

Hastening to Embrace the Internet Revolution in Asia

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In order for Asia to benefit from the Internet Revolution that is rapidly sweeping through other areas of the world, a number of factors that are restricting its growth must be overcome. These include the limited usage of the Internet among small and medium-scale enterprises (SMEs) in Asia—which lags behind other regions in developing large companies; the undeveloped distribution and payment infrastructure; inefficiencies in the service sector supporting e-commerce; inadequacies in the institutional frameworks; and the thin layer of human resources.

Substantial strides towards overcoming these problems are being made by Asian NIEs, which are adopting and implementing policies that are more advanced than those of Japan in such fields as presenting visions, expanding Internet access, developing communications and institutional infrastructures, and creating international networks. As a result, a digital divide is emerging as the gap with late-starting countries continues to expand, leading to a role reversal that has destroyed the long-standing development pattern in Asia in which Japan has assumed the lead as other countries have taken off one after another much like the orderly take-off of a flight of wild geese. Accordingly, Japan should re-structure its economic relationships with other Asian countries by recognizing the new realities stemming from the changes that are emerging from this Internet Revolution.

The 11th Asia Forum 2000 was held on May 12 in Kyoto under the auspices of the Tokyo Club Foundation for Global Studies and jointly sponsored by Nomura Research Institute (NRI). The directors and presidents of ten representative research institutes in East Asia participated in the forum and panel discussions dealing with the theme of “East Asia Under Globalization and the IT Revolution: Search for a New Growth Paradigm for the 21st Century.” This paper outlines my personal views concerning the discussions and papers submitted during the forum by focusing on the impact of innovation in information technology, especially from the perspective of the Internet Revolution in terms of e-commerce.

I The Immediate Impact of the Internet Revolution on Asia

The economic impact of the rapidly emerging Internet Revolution centered around the US has three aspects: (1) an expansion in the production of IT-related products; (2) improvements in efficiency stemming from the greater utilization of IT for production and distribution activities such as e-commerce; and (3) the creation of new industries centering on e-commerce and related fields. From the Asian standpoint, the impact of the first item has been the most conspicuous through such formats as an increase in exports to the US market, etc. While great potential can be expected with respect to the other two factors, their full-scale evolution is yet to come. And before these advances can take firm root, a number of factors restraining such developments in Asia must be overcome.

1 Rapid Expansion in Asian IT Industry Centered on Equipment Manufacturing

While Asian countries have long been viewed as a base of supply for electronic products, Asia is also coming in for increased attention in terms of IT-related products in the worldwide progression of information technology innovation. Indeed, exports of information appliances have played a major role in helping a number of countries in the area recover from the Asian currency crisis. However, the bulk of electronic products exported from Asia consist of home appliances and PC-related equipment, and Asia still lags substantially behind advanced countries in communications equipment with high growth potential¹³.

In Singapore, the added value of the information and computer industry has grown at a rate of 26 percent annually between 1990 and 1996—from S\$12 billion to S\$26 billion (about ¥201 billion). Manufacturing accounted for 60 percent of the IT-related added value in 1996, followed by 16 percent for the wholesale and retail industries (mainly office and communications equipment). Other industries making up this total included

telecommunications (10.5%), computer-related services (3.8%) and business information and technical services focused on business consulting (6.9%). The largest part of IT-related output in Singapore is directed towards exports⁸.

In Korea, the IT industry’s share of GDP increased from 4.2 percent in 1993 to 6.3 percent in 1998. IT exports increased at an annual rate of 16.2 percent from \$14.4 billion in 1993 to \$30.5 billion in 1998, and the IT ratio among overall exports also increased from 17.5 percent to 23.1 percent⁹.

However, these IT equipment exports—especially in view of the weakness in the field of communications equipment where technical innovations are taking place most rapidly—essentially represent intensive non-technical production contracts based on technological innovations achieved mainly by the US. As such, they carry little connotation of autonomous industrial development by Asian nations in response to economic globalization.

With respect to software as well, exports by East Asian nations are relatively limited compared to those from India, although software exports by the Philippines where English abilities are high and higher education is widely developed have reached a significant scale¹. And despite its handicap in terms of language, China also offers a clear potential for growth in the future because of its enormous pool of low-cost labor and the pending return of a large number of students who have been studying in the US.

2 E-Commerce Market Still in Its Infancy

It must also be noted that Asia is just at the starting point with respect to utilizing IT for production and distribution based on e-commerce. While this is an area that is still woefully underdeveloped throughout Asia, it is nevertheless one that is also expected to see accelerating growth in the future. For example, while the US now accounts for some 80 percent to 90 percent of e-commerce markets worldwide, it is projected that most of the growth in Internet usage in the next three to five years will take place mainly in Asia and Latin America¹⁴.

At present, the principal format for e-commerce in Asia is B2B (business-to-business) applications—as is the case with advanced countries—while B2C (business-to-consumer) markets remain largely untapped. Many observers predict a similar scenario will prevail for the time being, with the B2B format expected to maintain a scale some ten times larger than B2C. This is because the former not only has the effect of reducing private-sector production costs by some 10 percent to 50 percent but also leads to better efficiencies in resource utilization¹⁴.

The Market Information Center of the Institute for Information Industry (Taiwan) predicts that the B2B market in Taiwan will expand from NT\$1 billion in 1999 to NT\$16.5 billion (about ¥56 billion) in 2002¹⁰. In Korea as well, e-commerce still remains relatively limited.

Moreover, official statistics in Singapore report that e-commerce transactions in 1999 were S\$19 billion (about ¥115 billion), accounting for only 0.9 percent of GDP. Of this total, a full 98 percent represented B2B business⁸.

