

## IV. INFORMATION AND COMMUNICATION TECHNOLOGY INFRASTRUCTURE

### A. INTRODUCTION

The role of ICT in achieving the Millennium Development Goals was recognized at the World Summit on the Information Society, as reflected in the Geneva Declaration of Principles.<sup>1</sup> Many issues involved in transforming the digital divide into digital opportunities are identified in the Geneva Plan of Action<sup>2</sup> and the Regional Action Plan Towards the Information Society in Asia and the Pacific<sup>3</sup> and need to be dealt with in partnership with all relevant stakeholders at the global, regional and national levels.

Against that backdrop, developing member countries are being called on to invest in the development of network infrastructure capacity to take advantage of newer, cost-effective telecommunications and computer technologies. Until recently, public telecommunications companies had the dominant role in building and maintaining core network infrastructure and providing universal access. However, privatization, liberalization and policies aimed at increasing competition in this strategic sector have increased the role of the private sector in providing ICT infrastructure. They have also hastened the adoption by many developing countries of new networking and telecommunications technologies, helped by their rapidly declining costs. Still, private telecommunications companies hesitate to provide infrastructure for rural and low-density areas and Governments still have a critical role to play in direct investment, creating an enabling environment or such interventions as setting up universal access funds by which companies can help Governments pay for community networks and public access points.

Recent estimates suggest that 80 per cent of total ICT expenditures goes to content, 15 per cent to software and application technologies and only 5 per cent to infrastructure.<sup>4</sup> In recent years, the Asian and Pacific region has invested more heavily than other regions into the latter, channelling close to 10 per cent of its expenditure into basic ICT infrastructure. However, global data compilations indicate that Asian and Pacific countries vary widely in their levels of connectivity and technology infrastructure development.

*The role of ICT in achieving the Millennium Development Goals is recognized at the highest political level*

*Asian and Pacific countries vary widely in their levels of connectivity and technology infrastructure development*

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<sup>1</sup> Adopted at the Geneva phase of the World Summit on the Information Society, held from 10 to 12 December 2003 (see document A/C.2/59/3 or visit [www.worldsummit2003.org](http://www.worldsummit2003.org)).

<sup>2</sup> Ibid.

<sup>3</sup> Adopted at the High-level Asia-Pacific Conference for the World Summit on the Information Society, held in Tehran from 31 May to 2 June 2005 (see [www.aprcwsis05.ir](http://www.aprcwsis05.ir)).

<sup>4</sup> Ang Peng Hwa, "Asia's piece of the pie: Asia's entry into 'dot-com' universe", *Harvard Asia Pacific Review*, vol. 4, No. 2 (Summer 2000) (available online at <http://hcs.harvard.edu/hapr>).

The Economist Intelligence Unit gives high scores to Hong Kong, China; Singapore; the Republic of Korea; Japan; and Australia for connectivity and technology infrastructure (table IV.1). In contrast, Kazakhstan, Indonesia, Pakistan and Viet Nam have modest standings. Even China and India, which serve as major global nodes in the ICT economy and are among its largest and fastest-growing consumers and producers of technology, have low rankings for connectivity and infrastructure.

**Table IV.1. Connectivity and technology infrastructure score for selected Asian and Pacific countries and areas\***

	<b>Connectivity and technology infrastructure</b>
Hong Kong, China	8.10
Singapore	7.65
Republic of Korea	7.20
Japan	6.90
Australia	6.75
Taiwan Province of China	6.70
New Zealand	6.10
Malaysia	4.10
Thailand	3.05
China	2.50
Iran (Islamic Republic of)	2.35
Kazakhstan	1.70
India, Indonesia, Sri Lanka	1.40
Pakistan, Viet Nam	1.25

*Source:* The Economist Intelligence Unit, *The 2005 e-readiness rankings: A white paper from the Economist Intelligence Unit* (London, EIU, 2005).

\* Ranking from 0-10.

***The focus of this chapter is on basic ICT infrastructure and associated salient issues and challenges***

A full examination of regional ICT investments would necessarily include devices and supporting services along with Internet/IP-based network infrastructure, but the focus of this chapter will be on basic infrastructure, comprising telephone mainlines, mobile telephones and Internet backbone, and on examining the salient issues and challenges in the region. Section B looks at the region's ICT infrastructure development and regional broadband initiatives. Section C focuses on future infrastructure expenditures needs and financing options while elaborating on the requirements for achieving internationally agreed goals, such as the Millennium Development Goals. Section D concludes with a proposal for regional cooperation on the Asia Broadband Program and highlights important policy considerations relevant to ICT infrastructure development.

## **B. CURRENT SITUATION**

### **1. ASIA-PACIFIC REGIONAL OVERVIEW**

A number of countries in the Asian and Pacific region are quickly and broadly rolling out high-speed Internet or broadband infrastructure. Asian Governments constantly review each other's strategies on advanced technol-

ogy infrastructures and deregulation, leading to the quick diffusion of similar Internet development practices in the leading Internet economies of Hong Kong, China; Singapore; the Republic of Korea; and Taiwan Province of China. These have some of the highest broadband usage and penetration rates in the world.<sup>5</sup> The Asian and Pacific region emerges in a favourable position in global data compilations, such as the connectivity and technology infrastructure component of the 2005 Economist Intelligence Unit's e-readiness rankings.

In countries where there has been traditional cooperation and even collaboration between the national Government and industry, such as the Republic of Korea, the Internet has had a broad influence. This trend will become even more evident as increased collaboration occurs between Internet service providers and their suppliers. Some of the top Internet service providers and suppliers in Asia and the Pacific are tapping into new service development opportunities in non-traditional markets, such as China and India.

Japan's NTT DoCoMo, one of the earliest mobile Internet service providers, has a new research and development (R&D) operation in Beijing reportedly developing fourth-generation (4G) technology that is 10 times faster than any network operating today. Cisco Systems is also opening an Asian R&D centre in Shanghai, China, to supplement work done at its largest regional centre, in India. Both companies aim to benefit from China's lower development costs and to demonstrate long-term commitment to one of the world's largest future Internet markets.

Many Asian and Pacific Internet service providers are State-owned, but this has not caused much of a slowdown in the adoption of advanced technology. In Japan, there is highly effective deregulation and unbundling of local loop and last-mile services to business and residential markets giving Japanese consumers some of the cheapest broadband services in the world. Competition in broadband services in Japan has increased significantly, and high-consumption Internet subscribers rose to almost 13 million in 2004, up from less than 1 million in 2001.

