give the industry a big boost if only it would increase its demand for IT. The computerization of public service in the NIEs has not only improved the delivery of such service and lowered transaction costs between government and business or households, it has also created a huge domestic demand for IT, which in turn has led to the industry's growth and expansion. In the Philippines, while there is admittedly a marked increase in the computerization of government projects, the state of technological advancement in the public sector nonetheless remains low.

CONCLUSION AND RECOMMENDATIONS

The study has highlighted the structural weaknesses of the Philippine IT industry. The industry is still on a substantially lower level than the NIEs, both in terms of product sophistication and the technological complexity of the production process involved as production consists mostly of labor-intensive assembly operations. This was shown by the high concentration of exports of the industry in a few low value-added products. Localization of inputs is still at an embryonic stage as the industry relies on parts imported on a consignment basis. Infrastructural and institutional bottlenecks and the inadequacy of the educational system to meet the technical human resource requirements of the industry have remained critical constraints to the industry's further growth.

Technological advancement in the IT industry is very fast. However, the limited capability of the industry in the country in terms of skills and facilities has constrained the continued transfer of process technologies from multinational companies. Unless the industry improves its local capability to cope with new and advanced technologies, its long-term competitiveness will be at

risk, especially as the country's competitors are increasing their stake in the global IT market much faster than the country.

The main agenda at the turn of the century should be to transform the Philippine IT industry from a labor-intensive, low-skill industry to a knowledge- and technology-intensive one. However, for the country to upgrade its competitive position in the industry amid the accelerating global technology race, a number of cross-cutting strategies to lessen or overcome such difficulties may be considered:

a) Implementation of a comprehensive IT policy

- *Private sector to identify IT products and services for promotion and development.* The industry itself should identify its niche products and services. These products and services will then be the focus of efforts on R&D, manpower development, and investment.

  The industry needs to capitalize on IT services, which appear to be its greatest strength. With the fast development of telecommunications, demand for IT services offshore is expected to increase, given that the cost of providing IT services through this modality is much cheaper than providing it at the client's site.

  Likewise, while the country is traditionally known as a computer service provider, the industry needs to strengthen its capability in software development. This could be done by encouraging consumers to use local brands, thereby increasing the demand for local software. Along the way, this strategy will provide the software industry with experience and a base for relevant skills and ultimately become the launching pad for exports.

- *Review policy gaps in IT.* IT21 should be reviewed and strengthened where it is weak. Considering that IT policies are currently being implemented by various agencies, there is a need to review these policies and identify policy gaps.

- *Strengthening of NITC as agency tasked to promote the IT industry.* Currently, the NITC has no budget and relies on its

members to finance its meetings. An agency without a budget is like a car without gasoline; it cannot function. Hence, the NITC should be given an annual budget for it to carry out its functions.

Also, the Commission on Higher Education (CHED) and the Department of Education and Sports (DECS) should have greater involvement in the NITC, particularly in IT policy formulation, considering their critical role in developing the technical human resource requirements of the IT industry.

b) Investments in R&D

- *Private sector to invest more in R&D.* Given the limited government budget, the private sector should assume a greater role in R&D for the industry. The government can encourage the private sector to do so by giving them some incentives.

- *Focus R&D on high value-added IT products, product design and process.* Accessing the newest technology through licensing is becoming more difficult, since greater emphasis is now given to intellectual property rights (IPR). Hence, the country's limited resources should be directed to the development of the technologies required by the targeted IT products.

- *Strict enforcement of IPR.* To encourage the development of new products and process, the country should strictly enforce intellectual property rights.

c) Development of specialized skills for high value-added IT products

- *Incorporate IT in all levels of education (primary, secondary and tertiary).* While this measure would mean an increase in the cost of education and/or additional years in schooling, it would undoubtedly create an "IT culture" in the mindset of the future workforce and prepare them for the greater skills requirements of globalization.

To implement this proposed measure, DECS and CHED should be technology advocates themselves. Investment in

computers and student access to the Internet should get a bigger share of the budget of these two agencies.

- *Re-design engineering and other natural sciences curriculum.* Emphasis should be given to developing the capability, creativity and willingness of students to develop new products and processes. The industry should be involved in designing the curriculum to ensure that graduates have the kind of education the industry needs.

- *Investment in specialized technical training schools to enhance the technical competencies of the labor force.* Skills are essential to moving up the technological ladder. An engineering course is not enough, since developments in information technology are happening very fast. Again, the industry should be involved in designing the training programs.

d) Development of a national information infrastructure

- *Investment in telecommunications infrastructure.* Government should invest in building public telecommunication and specialized networks that could make IT accessible to everyone. In this regard, government-business partnership has a crucial role to play in guiding the broad directions for standards, regulations, and network-based applications. For specialized networks (e.g., customs, health services, government database), standardization and coordination among the various agencies concerned are essential.