Although the e-commerce infrastructure in Asia is still underdeveloped compared to that in the US, it is rapidly being organized and starting to form the foundation for the development of e-commerce. And even though the PC penetration ratio in the entire Asian area is substantially lower than that in the US and Europe as indicated in Table 1, a large gap exists within Asia itself—with Singapore having reached a level equivalent to that of the US. While the PC density in Japan and NIES is lower than that of the US, it still tops the average in Europe. And in Korea as well, the number of Internet host computers has grown 33 times in five years—from 14,000 units in 1994 to 460,000 units in August of 1999⁹.

3 Factors Restricting the Development of E-Commerce in Asia

One of the factors that can be cited for the delays in developing e-commerce in Asia—especially with respect to B2B transactions as the main e-commerce format—is the general absence of large companies other than in Japan and Korea. The importance of this phenomenon cannot be understated, as we find that entities taking the lead in approaching e-commerce have mainly been large companies not only in Asia but in advanced countries as well.

According to a survey conducted among manufacturing companies in Taiwan by the Chung-Hua Institution for Economic Research, a full 70 percent of the respondents indicated that they had no experience in carrying out e-commerce¹⁰. Moreover, the low awareness of e-commerce among small and medium-scale enterprises is also hampering its development. The survey revealed that the inability of SMEs to appreciate the benefits of EC continues to be a factor in accounting for the delays in approaching this market.

Manufacturing businesses in Taiwan have long excelled at OEM contract work through a highly integrated vertical network that links small and mid-sized firms. In the early stage of IT development, IT related companies centered around the US expanded outsourcing in such fields as component production in order to concentrate on high-margin segment by gradually establishing de facto standards for such output. This worked to the advantage of SMEs in Taiwan, which have established their networking arrangements among local partner companies on the basis of such standards.

However, as B2B e-commerce in such areas as supply chain management, wherein all processes from ordering, production, to sales are controlled by IT on an integrated basis, have rapidly expanded its capacity with the mass globalization of IT business. As a result, Taiwan is also seeing a tendency towards concentrated orders being placed with a limited number of large companies that can support such integrated global operations for clients¹⁰.

Despite these trends, many observers see EC as offering a means of overcoming the handicaps of SMEs in the future. For example, President Edward K. Y. Chen of Hong Kong's Lingnan University considers that the New Economy centered around IT innovation is actually neutral in terms of company scale and opens up great new potential for SMEs¹¹. This view holds that, because SMEs lack the funding base to invest in developing EC systems and/or building brand names, e-commerce offers such firms an easy way to substantially reduce access costs to network resources. Accordingly, EC is expected to significantly improve market access by SMEs, including access to overseas markets¹⁰.

In predicting the competitive relationship among Asian nations in the future, due attention must be given to the possibility that the competitiveness of Chinese-run SMEs may be considerably heightened by adopting B2B e-commerce marketing. As 98 percent of Hong Kong companies have 100 or fewer employees, the effect of introducing e-commerce can be seen as especially significant¹¹. Accordingly, an urgent task for

Table 1. PC Density Ratios in Asia, Europe and the US (Unit: %)

	1993	1994	1995	1996	1997	1998
Japan	7.77	9.19	12.03	16.21	20.21	23.72
Korea	6.84	8.64	10.77	13.17	15.07	15.68
Taiwan	6.68	8.05	9.86	10.27	12.70	15.86
Hong Kong	10.00	12.43	15.43	19.01	23.07	25.42
Singapore	12.18	17.06	23.43	31.21	39.95	45.83
Malaysia	2.60	3.26	3.73	4.16	4.61	5.86
China	0.12	0.17	0.23	0.36	0.60	0.89
Asian Average	0.75	0.94	1.20	1.52	1.88	2.21
US	27.20	29.74	32.81	36.39	40.69	45.86
European Average	5.74	6.71	8.30	9.58	11.11	13.29

Source: Presentation of President Jin Soo LEE of the Korea Development Institute; compiled from data in the *ITU World Telecommunication Indicators* (November 1999).

Asian countries is to promote IT networking among SMEs.

A factor that is sometimes seen as restricting the development of B2C e-commerce in Asia is the often-observed tendency—especially among the Chinese—of refraining from making any purchases until after actually seeing and feeling the product and then negotiating a price. A similar tendency has been pointed out for people in Taiwan as well¹⁰. Another factor having an even greater restrictive impact is the poorly developed distribution and payment infrastructure for B2C as well as B2B transactions—and the matter of online security. For example, it has been said that determining credit-worthiness is very difficult in China, where connections or “pull” can play a major social role. This can lead to considerable uncertainty in determining whether or not payment will actually be made².

As e-commerce requires technical and processing capabilities that permit online payments and quick online or physical distribution of goods or services to consumers, the wherewithal to provide such services is essential for B2C transactions. However, because it will be possible to provide easy-to-use payment functions at low costs by means of cellular phones (which are highly popular throughout Asia), some think that the matter of online payments is not necessarily a bottleneck as far as B2C transactions are concerned¹³.

In more general terms, the development of e-commerce requires that efficient service sectors be in place. According to a study by UNCTAD (United Nations Conference on Trade and Development), the expected improvements in the efficiency of resource utilization promised by e-commerce will be cut to less than half of the projected totals if service sectors remain as inefficient as now¹⁴. However, Asian countries that have adopted export-oriented strategies for industrial development are often characterized by a dual economic structure that consists of an efficient industrial sector exposed to international competition and an inefficient service sector isolated behind a wall of protective measures. As a consequence, there is a strong possibility that this dual structure will prove to be a major hindrance to the development of e-commerce.

In the EC business in Korea, for example, the high transaction costs due to logistical inadequacies (especially physical distribution management) have become a major restriction⁹. In Taiwan as well, the lack of such e-commerce infrastructure as the required network technology, taxation, payment systems, the rights of consumers and online security, is recognized as a serious impediment¹¹.