The Asian and Pacific region is among the first in the world where liberalization, privatization and competition began soon after the divestiture of AT&T in 1984. By the turn of the century, most countries in the region had opened up the telecommunications service industry to private sector participation.

Most countries segregate policy and regulatory functions in order to prevent the same company from providing and operating network infrastructure and services. This has allowed the industry to grow in an open, competitive market, resulting in remarkably high annual growth rates for cellular mobile services. The 1999-2004 compound annual growth rate (CAGR) for cellular services in Maldives was 107.8 per cent, in China 50.5 per cent and in India 90.5 per cent. The average for the whole region was above 38 per cent. After a few early market hiccups, the private sector has made steady progress and by 2003-2004 had taken the lead over public sector operators in providing basic<sup>6</sup> telecommunication services (fixed and

***Through deregulation and decentralization, many Governments are creating an enabling environment for the development of telecommunications***

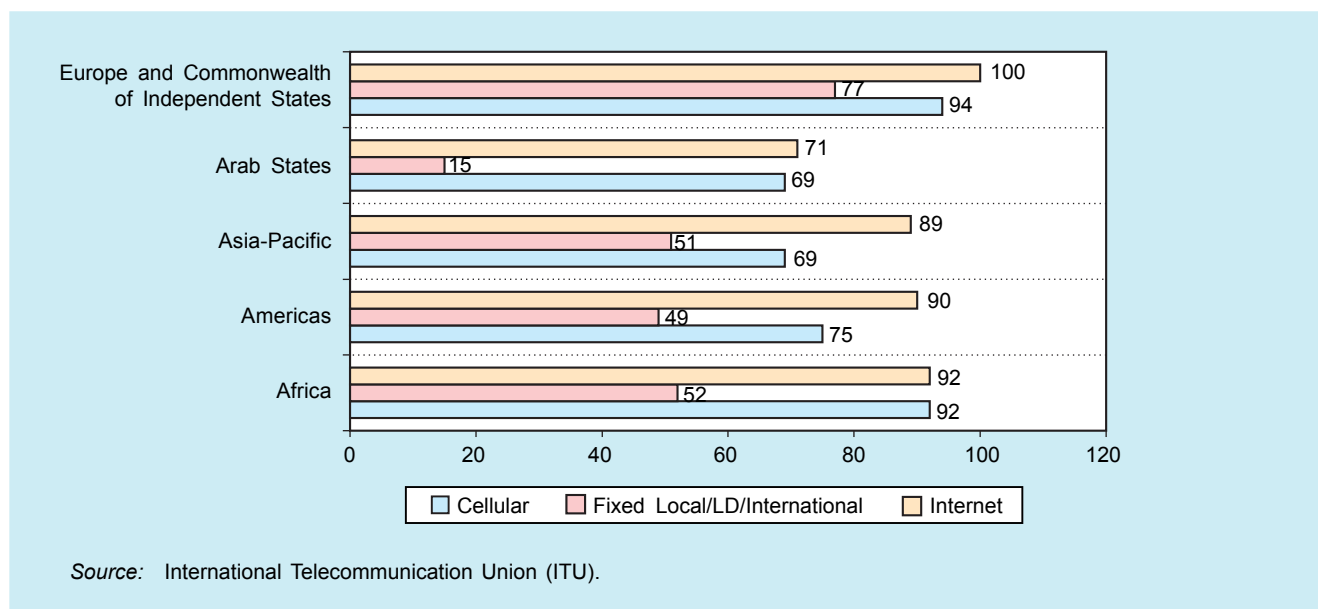
<sup>5</sup> Greg Pelling, *Cisco Net Impact: Competitive Advantage from Internet Innovators in Asia Pacific and Japan* (Singapore, Wiley, 2005).

<sup>6</sup> According to the definition of the World Trade Organization, basic services mean fixed, cellular mobile, national and international long distance services, among others. Some countries consider fixed access service as basic service and exclude cellular mobile.

cellular mobile access, national and international long distance) and Internet services by 2003-2004 (figure IV.1). The average proportion of fully or partially privatized incumbents among Asian and Pacific countries is 53 per cent.

**Figure IV.1. Privatization/competition in ICT services**

(Percentage)



Since the cellular mobile penetration had risen to 15.83 per 100 inhabitants for the Asian and Pacific region by 2003 overtaking the fixed lines by early 2002, the future growth area would indeed be mobile. But given the low fixed line density far behind that of the Americas at 37 and Europe at 43, Asia-Pacific demand for fixed lines is likely to remain positive for the next 4 to 5 years, although in 2004 there were already signs of negative growth in fixed main telephone lines from some of the OECD and more developed countries e.g., Japan (-1.3 per cent), New Zealand (-0.7 per cent), Malaysia (-3.1 per cent), Singapore (-1.9 per cent) and the Republic of Korea (-0.3 per cent).

**The Asia-Pacific region continues to witness robust growth in investment in ICT infrastructure**

The Asian and Pacific region continues to witness robust growth in investment in basic ICT infrastructure, particularly in China, followed by ASEAN, although neither comes close to the magnitude of Japan's standard ICT investments.

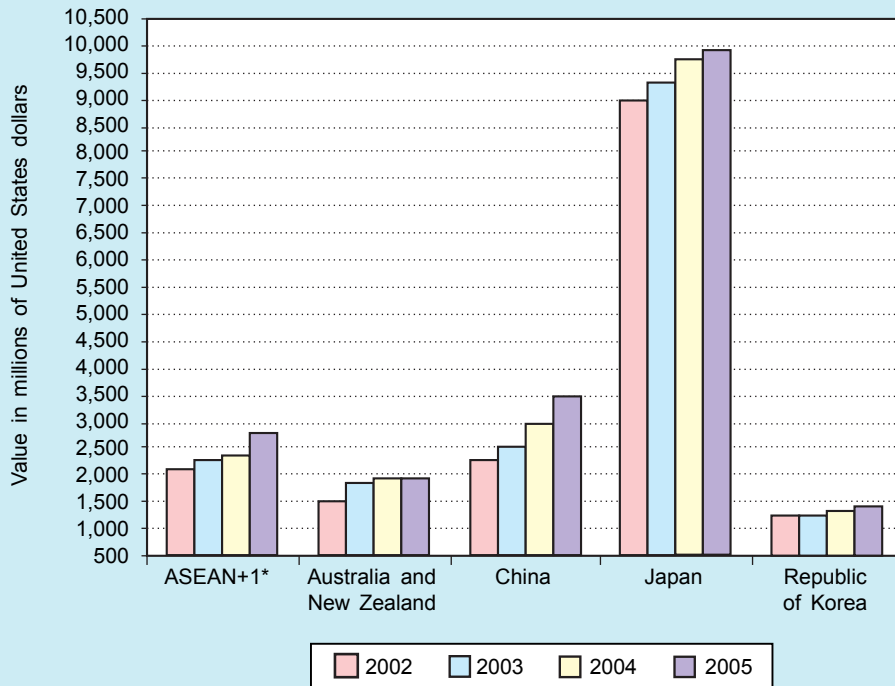
## 2. PACE OF ICT INFRASTRUCTURE DEVELOPMENT