- *Harmonize classification of IT services.* IT services should be classified separately from other types of services. Statistical gathering agencies should follow the GATS Services Sectoral Classification as follows: (i) consultancy services related to the installation of computer hardware; (ii) software implementation services; (iii) data-processing services; (iv) database services; and (v) others (WTO 1998).

- *Build a database for IT services.* There is a need to build a comprehensive statistical database for IT services for use in formulating plans and strategies needed to develop this segment of the industry. The database should follow the international classification of the industry, as discussed above. Such database should form part of the existing government statistical system accessible to the public.

e) Role of government in IT diffusion

- *Create an enabling environment for IT diffusion.* This could be achieved through cheaper access to information and technology. Such access would encourage potential IT users to invest in information and communications facilities, thereby creating more demand for IT products.

- *Government to utilize local IT consultants.* Instead of hiring foreign consultants to provide IT services in government projects (including foreign-funded projects), the government should utilize local consultants. It is ironic that the demand abroad for the services of Filipino IT professionals is increasing while they are not being fully utilized here.

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Appendix Table 1. Share in total IT exports, 1991-1997 (%)

Code	Description	1991	1992	1993	1994	1995	1996	1997	Average
Computer hardware									
75260	Input or output units	4.9	6.8	5.6	3.9	2.7	4.5	11.4	5.7
75997	Parts and accessories of data-processing machines	4.9	0.7	0.8	1.2	2.3	3.1	2.6	2.2
Semiconductors									
77632	Transistors with less 1W dissipation rate	1.2	1.3	1.0	1.6	1.7	1.8	1.5	1.5
77639	Other semicon ductor devices	3.1	4.9	4.2	3.2	3.0	3.6	2.2	3.4
77641	Integrated circuits	1.3		0.0	0.0	5.3	11.0	10.1	4.0
77649	Electronic microassemblies	31.6	14.5	17.2	17.3	10.4	2.9	4.0	14.0
78433	Brakes and servo-brakes		0.9	1.0	1.6	1.2	1.2	1.2	1.0
93102	Materials imported on consignment basis for the manufacture of semiconductors and electrical equipment	37.7	54.0	54.3	56.0	60.6	59.7	56.9	54.2
Telecommunications									
76411	Telephone sets and videophones	0.8	1.9	1.8	2.1	1.9	3.6	3.3	2.2
76432	Transmission apparatus	3.4	5.5	5.2	4.2	2.7	1.2	1.0	3.3
76493	Aerial and antennae and parts used for radio telephony and radio telegraphy	2.6	1.8	1.8	2.0	1.8	1.5	0.7	1.7
	Total share	91.5	92.3	92.9	93.1	93.5	94.1	94.9	93.2

Source: PCTAS

Appendix Table 2. Share in total IT imports, Philippines, 1991-1997 (%)

Code	Description	1991	1992	1993	1994	1995	1996	1997	Average
Computer hardware									
75260	Input or output units	0.8	4.7	1.6	1.3	1.2	1.3	0.8	1.7
75997	Parts and accessories of data processing machines	4.2	5.5	3.6	3.2	3.9	5.2	8.8	4.9
Semiconductors									
77641	Integrated circuits	1.5	0.7	1.0	0.9	1.2	0.8	2.1	1.2
77649	Electronic microassemblies	2.0	2.3	1.5	1.1	1.0	1.0	2.7	1.7
77689	Parts of electronic integrated circuits and microassemblies	28.9	11.4	12.3	12.3	9.5	8.1	14.0	13.8
93102	Materials imported on consignment basis for the manufacture of semiconductors and electrical equipment	32.4	43.8	46.2	48.8	49.1	48.4	40.2	44.1
Telecommunications									
76415	Telephonic or telegraphic switching apparatus	1.7	1.6	2.3	3.7	3.0	2.9	2.3	2.5
76431	Transmission apparatus other than for radio-broadcasting or television	0.9	1.5	1.9	1.8	3.0	2.5	2.3	2.0
76491	Parts of electrical apparatus for line telephony or telegraphy	2.0	3.6	2.5	2.4	2.4	4.4	4.7	3.2
76493	Aerials or antennae and parts used for radio telephony and radio telegraphy	3.5	4.4	5.5	4.3	4.3	5.4	3.3	4.4
Other IT products									
77259	Connection and contact elements for wires and cables	1.9	1.8	1.5	1.5	1.3	0.9	0.8	1.4
77314	Electronic conductors	0.6	1.4	1.3	1.3	1.1	0.9	0.7	1.0
Total share		80.3	82.8	81.2	82.7	81.0	81.8	82.8	81.8

Source: PCTAS

Appendix Table 3. List of competitive and non-competitive IT products, Philippines, 1991-1997