Moreover, the inadequate protections given to public and personal information on the Internet represent another obstacle. Developing an institutional infrastructure regarding e-commerce, such as systems for electronic authentication is a still-pending task.

In addition, a problem seen in many Asian countries is what can be described as limited activity with respect to starting the businesses that are essential to the devel-

opment of new IT industries such as e-commerce. By way of background, this paucity of entrepreneurship is sometimes traced to the history of strong government intervention in pursuing growth and economic development and a reliance on foreign capital within the framework of a “development dictatorship.” This has come to constitute a major problem in Singapore and some other Asian nations, and is similar to the situation in Japan where strong government intervention has guided economic activities and large companies have dominated its economy. This lack of entrepreneurship may be difficult to overcome.

While it appears that this issue is not as conspicuous in Taiwan and Korea, nevertheless these countries and other Asian nations are all subject to the drawbacks of conventional, Asian-style bank-based financing, which does not seem capable of providing start-up capital in ways that are suitable to the particular needs of the IT industry.

In more basic terms, another problem is the matter of human resources. In addition to the issue of IT education itself, East Asian countries are increasingly coming to recognize that the school systems that have formerly served them so well by emphasizing basic education and adaptation in promoting industrialization may work in a negative way in the new era of “informatization.”

Because of the networking effect of IT (i.e., the greater the number of participants, the higher the network advantages), both hardware and software for the use of the Internet and e-commerce are likely to converge. At the same time, however, easy access to the Internet is considered to offer the possibility of various products and services co-existing in e-commerce¹⁴.

The abilities to marshal creativity and originality are essential for the development of such differentiated products and services. In order to be successful in the new global economy, flexible and creative workers with an international perspective are needed. This calls for an education system that fosters creativity, develops abilities in both scientific and artistic terms, and encourages an interest in lifetime education.

While Asian nations have made substantial efforts to enhance basic education to promote industrialization and to narrow the gaps between rich and poor, there are still weaknesses in higher education and in those areas of instruction that focus on the creativity that is essential for IT. Depending on the country, moreover, education in science and engineering is often insufficient. Another task related to education is improving the abilities to communicate in English, which is vital for access to global e-commerce information and is also important in marketing activities. This is a problem shared in varying degrees by all Asian nations, although somewhat less serious for those that are former colonies of the UK or the US.

Depending on the extent to which effective reforms are applied, these various restrictive factors may lead to

adaptability gaps in the IT revolution (i.e., the so-called digital divide) among companies, among regions and among social strata. In Korea, for example, a major gap is already apparent between Seoul and other cities⁹. And as noted earlier, the growing gulf between large companies and SMEs in their respective approaches to EC has become a major problem. Furthermore, there is a strong possibility that a digital divide may emerge among nations. To be quite specific, it would appear that this gap is emerging between NIES and late-starters among developing countries.

II Strengthening Policy Measures for IT Innovation in NIES

1 Framework of Policy Measures

As Asian nations become increasingly aware of both the benefits that IT innovation can offer in improving productivity and creating employment as well as the restrictions that hamper such development, a number of economies in the region—especially NIES such as Korea, Taiwan, Hong Kong and Singapore—have set out a series of drastic measures to promote the adoption of IT innovations.

These policies have the following objectives: (1) presenting realistic and explicit visions based on the actual situation that prevails in the country; (2) promoting the building of appropriate information infrastructures; (3) developing institutional infrastructures; (4) expanding access to the Internet; (5) supporting IT innovation; (6) expanding human resources; (7) promoting digital government; and (8) strengthening and expanding international linkages. These policies also take a basic approach in working towards these objectives by promoting competition and creative activities rather than by government intervention and/or investment. Moreover, they are also designed to pursue the development of models and to create markets by promoting digital government.

At the same time, however, it is also recognized that fostering such environments and establishing the necessary physical and institutional infrastructures will require active government involvement. Despite Hong Kong's long success with a *laissez-faire* economic policy, for instance, the fact that the area continues to lag behind Singapore and Taiwan—countries that have implemented government-led industrial policies in such businesses—has given rise to a sense of urgency. As a result, Hong Kong is now pursuing a policy shift in the direction of more active government involvement in fostering the IT industry¹¹.

Moreover, as the IT industry and its impact is both broad and pervasive, measures taken by the government must be across-the-board and implemented on an integrated basis in order to achieve a substantive effect. Unlike Japan, where the influence of vertically divided

organizations can sometimes make such progress painfully slow, NIES appear to be making better headway in their responses.

It is also becoming increasingly evident that these political innovations by NIES in the IT field are creating competitive advantages over Japan. This has resulted from the fact that such economies are benefiting from latecomer advantages—precisely because these newer systems are smaller-sized, simpler, more integrated and have less rigidity compared with the government and large-company systems in Japan.

2 Presenting Clear and Specific Visions

NIES have clearly set out the following visions and plans concerning the IT field centered on e-commerce.

The white paper “Cyber Korea 21” released by the Korean government in March 1999 outlines Korea's goal to become one of the top ten leaders in information infrastructures and the IT industry by 2002. The specific numerical targets include: (1) an IT-related workforce of 1 million people; (2) new production worth of 118 trillion won (about ¥11 trillion); (3) increasing the bandwidth for universal service (communications and broadcasting service available to anybody) to 2Mbps; (4) fostering 5,000 venture enterprises; (5) doubling the ratio of Korean parts in IT shipments from the current 40 percent to 80 percent; and (6) increasing the number of Internet users to 10 million by 2001.

Cyber Korea 21 emphasizes the primary role of the government in creating a dynamic information infrastructure and in establishing both a market environment and incentives to promote competition and investment in the private sector. The report also points out the need to create demand for e-commerce through the application of electronic formats by the government itself⁹.