### (a) Fixed and mobile infrastructure

#### *Association of Southeast Asian Nations*

In the early years of liberalization, the Association of Southeast Asian Nations (ASEAN) took the lead in expanding infrastructure and improving operational efficiency with private capital and expertise. Thailand, without waiting to amend legislation that mandated State ownership of telecom infrastructure, allowed private investment in network infrastructure through concessions by the State-owned monopoly operator for basic services, the Telephone Organization of Thailand. It also adopted an innovative build operate and transfer (BOT) financing scheme to attract private sector partici-

**Figure IV.2. Comparison of investment in basic ICT infrastructure, 2002-2005**



Source: Extrapolated from estimates by the International Data Corporation (IDC).

\* ASEAN+1 includes ASEAN member countries and India

pation in network infrastructure and operations. Expansion of ICT infrastructure as reflected by main exchange lines and mobile subscriptions per 100 inhabitants grew at a CAGR of 7.09 per cent and 56.1 per cent per year from 1995 to 2004 respectively.

**South Asian Association for Regional Cooperation**

All South Asian Association for Regional Cooperation (SAARC) member countries have liberalized their telecom sector and set up the policy, regulatory and legal framework to foster speedy growth with limits on foreign investment in some countries (for example, India). Development that took many SAARC member countries a decade to achieve prior to private sector participation and competition is now being achieved by them in less than a year. Sri Lanka was the first SAARC member to set up an independent regulator and allow private sector entry. Pakistan, India, Maldives and others followed suit and the region has experienced steady growth in telephone users. The (weighted) average penetration per 100 inhabitants in SAARC member countries rose in 2004 to 3.54 per cent for fixed lines and 4.04 per cent for mobile services.

*Development that took many SAARC member countries a decade to achieve prior to private sector participation and competition is now being achieved by them in less than a year*

**Economies in transition**

In the subregion that includes Central Asia and the Caucasus, (weighted) average penetration per 100 inhabitants for fixed and mobile services is 20 and 36 respectively, higher than the corresponding figures for SAARC member countries. Mobile service subscriptions, however, have not picked up in the way they have in ASEAN and SAARC member countries. The

countries of the Commonwealth of Independent States need to revise policies in order to place ICT development on a fast track.

### **China**

China has maintained consistently high ICT and economic growth after adopting entrepreneurial and free market principles in the 1980s. It has the region's largest network and one of the world's largest markets for ICT equipment and services (table IV.2). Many major cities are reaching telecommunications saturation but penetration in the rest of the country is still low compared with developed countries, particularly in rural areas.

### **India**

The Indian telecom sector is undergoing a dynamic change. Major policy reforms since 1999 have resulted in the fastest ever expansion of the telecom network. All basic and value-added-services have been opened up to the private sector with total foreign investment limit raised to 74 per cent of the capital. To ensure balanced development of ICT in all the regions, the Universal Service Obligation Fund has been created to support the funding of expansion of services in rural and remote areas. The intense competition in the sector has resulted not only in steep reduction of tariffs for national and international long distance telecommunication services but also better quality of service and provisioning of new features to subscribers. India's Telecom Network with over 93 million lines is among the tenth largest networks in the world and the second largest among the emerging economies (after China) offering a wide range of services. India with a telecom penetration rate (combined fixed and mobile) of about 9 per 100 inhabitants has a tremendous scope for investment and further growth in the sector.

*Japan has the region's most highly developed ICT infrastructure, the Republic of Korea leads the world in broadband penetration; China and India are catching up fast*

### **Islamic Republic of Iran**

The number of fixed telephone lines is three times the number of mobile subscribers (table IV.2), but they are expected to be equal by 2009, reaching 35 million in total. That would represent a fixed and mobile density of 50 per 100 persons.

### **Japan**

Japan has the region's most highly developed ICT infrastructure, with the highest numbers of users of broadband and Internet protocol (IP) telephones. In 2000, the number of mobile telephone subscribers exceeded that of fixed telephone subscribers. The number of fixed-line telephones was 58.79 million in March 2004, a slight increase over the previous fiscal year. Mobile telephone subscriber numbers are still growing but at a slower rate and in 2004 reached 91.47 million.

### **Republic of Korea**

In 1960, the Republic of Korea had a fixed-line density of 0.36 per 100 inhabitants, among the lowest in the world. It now leads the world in broadband penetration and has developed into a world leader in ICT components and equipment manufacturing and services.

### **(b) Internet infrastructure in ASEAN+1<sup>7</sup> member countries**

ASEAN+1 includes sophisticated Internet economies, such as Singapore, developing Internet economies, such as Brunei Darussalam, Indonesia,

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<sup>7</sup> ASEAN+1 includes ASEAN member countries and India.

Malaysia, the Philippines and Thailand, and emerging Internet economies, including Cambodia, the Lao People's Democratic Republic, Myanmar and Viet Nam. India is included in the developing Internet economies of this group because of its current stage of development and growing influence in the region, hence the acronym "ASEAN+1." Spending on basic ICT infrastructure in ASEAN+1 is projected to increase from about \$2.2 billion in 2002 to \$2.8 billion in 2005, including increased spending on an Internet backbone. This group is expected to rival China as the region's most aggressive investor in the Internet.