Code	Competitive Description
75260	Input or output units
77631	Diodes, other than photosensitive or light emitting
77632	Transistors with a dissipation rate of less than 1W
77639	Other semiconductor devices
77641	Digital monolithic integrated circuits
77649	Electronic microassemblies
77681	Mounted piezo-electric crystals
78433	Brakes and servo-brakes
76411	Line telephone sets with cordless handsets
76424	Line telephone hansets
76432	Transmission apparatus incorporating reception apparatus
76492	Parts of amplifiers, microphones and loudspeakers
77125	Other inductors for power supplies for data processing machines
76483	Radar and remote control apparatus other than for toys
76493	Aerials and antennae and parts used for radio telephony and radio telegraphy
77232	Other fixed resistors for power handling capacity

Code	Non-competitive Description
75220	Other digital automatic data processing unit
75230	Digital automatic data processing unit other than those of sub-heading 7522
75290	Other units of automatic data processing machines
75997	Part and accessories of heading 752
77220	Printed circuits
77633	Transistors with a dissipation rate of 1W or more
77635	Thyristors, diacs, and triacs
77637	Photosensitive semiconductor devices
77643	Other monolithic integrated circuits
77645	Hybrid integrated circuits
77688	Parts of mounted piezo-electric crystals
77689	Parts of electronic integrated circuits and microassemblies
76382	Transcribing machines
76383	Sound-reproducing apparatus, cassette type
76384	Magnetic tape recorders, cassette type
76415	Telephonic or telegraphic switching apparatus
76419	Other apparatus including entry-phone systems
76431	Transmission apparatus
76481	Portable receivers for calling, alerting and paging
76491	Parts of electrical apparatus for line telephony and telegraphy
76499	Magnetic type sound heads and parts for recording
59850	Chemical elements doped for use in electronics
72819	Parts of machines used for semiconductor wafers
72842	Encapsulation equipment for semiconductor assembly
72852	Parts of encapsulation equipment
72855	Parts of apparatus for semiconductors assembly
73111	Machines for the removal of material by laser in the production of semiconductor waves
73591	Parts of focused iron beam milling machines
74131	Furnaces and ovens for the production of semiconductor devices
74133	Apparatus and parts of the manufacture of semiconductor devices
74135	Parts of apparatus for rapid heating of wafers
74189	Chemical vapor deposition apparatus for semiconductor production
74190	Parts of chemical vapor deposition apparatus for semiconductor production
74359	Spin dryer for semiconductor wafer processing
74391	Parts of spin dyrer for semiconductor wafer processing
74565	Cleaning machines for semiconductor packages
74918	Parts of automated machines for transport of the manufacture of semiconductor devices
75113	Word processing machines
75131	Electrostatic photocopying apparatus
75133	Other photocopying apparatus

Competitive		Non-competitive	
Code	Description	Code	Description
		75910	Parts and accessories of photocopying apparatus
		75995	Parts and accessories of machines of sub-heading 751.2
		76421	Microphones having a frequency range of 300 Hz to 3.4 KHz
		76423	Loudspeakers, without housing
		77121	Static converters for automatic data processing machines and telecommunications
		77231	Fixed carbon resistors, composition or film types
		77233	Wirewound variable resistors, including rheostats and potentiometers
		77235	Other variable resistors
		77238	Parts of variable resistors
		77255	Electronic switches
		77258	Plugs and sockets for co-axial cables and printed circuits
		77259	Connection and contact elements for wires and cables
		77314	Electronic conductors
		77315	Other electronic conductors
		77863	Aluminum alectrolytic-fixed capacitors
		77865	Ceramic dielectric, multilayer fixed capacitors
		77866	Dielectric-fixed capacitors of papers and plastics
		77867	Other fixed capacitors
		77868	Variable or adjustable (pre-set) apparatus
		77869	Parts of capacitors
		77878	Proximity cards and tags
		77879	Parts of 77878
		77884	Indicator panels incorporating LCD or LED
		77885	Parts of apparatus of subheading 77884
		87131	Electron beam microscopes
		87425	Optical instruments and appliances
		87426	Parts and accessories of optical instruments
		87431	Instruments for measuring or checking the flow of liquids
		87435	Instruments for measuring or checking pressure
		87437	Other instruments for measuring and checking of heading 759.1
		87439	Parts and accessories of instruments of heading 759.1
		87443	Spectrometers, spectrophotometers, and spectographs using optical radiations
		87445	Other instruments and apparatus using optical radiations
		87446	Other instruments and apparatus under heading 8744
		87449	Parts and accessories of products of heading 8744
		87477	Instruments and apparatus designed for telecommunications
		87478	Instruments and apparatus for semiconductor wafers
		87479	Parts and accessories of instruments for semiconductor devices
		88135	Apparatus for making circuit patterns for semiconductor wafers
		88136	Parts and accessories of the apparatus of heading 88135
		89845	Magnetic tapes of a width exceeding 6.5mm
		89859	Other magnetic tapes and discs
		89867	Magnetic tapes for reproducing phenomena other than sound
		89879	Other media for reproducing phenomena