In the “Chinese Taipei E-Commerce Policy Outline,” the Taiwanese government has set out strategies that focus on: (1) development led by the private sector; (2) active participation in international cooperation by private enterprises; (3) the establishment of models by the government; and (4) ensuring a fair chance for all participants¹⁰. Based on this outline, the Taiwanese government is striving to promote e-commerce by providing subsidies with a focus on B2B applications in order to facilitate the adaptation to e-commerce by SMEs, which are the mainstay of the Taiwanese economy.

By making the best use of its characteristics as a country that started as an entrepot, Singapore has signaled its strong intention to become an international hub in e-commerce. Singapore's IT policies feature the utilization of government and foreign-capital investments on a large scale and actively attracting foreign professionals.

Singapore's government clearly outlined its goal of making the island nation a global communications hub for the Asia Pacific region with its 1992 announcement of “IT-2000: A Vision of an Intelligent Island.” The goals

under the Singapore ONE plan set out in 1997 as part of IT-2000 include building a world-class broadband infrastructure and the introduction of advanced applications and services utilizing this infrastructure.

The 1998 Report of the Committee on Singapore's Competitiveness recommended the adoption of strategies that will serve as the key to developing IT services and e-commerce by outlining a vision aimed at structuring a highly advanced knowledge-based economy that will be globally competitive within the next ten years.

Three specific strategies were proposed in this report: (1) making Singapore a communications and media hub by attracting creative human resources, strengthening the laws on intellectual property rights, and utilizing the results of Singapore ONE to accelerate the development of local broadband and multimedia industries; (2) positioning Singapore as a secure and reliable one-stop business center for processing e-commerce transactions and payment data; and (3) making Singapore a national test bed for testing and customizing new products and services in preparation for their commercial release in markets worldwide⁸.

Moreover, the Infocomm 21 plan recently announced a three-pronged strategy that consists of: (1) developing the local broadband multimedia industry; (2) promoting collaborative research and development in key areas such as e-commerce; and (3) strengthening overseas strategic partnerships⁸.

With respect to e-commerce, the Electronic Commerce Master Plan announced in 1998 set out policies that focused on the financial, transportation, logistics and communications sectors (fields in which Singapore already has established hub advantages) in order to position Singapore as an international EC hub.

The Singapore government has outlined a goal of attracting 25 world-class logistics, manufacturing and communications companies to set up EC businesses in Singapore by 2003. In order to build an internationally linked EC infrastructure, the government is promoting efficiency improvements in international settlement systems, linkages between domestic infrastructural services and those overseas, and the establishment of international standards⁸.

3 Strategic Measures Towards IT Integration by All Government Organizations

In formulating IT policies, it is vastly more important to unite all government organizations in setting out comprehensive measures on an integrated basis, rather than relying on piece-meal approaches by individual agencies. This is mainly because of the comprehensive and pervasive nature of the IT industry itself, including the convergence of computers and communications and the wide-ranging impact on users, industry, employment and society. As noted earlier, moreover, the efficiency of ser-

vice sectors such as communications, transportation, distribution and finance has a vital importance in the development of e-commerce.

Accordingly, the promotion of policies to improve efficiency in a broad array of industrial fields is needed for the development of e-commerce. In this sense, the relatively high concentration of authority in a president or premier in NIES can provide competitive advantages in terms of IT policies over the situation in Japan, where authority is widely dispersed under a vertically divided administration. By utilizing this advantage, NIES are often able to set out more comprehensive IT policies.

Taiwan's E-Commerce Promotion Meeting was established in July 1999 to integrate the resources and budgets of all government departments in promoting the Chinese Taipei E-Commerce Policy Outline¹⁰. Moreover, in a move growing out of the convergence of computers and communications, Singapore's National Computer Board and the Telecommunications Authority of Singapore were merged in 1999 to form the Infocomm Development Authority.

4 Improving Communications Infrastructures Through Liberalization

The recent approach to building communications infrastructures in Asia has tended to focus on the promotion of competition through liberalization and investments from domestic or overseas sources, rather than government investments.

Despite the major role played by the Singapore government in investing in communications networks at the initial stage, for example, recent policy priorities have largely shifted towards privatization and liberalization as significant inefficiencies in government investments have come to light. Singapore's national telephone network was fully digitized in 1994, and government-owned communications firms used public funding under the Singapore ONE initiative to connect all households via optical fiber cables by 1999. However, these advanced facilities are not fully used partly because access charges are too expensive.

At the same time, the Singapore communications sector, which was fully developed under the monopoly of Singapore Telecom, was completely liberalized in April of 2000 in order to promote competition in the communications industry⁸.

Liberalization in the communications industry has also been encouraged in Korea. Private ownership in the telecommunications sector has been approved and overseas investments in this field have also been encouraged. In 1998, overseas investments of up to 20 percent were allowed for Korea Telecom and 33 percent for other communications firms. These limitations are to be raised to 33 percent and 44 percent, respectively, in 2001¹³. In addition, the liberalization of local loop markets (subscriber networks) in 1998 has played an important role

in the promotion of competition. As was also seen in Japan, the deregulation of mobile communications in Korea has largely contributed to the explosive growth in cellular phones⁹.

On the other hand, regulatory reforms appear to be slow in late-starting countries such as Indonesia, Thailand and China¹³.

Policies that favor competition are vital not only for the communications infrastructure itself, but also for all other industries including fields related to e-commerce. Inevitably, Japan and other Asian countries will find it necessary to reform their underdeveloped competition policies (antimonopoly policies) in the future, in addition to accelerating privatization efforts.

5 Improving Institutional Infrastructures

Improving the certainty and reliability of online transactions is essential for the development of e-commerce. To this end, an institutional infrastructure must be firmly established, especially in terms of electronic authentication, encoding, protection of intellectual property rights, and international compatibility in standards and protocols.