**Table IV.2. Telecommunication development in selected Asian countries**

Country	Reference year	Fixed lines (millions)	Mobile (millions)	Telephone density (per 100 persons)
China	2004	311.75	334.82	23.98 (fixed) 25.76 (mobile)
India	2004	43.96	47.30	4.07 (fixed) 4.37 (mobile)
Iran (Islamic Republic of)	2003 and 2004	14.57	4.30	21.97 (fixed) 6.16 (mobile)
Japan	2004	58.79	91.47	46.00 (fixed) 71.58 (mobile)
Republic of Korea	2004	26.6	36.6	55.31 (fixed) 76.09 (mobile)

*Source:* International Telecommunication Union (ITU), (2004).

### **Emerging Internet economies**

The emerging Internet economies of Cambodia, the Lao People's Democratic Republic, Myanmar and Viet Nam are the latest adopters of the Internet in Asia and still have the greatest hurdles to overcome with regard to infrastructure. Governments have yet to develop an adequate network infrastructure to support the expansion of Internet usage. Only a small percentage of the population has Internet access, mostly in the larger urban centres due to the lack of connectivity, which is largely restricted to telephone lines.

Usage is restricted mainly to e-mail, browsing and information-gathering. In the major institutions, such as government, health care and education, Internet absorption is still at an early stage. Universities have some Internet access for students, but at the primary and secondary school level it is almost non-existent. Many government ministries have websites, but none share a website. Business usage is low, probably due to limited network infrastructure, high costs and lack of sophisticated business tools on the websites.

In least developed countries such as Cambodia and Myanmar, or even better-off Viet Nam, it is difficult to justify spending millions on Internet initiatives when faced with pressing needs for food, health care, education and employment. However, they will be able to build their Internet capabilities with proven, less expensive, optimal-use Internet technologies when they do decide to make that investment.

***In emerging Internet economies, Internet usage is limited mainly to e-mail, browsing and information-gathering***

### **Developing Internet economies**

**Developing Internet economies have Internet access mainly in the major cities, but there is little access in rural areas**

By contrast, India, Thailand, Malaysia, the Philippines, Brunei Darussalam and Indonesia are arguably the most economically diverse group in ASEAN+1. Internet usage in these six countries ranges from just over 1 per cent of the population in Indonesia to almost 20 per cent in Malaysia. Internet access among the major cities and provincial capitals is good but rural access is still limited by the lack of telephone connectivity and personal computers (PCs). Major public institutions have varying degrees of connectivity. Universities and colleges have full Internet access, and access for secondary and primary schools is becoming more common. In the Philippines, more than one third of schools now have Internet access.

Connection and access speed within these countries is moderate and all have a solid Internet infrastructure comprising fibre optics, microwaves and satellites, with access to high-speed asymmetric digital subscriber lines (ADSL) and cable modems. In contrast to the emerging countries, this group has an abundance of Internet service providers – between two dozen and four dozen each. Due to the previous network infrastructure build-out and competition, the cost of Internet usage is lower and entry into the Internet service provider market is relatively easy. Internet usage includes not only e-mail and browsing, but also more advanced usage, such as e-commerce and e-marketplaces.

India is still in the earliest stages of Internet development compared with some other countries of the Asian and Pacific region. Despite significant progress in Internet and software development, India's lack of Internet infrastructure, outdated and costly service regulation in some key areas, and the sometimes slow speed with which it implements development plans, puts its Internet status behind a more aggressive China. Moreover, it suffers from an extreme divergence between the small percentage of its people who are spearheading the expansion of the Internet economy with world-class capabilities, and a large percentage of the population living in some of the region's most dire conditions of poverty who will not have access for years.

However, Internet usage has exploded since 2001 with the expansion of cyber cafes. In 2004, the number of Internet users in India jumped to 50 million, up from 31 million subscribers in 2003. Moreover, India has gained most from the outsourcing of ICT and Internet services since the 2001 global economic downturn and now controls more than 80 per cent of the global application outsourcing market, increasing awareness of the Internet. It would appear, however, that the country seems to fit into two types of Internet classifications: an emerging Internet economy and a developing Internet economy. A large percentage of its population live in poverty more dire than anything seen in most of ASEAN+1, while a small percentage of its people are spearheading the expansion of the Internet economy with world-class capabilities. Though this divergence happens in most countries, the scale is extreme in India. So, while a small percentage of its population will eventually have advanced access to the Internet, it is expected that most will not for years to come.

### **A mature Internet economy: Singapore**

**Mature Internet economies widely use the Internet for sustainable development**

The active development of the Internet by the Government of Singapore resulted in more than 61 per cent of the population being connected in 2004, behind only Hong Kong, China, and the Republic of Korea for connectivity. Broadband access is pervasive and Singapore is one of the world's most sophisticated users of Internet technologies in the public

and private sectors. Singapore cannot afford to lag behind the world leaders in its use of ICT. Its main source of income is trade and high-tech industries and its infrastructure is one of the main attractions for foreign companies looking to invest in the country or region. To maintain this advantage, it must quickly identify and exploit ICT and Internet trends.<sup>8</sup>

### 3. REGIONAL BROADBAND INITIATIVES

Several regional initiatives focusing on increasing broadband deployment and usage have been launched by organizations including the Asia-Pacific Telecommunity (APT), Asia-Pacific Economic Cooperation (APEC) forum, the World Bank Group, ASEAN, the Asia-Pacific Broadcasting Union (ABU), various trade associations and United Nations agencies, such as UNDP and ITU.<sup>9</sup> Many of these initiatives look at key themes that need to be addressed to bring broadband to more people in the region:

*Regional broadband initiatives are vital for bringing ICT benefits to all*

- The Government as a lead adopter/demand stimulator
- Developing regulations to stimulate competition and infrastructure deployment
- Developing spectrum management policies to stimulate wireless broadband use
- Creating sustainable broadband business models suitable for the region
- Understanding and meeting customer expectations
- Addressing the special needs/issues of rural areas
- Giving broadband its role within universal service obligations
- Making the private sector a partner in broadband deployment
- Supporting the development of local web content.

Other regional initiatives are bilateral; for example, one between Japan and ASEAN calls for increased cooperation to support broadband development in ASEAN members, Japan and the region overall.

Japan is also coordinating the Asia Broadband Program<sup>10</sup> announced in March 2004, which aims to enable broadband access in Asia, construct intraregional broadband networks that will facilitate robust information flows; facilitate the transition of IPv4 to IPv6 for next-generation mobile communications and create an environment for the secure and easy use of ICT. It will also digitize and archive major cultural assets in Asian economies and develop machine-translation technologies between major languages in Asia and put them to practical use. The project is also intended to dramatically increase the number of ICT engineers and researchers in Asia.

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<sup>8</sup> Shri Pankaj Agrawala and J.S. Sehra, "Construction of broadband network environment in Asia", discussion paper presented at the Asia IT Ministers' 2<sup>nd</sup> Summit, held in Hyderabad, India, on 12 and 13 January 2004 (available online at <http://asiaitsummit.nic.in>).

<sup>9</sup> For the Asia-Pacific Telecommunity, see [www.aptsec.org](http://www.aptsec.org); for the Asia-Pacific Economic Cooperation Telecommunications & Information Working Group, see [www.apectelwg.org](http://www.apectelwg.org); for the World Bank's Global Information & Communication Technologies Department, see [www.worldbank.org/ict](http://www.worldbank.org/ict); for the Association of Southeast Asian Nations, see [www.aseansec.org](http://www.aseansec.org); for the Asia-Pacific Broadcasting Union, see [www.abu.org.my](http://www.abu.org.my); for the United Nations Development Programme, see [www.undp.org](http://www.undp.org); and for the International Telecommunication Union, see [www.itu.int](http://www.itu.int).

<sup>10</sup> The website of the Asia Broadband Program may be accessed at [www.asia-bb.net/en](http://www.asia-bb.net/en).

Also noteworthy is the Asia Mobility Initiative, launched in April 2003 by Telstra, Maxis, M1, Smart and HK CSL to focus on content sharing, interoperability and cooperation on new mobile data applications. One month earlier, StarHub, Maxis, Telstra, China Netcom and KT had announced plans to cooperate on roaming and other technical/marketing matters related to Wi-Fi (wireless fidelity) deployment.

### C. FUTURE INFRASTRUCTURE DEVELOPMENT NEEDS

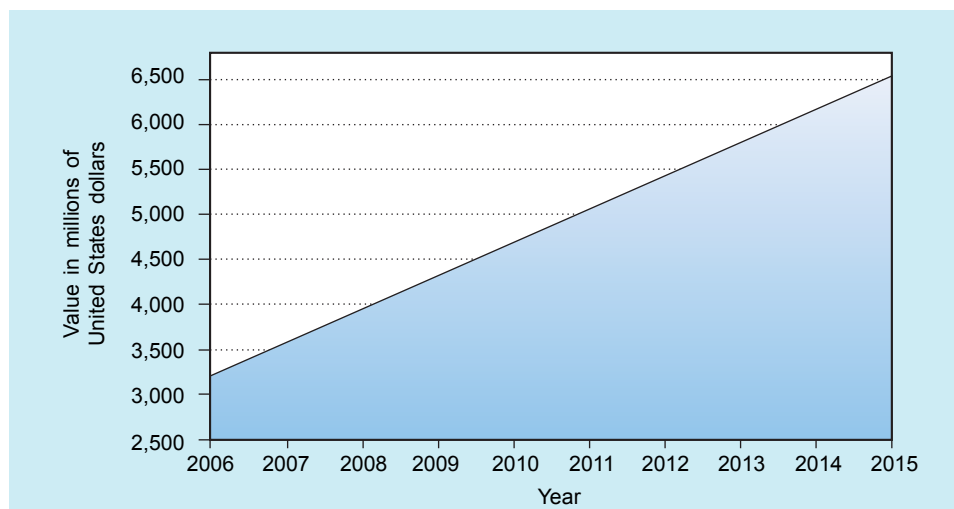
#### 1. REGIONAL ICT OUTLOOK AND PROJECTED INFRASTRUCTURE EXPENDITURES

*Deployment of the latest ICT and broadband technologies is expected to strengthen regional integration*

The ability of Asian and Pacific organizations and businesses to collaborate effectively across borders and to use modern ICTs and the Internet to do so is likely to be a key factor in the region’s success. Internet-based collaboration will strengthen integration in a region that by 2015 will have 3 billion people, approaching the size of the United States or the European Union, and will offer the world’s largest developing markets, the lowest cost manufacturing and services and the highest penetration of leading Internet infrastructure. The markets include:

- ASEAN+1, which includes mature, developing and emerging economies with different levels of Internet investment, development and use, but many countries debate whether they should provide basic infrastructure, adequate nutrition and education or buy Internet technologies that can attract development expertise and resources;

**Figure IV.3. ASEAN+1: projected investment in basic ICT infrastructure, 2006-2015**



Source: Projected on the basis of data from the International Data Corporation (IDC), (2003).

- China, where the Internet will have a potentially greater impact than anywhere else in the world, providing a catalyst for the development of small to mid-sized businesses at a pace never before imagined;

**Figure IV.4. China: projected investment in basic ICT infrastructure, 2006-2015**

*In China, the Internet is being used to develop small to mid-sized businesses*

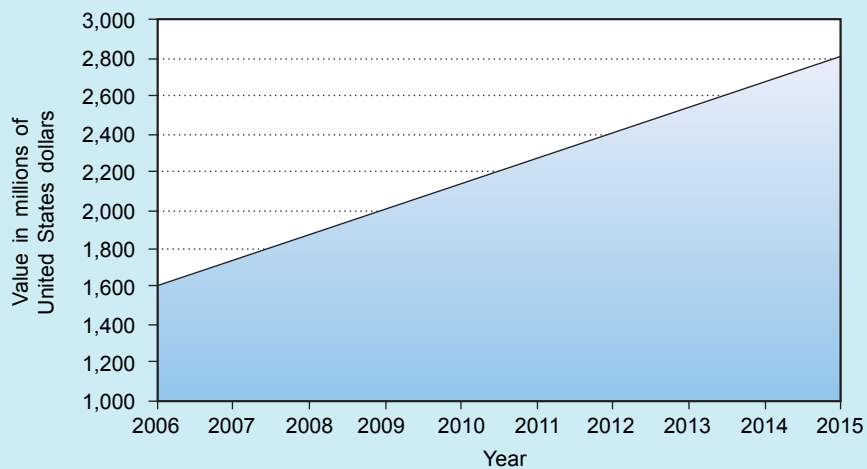


Source: Projected on the basis of data from the International Data Corporation (IDC), (2003).