The Singapore government enacted the Electronics Transaction Act in 1998 to address various legal and other issues relating to e-commerce as part of its goal to position Singapore as an international e-commerce hub. The main features of this act include a commercial code for e-commerce transactions, a broader use of electronic applications and licenses in the public sector, and defining the responsibilities of network providers. The Electronics Transactions (Certification Authority) Regulations of 1999 include stipulations covering the licensing and regulation of certification authorities.

Based on its recognition of the importance of intellectual property rights in building an attractive business environment for overseas firms, the Singapore government enacted the Copyright Act in 1997 and improved legal procedures covering litigation related to copyright issues⁸. In Korea, the Electronic Signature Law was adopted in July 1997.

As China, Singapore and Malaysia have indicated their intentions to limit such functions as encoding¹⁴, the development of e-commerce may be hindered in these countries. While Malaysia, Korea, and Thailand are making efforts to improve statutory protections for personal information, Singapore opted to depend on voluntary regulations established by the private sector. Efforts have been relatively slow in Hong Kong, Taiwan and the Philippines.

6 Improving Access to the Internet

In order to promote IT applications (especially e-commerce), NIES have generally adopted policies to improve access to the Internet through IT education and provid-

ing assistance to SMEs concerning the use of the Internet in order to eliminate the domestic digital divide.

The Korean government is now making efforts to limit and correct such imbalances in access by providing a wide range of training opportunities and enhanced access services. Specifically, these measures include: (1) accelerating the installation of Internet connections to schools; (2) establishing Internet centers at public facilities; (3) providing computer training to civil servants, students and military personnel; and (4) providing all civil servants with email addresses and promoting electronic documentation⁹.

As noted earlier, the future development of e-commerce in Asia fully depends on efforts by SMEs. Accordingly, Asian countries have adopted a wide variety of policies to enhance the Internet capabilities of SMEs.

Under the leadership of Taiwan's E-Commerce Promotion Meeting, a budget of NT\$1 billion (about ¥3.4 billion) has been allocated for a five-year cross-ministerial initiative known as the Industrial Automation and Electronic Business Promotion Project. The primary target in the first two years is the introduction of e-commerce into the information technology industry. Subsidies will be provided to help domestic information equipment manufacturers establish supply links in both the up-stream and mid-stream supply chains.

The Ministry of Economic Affairs has also decided to offer a 20-percent investment tax credit for software, hardware and consulting fees, and has earmarked some NT\$1–NT\$1.2 billion as subsidies to promote electronic business in leading industries such as computers, automobiles, motorcycles, bicycles, textiles, machinery, precision instruments, communications and home appliances¹⁰.

These policies focus on providing subsidies to B2B transactions, and can be regarded as an incentive towards private-sector activities rather than direct government intervention in the industry. Although such measures may possibly generate some distortions in resource allocation, these effects are considered to be relatively weak.

In recognition of the importance of SMEs in the New Economy, the Hong Kong government established an SME Committee in 1996 and instituted an SME Office in 1999. An SME loan scheme was then adopted to provide information, financing and technical support to SMEs. Considerable efforts will also be required by the private sector to meet these government initiatives¹¹.

7 Supporting IT Innovation

From an economic point of view, IT innovation is not merely a simple technological change but rather a groundbreaking opportunity for new business that depends on the involvement of entrepreneurs. Such an ap-

proach is essential in e-commerce and other aspects of the Internet Revolution that are emerging with increasing alacrity. From a policy perspective, various forms of support to encourage the creation of new businesses are required in addition to IT research and development activities.

Policy support is also being provided to IT research and development. In particular, such endeavors include: (1) establishing comprehensive research and development programs; (2) providing direct subsidies for research and development activities; (3) establishing research laboratories; and (4) constructing IT-oriented high-tech industrial zones.

In 1997, for example, Hong Kong invited C.L. Tien, chancellor of the University of California at Berkeley, to head up an Innovation and Technology Committee to formulate a program aimed at developing IT technology. As a result, a HK\$5.5-billion (US\$700 million) Innovation and Technology Fund was set up in 1999. In March of 1999, a 23-hectare Science Park and a 28-hectare Cyber Port (exclusively for IT-related high-tech industries) were opened with private funding provided by Pacific Century. In addition, the Applied Science and Technology Research Institute (ASTRI) will be opened in 2000¹¹.

A better financial environment for the creation of new businesses is also needed, particularly for e-commerce and other IT-related industries. For instance, corporate finance in the age of a New Economy should pay more attention to the future expected earning stream rather than past and present earnings. Incubators, venture capital, and venture stock markets should also be encouraged¹¹, and traditional financial systems focused on indirect financing should then shift to those providing for direct financing schemes.

In Hong Kong, a GEM (Growth Enterprise Market) was opened in 1999 as a second board on the Hong Kong Stock Exchange. OTC markets are also developing in Korea (KOSDAQ), Taiwan, and Singapore (SESDAQ). The Malaysian government has invested significant sums in business incubators and investment funds¹⁴. And the Korean government plans to invest 1 trillion won (about ¥95 billion) in government funding for some 5,000 computer-oriented venture businesses³.

8 Enhancing Human Resources

Human resources must be enhanced to promote technological innovation and to meet the personnel needs of IT industries. Governments have been pursuing policies for human resource development through IT education and educational reforms that have focused on creativity and developing an international perspective. In addition, overseas professionals are being invited to work in Asian countries as a short-term solution to the shortage in skilled workers. Curricula focusing on IT knowledge and training have been incorporated into primary and sec-

ondary education in Hong Kong, Singapore, Korea and the Philippines¹³.