- The Republic of Korea, which views the Internet and ICT as a key component of its strategic development and its ability to sustain its competitive advantages, has both high-level government backing and the infrastructure in place to support rapid growth for business and social uses;

*The Republic of Korea views the Internet and ICT as a key component of its strategic development*

**Figure IV.5. Republic of Korea: projected investment in basic ICT infrastructure, 2006-2015**

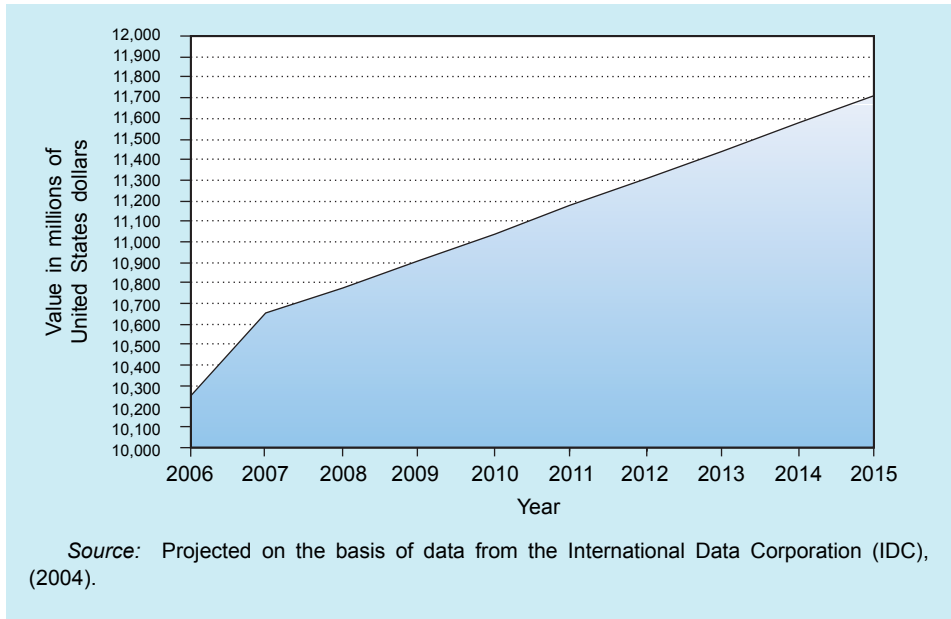


Source: Projected on the basis of data from the International Data Corporation (IDC), (2003).

**Japan has reinvigorated business with impressive use of the Internet**

- Japan, which has reinvigorated business with impressive use of the Internet by some leading companies to achieve change and productivity gains. More organizations are expanding the use of Internet-based solutions to achieve sustained growth. This could be the start of Japan’s next major economic evolution and growth cycle.

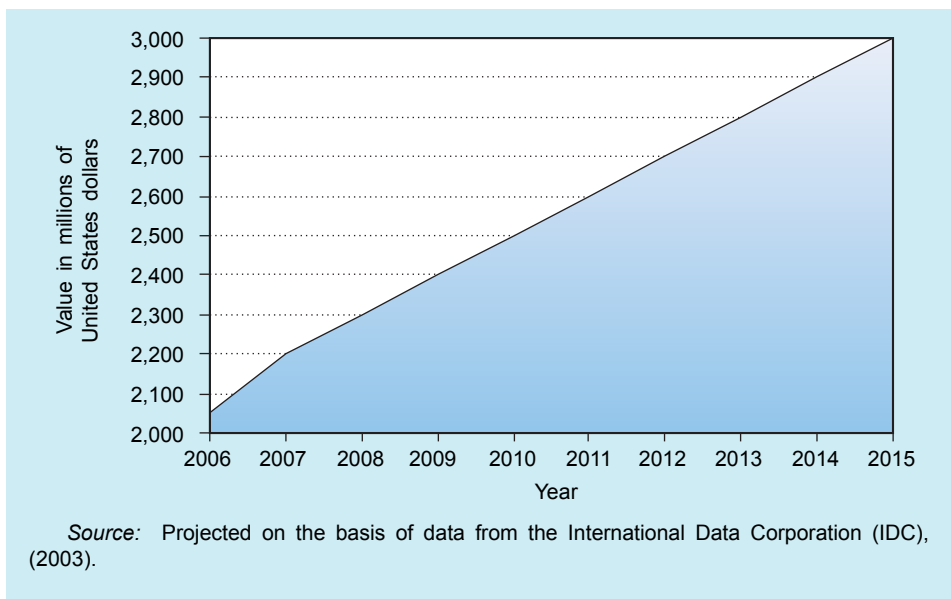
**Figure IV.6. Japan: projected investment in basic ICT infrastructure, 2006-2015**



**Australia and New Zealand are using ICT to tackle the need for continuous productivity gains**

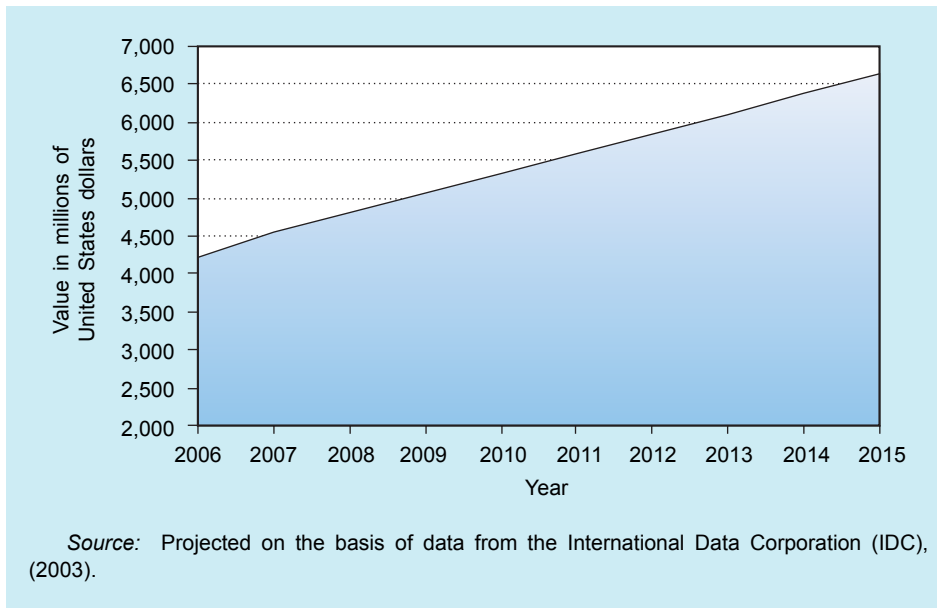
- Australia and New Zealand, which are using ICT pragmatically and innovatively in government and the private sector to tackle issues of vast geography, small populations, limited availability of investment funds and the need for continuous productivity gains;

**Figure IV.7. Australia and New Zealand: projected investment in basic ICT infrastructure, 2006-2015**



- Other Asian and Pacific developing countries which are marginalized or emerging Internet economies, Governments and multilateral organizations, such as ADB, UNDP and the World Bank, can be expected to play the main role in funding ICT infrastructure, be it telecommunications lines, PCs for schools or Internet access for communities.