The Singapore government has taken an especially proactive stance with regard to the development of IT professionals. As early as in 1989, the government launched its Critical IT Resource Programme (CITREP) to accelerate the development of critical and specialized IT skills required by both the IT industry and users. Under this scheme, the then National Computer Board (NCB) financed 50 percent of the course and/or examination fees for all IT training programs approved by CITREP. More recently, the program has actively recruited foreign IT professionals to strengthen Singapore's high-skilled workforce, and subsidies will be provided to Singaporeans and resident aliens with degrees or diplomas who shift jobs to IT-related employment⁸.

As is apparent under the policies in Singapore, extending invitations to skilled personnel from overseas plays an important role as a short-term measure to secure needed IT professionals. Taiwan has also been eager to attract a number of IT professionals¹², and Hong Kong has high expectations for Chinese professionals as well as for other overseas talent¹¹.

Educational reforms aimed at developing creative and internationally minded personnel have been promoted throughout the entire region. Hong Kong recently announced a proposal for fundamental reforms in its educational system directed at fostering an international, cross-cultural outlook and upgrading creativity and science capabilities¹¹. Virtual education (i.e., network-based education using the Internet) is also being promoted in Singapore, the Philippines, and India¹³.

9 Moves Towards Electronic Government

Creating what is known as electronic government has been an important policy agenda in the region not only for the purposes of increasing efficiency and transparency in the public sector, but also as a driving force to expand e-commerce markets.

The Singapore government has invested heavily in the adoption of IT technologies over the past two decades, and an intranet system has been established to allow various government organizations to communicate and exchange information over a secure system. The Ministry of Defence established an on-line procurement system in 1998, and citizens can use the Internet for various purposes, including "e-filing" of tax returns, patent applications, military service applications, birth/death registrations and the sale of government-built apartments. Indeed, a full 14 percent of Internet users in Singapore have involved online access to government services⁸.

Taiwan publicly announces government procurement programs on the Internet, and the use of electronic formats in such procedures may lead to increased business opportunities for SMEs as well as more transparent policy measures for citizens¹⁴. And as noted earlier, the

Korean government has also been trying to expand the need for e-commerce through electronic-based government procedures.

10 Expanding and Strengthening International Linkages

The IT industry is subject to the so-called networking effect, which essentially holds that the greater the number of participants in a network, the higher the advantages of such a network. Accordingly, while participating in a network means greater advantages for the participant, it also exposes the participant to the significant risks of being eliminated from the network. It is therefore indispensable to ensure international compatibility in terms of policy and provide incentives for the private sector in order to achieve the networking effect¹⁴.

From an international perspective, it is highly advantageous for Asian countries to strengthen linkages with the United States, which is the leader in IT technologies and represents an enormous market. In terms of language, while English is the predominant language on the Internet (some 80% at present), the Chinese language has been coming in for wider use in recent years. Therefore, expanding linkages between languages is becoming an important policy task.

Asian businesses are actively pursuing strategic partnerships with domestic and overseas firms to enhance their e-commerce capabilities. For example, leading Korean companies including Hyundai Motors, Samsung Electronics and LG Telecom have recently agreed to launch a Website for joint marketing and promotion. At the same time, the world's leaders in the Internet business are actively entering Asian markets, thereby strengthening the mutual relationship between Asian industries and global IT industries. Samsung Electronics is pursuing efforts to transform itself into an Internet company by entering a strategic alliance with AOL (America Online). In addition, Samsung has established a joint venture with amazon.com, a well-known name in the US e-commerce industry⁹.

Although international linkages should basically be reinforced by fostering private-sector activities under policies that promote deregulation and liberalization, these efforts should be supplemented to some extent by government involvement.

For example, Singapore has been particularly active in building strong ties with the United States to develop domestic IT industries. Through the Technopreneurship Investment Fund, the Singapore government has committed US\$100 million to the US\$1-billion ePlanet Fund to link Asia and the United States. The purpose behind this move is to deepen interest among venture capital firms in the US concerning investment opportunities in Asia.

Singapore has also established a Singapore center called Connect@sig in California's Bay Area, which has

the potential of playing a critical role in high-tech linkages between the US and Singapore. The facilities will serve as a one-stop center in providing business services to Singapore start-ups in the US and create entry points for Singapore firms looking for contacts in Silicon Valley and for US companies interested in Asia⁸.

Singapore's Infocomm Development Authority (IDA) is also focusing on emerging regional markets in China and India. In addition to their market potential, China and India are expected to be major sources of Asian content and Singapore hopes to utilize its multilingual and multicultural background to translate, digitize and package the content for markets worldwide.

Once China gains entry in the WTO, Hong Kong hopes to serve as an operations and control center for Greater China and offers substantial potential as a site for databank operations. Indeed, Motorola—which has a plant in Tianjin—has already established an operations center in Hong Kong. Similarly, IBM and Compaq have set up operations centers in Hong Kong and production plants in Shenzhen. Microsoft's regional headquarters are also located in Hong Kong⁷. Actually, Hong Kong offers some advantages over Singapore in terms of linkages with China as the SAR shares the same culture and language with the rest of China⁴.

III An End to the Flying Geese Pattern of Development

Since the middle of the 1980s, Asian countries have fully enjoyed the benefits of economic globalization and have achieved remarkable growth in their own right by rapidly promoting economic deregulation and introducing direct investment. The process towards such achievements has followed a relatively orderly pattern of development that can be likened to a flight of wild geese—with Japan taking the lead and followed by NIES and then other developing countries taking off one after another through technology transfers. At the same time, however, they all were exposed to the negative impacts of economic globalization and had to suffer through the Asian currency crisis that stemmed from the globalization of the capital market.