**Figure IV.8. Other Asian and Pacific developing countries: projected investment in basic ICT infrastructure, 2006-2015**



## 2. FINANCING NEEDS

Total annual investments in basic ICT infrastructure in the Asian and Pacific region for the next 10 years (2006-2015) will amount to an estimated \$32.7 billion, of which \$19.1 billion will be for developing countries of the region (table IV.3). China will enjoy the highest growth, followed by ASEAN members and India, although in sheer magnitude of investment, none will surpass Japan. The other Asian and Pacific developing countries, which most need financial assistance, are projected to need \$5.5 billion in this period.

## 3. OPTIONS FOR FINANCING ICT

Experience shows that the private sector often provides services more effectively than Governments and this is certainly true in telecommunications. The phenomenal spread of mobile telephones in the past decade, particularly in the Asian and Pacific region, was driven by the ability of private providers to move quickly to satisfy a pent-up need for telephony as soon as they were allowed into the market. Private companies have proved more efficient and flexible than State-owned monopolies in keeping up with technological developments and competition between them brings lower prices.

The success of the private sector does not mean that Governments and aid donors should withdraw from ICT provision altogether. Private sector success often depends on support from Governments and donors and some development needs will certainly continue to require public investment. Government and private sector partnerships are essential for ICT financing.

*Government and private sector partnerships are essential for ICT financing*

**Table IV.3. Annual ICT infrastructure financing needs**

Country/region	Amount (Billions of United States dollars)	Percentage
Japan	11.1	33.9
China	6.5	19.9
ASEAN+India	4.9	15.0
Australia and New Zealand	2.5	7.6
Republic of Korea	2.2	6.7
Other developing countries*	5.5	16.8
Total	32.7	100
All developing countries of the region (excluding Australia, Japan and New Zealand)	19.1	58.4

*Source:* Projected on the basis of data from the International Data Corporation (IDC), 2003.

*Note:*

\* All developing countries of the region excluding ASEAN+1, China and the Republic of Korea.

**Governments are responsible for creating the conditions that attract private sector investors**

**Creating an enabling environment for investment**

Governments are responsible for creating the conditions that attract private sector investors. They must make laws, regulations and start-up procedures for private companies as simple, transparent and predictable as possible; ensure fair competition; and ensure that back-up services, skilled personnel and capacity are in place to enable operations to run smoothly. Without an enabling environment, investment will not be made or will not be effective in providing services efficiently and at the best price. While each country needs to develop its own policy and strategies, global communications require regional and international governance.

**Financial support**

Investors may be wary if a project seems to be very risky, has high start-up costs or will not generate profit for several years. Donors offer financial assistance, such as loans or risk mitigation, especially for the early stages of projects, to enable private companies to operate in areas that might not otherwise be considered commercially attractive or viable.

**Public-private partnerships**

The private sector is good at supplying wealthier and urban populations that can easily pay for services but may not be willing to supply poor, marginalized and rural people – the very people who should be the target of development aid. Large distances and thinly spread populations make for high infrastructure costs in providing fixed-line telephone systems for rural or remote areas. Poverty also means that the use of telephones will probably be low. Private companies are starting to look seriously at how they can serve the poor profitably, but market gaps remain, requiring government and donor aid.

Donors can help Governments to develop policies and projects for meeting the ICT needs of the poor, by supporting research and consultation. They can encourage and co-finance ICT projects that benefit the poor

directly, such as local community information points or community e-centres, without losing sight of the need for ICT projects to be sustainable in the long run. They can also help to establish cross-subsidy schemes or innovative public-private partnerships to encourage commercial network operators to channel investments towards less commercially attractive regions.

### **Partnership for regional projects**

The construction of regional infrastructure presents another challenge that the market is unlikely to solve unaided. Building an effective telecommunications backbone to link different Asian and Pacific countries and regions is essential, but this will require so much coordination, political commitment, policy and regulatory reform and institution-building, apart from significant physical infrastructure, that the challenge is beyond the capability of any single private investor or development bank. Regional cooperation is indispensable for linking different countries.

*Regional cooperation is indispensable for linking different countries*

Many important aspects of ICT infrastructure usage and governance depend on collaboration among countries – among neighbours, regionally or globally. Donors are examining options for setting up international development partnerships that mobilize public and private resources to tackle large issues that demand such coordination or are beyond the capacity of individual donors.

### **Meeting the Millennium Development Goals**

An estimated \$50 billion in additional aid would be needed to achieve the Millennium Development Goals globally by 2015, over and above the development funds already promised in the Monterrey Consensus.<sup>11</sup> A significant part of this will likely be spent on ICT to make services more efficient and effective, support good governance and enable economic development. Many least developed countries and landlocked developing countries which are furthest from achieving the Goals, need ICT to help them stimulate their economies and integrate them into the world economy.

*ICT is an essential tool to stimulate developing economies and integrate them into the world economy*

## **D. THE WAY FORWARD**

### **1. REGIONAL COOPERATION IN ICST INFRASTRUCTURE DEVELOPMENT**

Despite the differences between countries in the region, opportunities exist for regional cooperation at various levels to implement the objectives set out in the Millennium Development Goals and action lines of the Plan of Action of the World Summit on the Information Society.<sup>12</sup> Such cooperation can and should be driven by the private sector and other enablers, such as international and regional financial institutions, and facilitated by member States through various modalities and mechanisms. ESCAP can play an important role in facilitating a regional consensus and promoting regional cooperation in the three areas described below.

<sup>11</sup> Monterrey Consensus of the International Conference on Financing for Development (*Report of the International Conference on Financing for Development, Monterrey, Mexico, 18-22 March 2002* (United Nations publication, Sales No. E.02.II.A.7), chap. I, resolution 1, annex).