With the continuing progress of the Internet Revolution, the impact of IT innovations is expected to substantially increase and seriously test the adaptability of Asian countries. Some NIES such as Korea, Taiwan, Hong Kong and Singapore have successfully demonstrated a greater degree of adaptability and have been performing better in some fields than Japan—the leader of the conventional flying geese pattern of development. On the other hand, there is a possibility that countries with relatively low levels of development may drop out of the formation altogether due to the aftermath of the Asian currency crisis and delays in adapting themselves to IT innovations.

Accordingly, economic globalization centered on IT innovations may transform the development pattern of Asian countries to one that is more complicated than before and which is highly subject to change. And these changes will compel Japan to review its own economic policies concerning Asian countries.

1 The Competition Between Japan and NIES over E-Commerce Leadership

While NIES such as Korea, Taiwan, Hong Kong and Singapore are rapidly adapting to IT innovations, the situation in Japan—the advanced nation facilitating such adaptability—has not necessarily been as smooth. In Singapore, for example, the household penetration ratio of personal computers and the Internet has reached 59 percent and 49 percent, respectively—figures that are higher than those for the US and Japan⁸. According to a recent Web-based questionnaire surveying users worldwide, the Internet access ratio at schools in Korea was among the highest in the world at 29 percent (versus a figure of 7% for Japan). Moreover, the access ratio from public facilities such as kiosks, libraries and cyber-cafes exceeded 20 percent, compared to 10 percent in Japan⁹.

The ratio of online transactions in the Korean stock market was 29 percent in August 1999, and has increased to over 50 percent recently. In Singapore, various levels of online banking services are now available through many local banks, including balance inquiries, fund transfers, new accounts, payment handling and various applications⁸.

The fact that NIES are demonstrating greater IT adaptability than Japan can be attributed mainly to the active approaches to e-commerce by local companies, as well as the previously noted competitive advantages in terms of the political aspects and the stronger international linkages centered on the US such as with Silicon Valley.

These international linkages can be measured by yardsticks such as (1) language skills, (2) the number of professionals working in Silicon Valley and other innovation centers, (3) the number of students studying in the US and other countries, and (4) the degree of acceptance of IT-related foreign capital. With respect to these factors, Korea, Taiwan, Hong Kong and Singapore are considered to have greater adaptability than Japan (Table 2).

This evolution is seen as changing the conventional flying geese development pattern based on technology transfers in Asia to what Edward K.Y. Chen has called the “aerobatics” development pattern. Industrial clusters are formed around individual technologies, and the leader of such a cluster is not necessarily Japan in all cases, but could be Korea, Taiwan or Singapore depending on the specific technology cluster. This development pattern resembles the changing of the lead plane as various stunts are performed by aerobatics teams¹¹.

The competitive advantages enjoyed by NIES in terms of policies is—as I noted earlier—playing a substantial role in forming the leadership in each of these technology clusters.

2 Concerns over Creating an International Digital Divide

The Asian currency crisis has had a major impact on countries whose adaptation to economic globalization was weak to begin with, and has given rise to the possibility that such nations may be forced to drop out of the conventional flying geese development pattern because of their inability to stay abreast. Moreover, there is added concern that the difficulties these fragile economies have had in adapting themselves to IT innovation as compared to NIES may be creating a digital divide among nations.

Relatively few benefits from IT innovation are seen in countries with comparatively low levels of development such as Indonesia, China, the Philippines and Thailand, and such countries are urged to adapt themselves to economic globalization. The existence of wide-spread layers of poverty is a restrictive factor in IT innovation. E-commerce requires an advanced transportation and communications infrastructure, a legal framework, and an abundant supply of educated and skilled human resources. These requirements tend to favor advanced countries and NIES, as it is difficult for countries with low levels of development to meet the need for such comprehensive strengths on a national scale.

In the Philippines, for example, while higher education is relatively developed and the production and export of IT equipment and software is showing a high growth rate, delays in the development of infrastructure and the continuing existence of wide-spread layers of

Table 2. Extent of US Linkage with Asian Countries

	TOEFL Average Score (July 1998–June 1999)	Number of Students Studying in the US per 1,000 Population (1997–1998)
Japan	501	0.37
Korea	535	0.94
Taiwan	510	1.44
Hong Kong	524	1.53
Singapore	—	1.26
Malaysia	536	0.71
Thailand	512	0.25
Indonesia	545	0.07
Philippines	584	0.04
China	562	0.04
India	583	0.04

Notes: (1) TOEFL: Test of English as a Foreign Language by the Council on International Educational Exchange; (2) the number of students studying in the US per 1,000 population was calculated on the basis of population data for 1996.

Source: Compiled from *Asia Economy 2000*, Research Bureau of the Economic Planning Agency, and *World Statistics 1999*, Statistics Bureau of the Management and Coordination Agency.

poverty constitute major obstacles in adapting to economic globalization and the information revolution.

One of the problems arising out of a digital divide between Asian countries and advanced countries—especially the US—is the issue of the excessive intellectual property protection. While moves to allow sweeping patents on business methods in the field of e-commerce are spreading mainly in the US, this may become a restriction on the development of e-commerce in developing countries such as those in Asia.

The WTO TRIPS Agreement (covering intellectual property rights related to trade) specifies a patent term of 20 years. This is too long a period for business method patents, and Jeff Bezos, CEO of amazon.com, has proposed cutting this term to three to four years. However, there appears to be no incentive for the US government to shorten the effective term⁵.

IV Remaining Political Tasks in Asia and Japan

1 Promotion of IT Innovations

As noted earlier, NIES are rolling out policies to promote IT innovation through support for IT research and development and entrepreneurship. However, these moves are still insufficient. With the progress being made in the paradigm shift from industrial technology to IT, the need to further strengthen support for innovation activities is rapidly increasing in importance.