<sup>12</sup> Adopted at the Geneva phase of the World Summit on the Information Society, held from 10 to 12 December 2003 (see document A/C.2/59/3 or visit [www.worldsummit2003.org](http://www.worldsummit2003.org)).

### **Asia-Pacific Broadband Program**

**A broadband network will provide the foundation on which to build an inclusive regional information society**

The Bangkok Agenda for Broadband and ICT Development in the Asian and Pacific region, adopted at the Asia-Pacific Broadband Summit in July 2004, called for the creation of a broadband network in the region that involves agreement on a set of common principles by all Asian and Pacific stakeholders, including Governments, the public sector and civil society. The network will provide the foundation on which to build an inclusive regional information society which can develop better responses to such issues as poverty eradication, the creation of knowledge and the promotion of sustainable development.

The initiative raises many issues, from building infrastructure to intellectual property and information security, highlighting the need for an institutional platform to facilitate contact and debate. ESCAP, as the only intergovernmental organization covering the entire Asian and Pacific region, is well placed to undertake that role. It may focus on creating the necessary regional consensus, helping to produce an enabling policy and regulatory environment, building the requisite skills base, promoting broadband applications (e-government, e-business, e-environment, e-learning and e-health) and developing content.

Such an initiative would complement and extend the activities of the Government of Japan in realizing the Asia Broadband Program, including the North-South Submarine Fiber-Optic Cable Link Project in Viet Nam, which runs a fibre-optic cable 2,000 kilometres from north to south. The initiative is therefore expected to prompt other national and/or subregional hubs to be linked up to this initial regional broadband effort.

### **Knowledge-based disaster management**

The catastrophic Indian Ocean tsunami, Hurricane Katrina and the South Asian earthquake underlined the constant threat of disasters that may bring great loss of human life and property. Most technical support tools supporting knowledge-based disaster management are enabled by information, communication and space technologies. As a follow-up to the World Conference on Disaster Reduction held in Kobe, Japan, in January 2005, the Regional Plan of Action towards the Information Society included a regional cooperation framework on knowledge-based disaster management.

For implementation of disaster management-related activities,

- ESCAP has established a regional trust fund for the tsunami early warning system in the Indian Ocean and South-East Asia, with the first contribution of \$10 million coming from the Government of Thailand. ESCAP is promoting regional/subregional, multinodal and integrated approaches for establishing early warning systems for tsunamis and other disasters;
- ESCAP received a \$1 million contribution from the Government of the Republic of Korea for technical cooperation in disaster preparedness in tsunami-affected countries and \$125,000 from the Government of Germany for South-South cooperation on tsunami and other disaster risk management.

ESCAP is working with space service providers and national disaster management authorities to develop regional cooperative mechanisms for

using space technology for disaster management. Spacefaring countries such as China, India and Japan have given ESCAP strong support by providing relevant space information products and services, exploring cooperation on a disaster monitoring satellite constellation and exploring ways to deliver products and services to disaster management authorities.

ESCAP is discussing with ITU and the Asia-Pacific Satellite Communications Council on how to help Asian and Pacific countries to establish emergency communication capabilities and the possibility of setting up regional or subregional standby systems.

ESCAP is also working with relevant organizations and countries on the possibility of providing the region with drought monitoring information services in line with the recommendations of the Asian Conference on Disaster Reduction, held in Beijing from 27 to 29 September 2005.

### ***Satellite strengthened connectivity and applications***

ESCAP is implementing projects on satellite broadband-based community e-centres, and on application models of satellite-based e-learning tools for population development and family planning. In cooperation with ITU, the United Nations Office for Outer Space Affairs and the Asia-Pacific Satellite Communications Council, ESCAP initiated a survey on satellite broadband resources to help less developed countries understand their availability and affordability, and to lay a foundation for public-private partnerships that deliver satellite broadband service and development-oriented ICT applications.

***ESCAP is implementing projects on satellite broadband-based community e-centres***

## **2. CONCLUSION**

Developing a strong Internet environment is a common goal for Asian and Pacific Governments, but the quality of government support varies greatly when it comes to implementing e-business and wider e-societal initiatives and fostering the necessary telecommunications infrastructure. Countries and areas such as Hong Kong, China, the Republic of Korea, Singapore and Australia are shaping technical, legal, economic and social environments to promote Internet use, but many other countries are lagging behind.

In order to create an environment that promotes wider use of the Internet and an all-inclusive information society, Governments need to address four general issues:

- ***Making the Internet available to everyone.*** Improving the local infrastructure and reducing access costs enable large parts of the local population to go online. Creating an enabling environment that encourages needed investment and public-private partnerships to expand the much-needed rural infrastructure is another important challenge;
- ***Developing legal and security frameworks for online activities.*** Australia, the Republic of Korea and Singapore have taken the lead in developing comprehensive e-legislation that covers digital signatures, encryption, public key infrastructure, protection of intellectual property and online taxation;

- **Promoting e-government and e-business effectively.** Strong central bodies that coordinate e-government and e-business initiatives in areas of national importance are effective tools to foster good government-to-consumer (G2C) and business-to-consumer (B2C) environments;
- **Allowing foreign investment in telecoms and Internet service providers.** Limits on foreign shareholdings in telecoms and Internet service providers have eased in many Asian and Pacific countries but the region needs to allow freer access to telecommunication and Internet service provider infrastructure.<sup>13</sup>

**Developing countries need to focus on providing rural areas with ICT infrastructure and access to narrow the digital divide**

Developing countries where ICT infrastructure is available mainly in urban areas need to focus on providing rural areas with infrastructure and access in order to narrow the digital divide. Governments can utilize innovative business models, such as universal access funds or franchised community e-centres, to help finance infrastructure in rural or thinly populated areas.

In order to encourage businesses to increase the use of ICT, the government or industry regulator must continue to benchmark network and Internet tariffs, reliability and bandwidth against the more mature Internet economies and developed countries. World-class ICT infrastructure at competitive tariffs is essential to attract FDI in higher value-added businesses, such as design, processing, packaging, distribution and marketing.

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<sup>13</sup> David C. Michael and Greg Sutherland, *Asia's Digital Dividends: How Asia-Pacific's Corporations Can Create Value from E-Business* (Singapore, Wiley, 2001).