As also noted before, the development of e-commerce requires the development of service sectors such as communications, finance, transportation and distribution. It hardly needs saying in this connection as well that the key is deregulation and liberalization. It is desirable for the regulatory authorities to back away from their long-standing roles in fostering particular industries, and to become independent regulatory bodies that concentrate on promoting competition to increase the overall welfare of the consumer. From the standpoint of globally benefiting from the networking effect of IT as well, such services should be offered on a worldwide basis. To achieve this goal, liberalization in the service sectors needs to be promoted.

This will necessitate a drastic review of the conventional Japanese/Asian-type strategies for industry development, in which the promotion of liberalization in the export-oriented industrial sector has moved forward while the domestic-market service sectors have remained protected by restrictive regulations due to local political considerations. However, we have recently witnessed the start of changes in the direction of reform through the financial big bang in Japan, the drastic communications and financial reforms in Singapore, and the deregulation and liberalization of the financial and other sectors in Korea to cope with the Asian currency crisis.

Looking at the current status in Japan as well, such reforms are often extremely difficult to implement as they shake the foundation of what are seen as vested rights and interests—a problem that is proving to be a major task in all Asian nations. Nevertheless, attention should be given to the fact that competition among nations in e-commerce may provide just the kind of stimulus each nation needs to resolve this problem⁶.

2 Suggestions on Japan's Economic Policies for Asia

The Internet Revolution and the responses by Asian countries are presenting Japan with an urgent need to review its economic policies in relation to Asia. In short, a shift must be made from responses that have focused on the development of market economies under the conventional flying geese development pattern to those that take full cognizance of the networking effect under the aerobics development pattern and the risk of a digital divide.

From this standpoint, the first priority should be placed on both broadening and deepening linkages with the US economy that is now the center of the largest network (the innovation center), while at the same time expanding and strengthening the links between Japan and other Asian countries within this network. Although it may seem paradoxical, the network between Japan and the US must first be strengthened and Japan's position as one core (innovation center) within this network must be firmly established in order to develop the linkages between Japan and other Asian countries.

Second, as the US-centered network represents what essentially may be called the "English zone," measures to improve and strengthen English education would have a substantial effect, mainly because English ability is essential for e-commerce with the English zone as well as for technology transfers from the English zone. It would also be desirable to strengthen the relationship with India as a country within the English zone and a large supplier of IT software and human resources.

Third, from the standpoint of positioning Japan as one of the leading innovation centers, it is a matter of crucial importance to establish efficient service sectors such as communications, finance, transportation and distribution especially for e-commerce, in addition to educational reforms. Unless Japan can establish itself as a model for highly efficient service sectors, its status and capabilities to cooperate in the field of IT applications in Asia would become very limited.

Generally speaking, advanced countries such as Japan typically enjoy an advantage in e-commerce, as the field requires certain comprehensive national strengths that extend to the service sectors. If such systems in advanced countries are overly rigid, however, economies such as NIES that provide more flexibility may take the late-starter advantage. Whether Japan can remain a lead-

ing international player in this area depends on the progress of its reforms in both the public and private sectors.

When the development of market economies in Asia followed the flying geese pattern, Japan's official development aid (ODA) policies represented multi-national or bilateral assistance (on an untied basis as much as possible) from the only technologically advanced nation of Asia to poor but strategically important neighboring countries such as Indonesia, China and Vietnam. This aspect remains even under the New Economy. In the IT-related field, assistance for the purpose of narrowing the digital divide with late-starting countries would also be included.

Under the aerobatics development pattern that is governed by the networking effect in Asia, however, the following shifts in focus would be appropriate: (1) expanding tied assistance especially in the software field with the perspective of strengthening linkages with Japan; and (2) emphasizing the importance of bolstering ties to NIES that stand abreast with Japan on an equal relationship.

Cooperative relationships should be established not from the standpoint of unilaterally providing cooperation from Japan, but with a view to sharing efforts and experience in carrying out reforms on a more comprehensive basis, including the service sectors. Moves to conclude free trade agreements between Japan and Singapore and between Japan and Korea should be seen within this framework.

I wonder if it would also be possible to formulate cooperative strategies with Asian countries if Japan were to take the initiative in establishing an Asian IT Research Center, which would enable NIES to participate as equal partners with Japan in studying IT developments and policy evolution. Research themes in this case would, as a matter of course, relate not only to IT in the narrow sense, but also a broader range of topics including e-commerce such as B2B applications, abolition of the restrictions electronic government, eliminating the digital divide, and other issues of major importance in this area. In addition to a physical center, a virtual environment for research should also be facilitated.

As NIES are either within the Chinese language zone or have a strong relationship with China, strengthening the linkages with NIES would contribute to the strengthening of the linkage with China, which is a country that offers high potential for the future. From the viewpoint of networking with such a vast area as China, the emphasis should be placed on strengthening relationships with such NIE-like cities as Beijing, Shanghai and Guangzhou⁷.

Notes

- 1 Software exports from India and the Philippines have recently been growing at an annual rate of nearly 50 percent, reaching \$2.6 billion (1998) and \$0.21 billion (1996), respectively.
- 2 Based on interviews by the author at local sites in July 2000.
- 3 From *South China Morning Post Technology*, January 4, 2000.
- 4 Based on interviews by the author at local sites in China in July 2000.
- 5 From Brenda Sandburg, "PTO Ups the Ante," April 5, 2000 (<http://www.law.com>).
- 6 There is a point of view that because IT is a new field and less bound by vested interests, it may serve to facilitate the liberalization of service sectors even in China, where strong inter-regional barriers are posed by the state-owned company system and delays are seen in the development of the service sectors. (Based on interviews by the author at local sites in July 2000).
- 7 Websites in Beijing are said to account for an overwhelming 90 percent of the total for China, with most of the remainder in Shanghai and Guangzhou. (Based on interviews by the author in July 2000.)

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