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Information and Communication Technology (ICT) Strategies for Developing Countries

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Executive Summary of Proceedings

CONTENTS

	Page
Introduction	**2**
ICT and Development	**3**
Strategies for E-Based Business Development	**8**
Policies and Strategies for ICT Development	**9**
Access Gap	**9**
Tele-centers	**10**
High Speed Access	**12**
Experiences in ICT Development in the Region	**12**
Regional and Global Perspectives on ICT Development	**16**
South East Asia – ASEAN Initiatives	**16**
East Asia – The Impact of New Economy	**17**
ICT Development Strategy: Recommendations by the Participants	**18**
Concluding Session	**19**
Further Recent ICT References	**19**

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Key Messages

[¶] References are to paragraphs.

1 The evolution of information and communication technology (ICT) implies a convergence between information technology and telecommunication technology. ICT provides many opportunities for developing countries to accelerate their economic growth and reduce poverty. More specifically, ICT offers enormous opportunities for governments to improve their administration and governance, public education and other measures to assist the poor in general. Businesses also stand to benefit from reducing transaction costs and enhancing efficiency and productivity. However, there are many obstacles and challenges that policymakers must address if they are to fully benefit from the ICT revolution. **[¶ 4, 6, 17-18]**

2 The potential benefits from ICT development for developing countries are many. The most important include: economy-wide efficiency gains and productivity growth; new export opportunities; new business opportunities such as ICT enabled services; provision of information and technical assistance to farmers on markets, weather and crop management; new educational opportunities to the general public at large; provision of primary health care advice; training and basic education in rural and remote areas; opportunities to enhance the quality of government services by improving accountability and transparency; and empowerment and participation of all stakeholders, including the poor. **[¶ 4, 18]**

3 In particular, ICT can bring about greater seamless integration of global labor markets. This integration is likely to be facilitated by the confluence of a number of factors such as dwindling trade barriers from multilateral trade negotiations and rapid dissemination of market information, as well as the efficient delivery of services. All this will help to bring about a more efficient allocation of labor—including unskilled workers—across the global economy. **[¶ 39-41]**

4 There is a large and growing divide among and within developed and developing countries in terms of access to and the use of ICT called the 'Digital Divide'. In the Asia and Pacific region, the gap of opportunities is widening amongst rich and poor countries and within these populations as well. If this trend continues, it will leave some countries and individuals even further behind in development and exacerbate existing inequalities and poverty. **[¶ 23, 36-37, 43, 84, 86, 122, 138]**

5 It is essential to ensure universal access or at least the widest possible access to ICT. Although technology is increasingly available and affordable, policymakers must create an enabling environment by providing the appropriate information infrastructure, developing human resources and establishing appropriate institutional frameworks to foster ICT development. Governments, private sector and donors all have roles to play and need to work closely together for synergy. **[¶ 64-69, 82]**

6 In this connection, the liberalization of the telecommunication sector represents the first important step a country needs to take for improving the quality and increased use of ICT. This should also reduce service cost, which is key to sowing the seeds for ICT development. This development in turn will contribute to accelerating economic growth and poverty reduction. **[¶ 9, 46-7, 68, 99, 140-1]**

7 From the developing planning perspective, ICT development is not simply a matter of providing every one a computer and a telephone. The important factors that need to be considered are easy access and affordability; formal and informal education to gain literacy, language and technical skills; and opportunities for re-skilling and continuing education. All these will help establish a framework for people to process information, and generate and use knowledge effectively. More importantly, citizens may make use of ICT productively to accelerate economic growth and social development. **[¶ 9, 35, 38-9, 57, 106, 132, 142]**

8 To help ensure the sustainability of ICT development, governments need to involve the private sector to a large extent to take advantage of flexibility, adaptability and innovation. **[¶ 10, 32, 36, 48-62]**

9 Regional cooperation would help in ICT development as well. Such areas of cooperation may include the development of infrastructure, improvement of health and education, establishment of standards, formulation of regulations and protection of intellectual rights. **[¶ 123-136]**

10 Donors could and should assist in strengthening the policy environment covering legal and regulatory frameworks, information infrastructure, ICT-related public goods, and in playing a catalytic role in mobilizing both public and private resources. **[¶ 24, 25, 72-82]**

11 Finally, although ICT can help developing countries to leapfrog some technological barriers, it is not a panacea for development problems or a substitute for sound economic policies. It can contribute to development only insofar as it forms a part of an overall development strategy for creating a sound policy environment for sustainable economic growth and development. **[¶ 6, 17, 87]**

Introduction

1. The ADB Institute conducted a capacity-building workshop on Information and Communication Technology (ICT) Strategies for Developing Countries from 21 to 27 February 2001 in Singapore. The workshop was jointly organized with the Asian Development Bank (ADB) and the Technical Cooperation Directorate (TCD) of Singapore's Ministry of Foreign Affairs (MFA). The participants were government officials and policymakers from seventeen developing member countries of the ADB. The workshop, organized under the overall design and management of **Dr. Ramesh B. Adhikari, Senior Capacity Building Specialist, ADB Institute**, featured prominent resource speakers from academia, government agencies, multilateral institutions and the private sector. The workshop aimed to strengthen the participants' understanding of the various issues involved in harnessing and utilizing emerging ICT to promote economic and social development in the Asia and Pacific region.

2. The workshop provided the participants with exposure to the various conceptual and practical policy issues pertaining to fostering ICT development as well as using ICT to help economic growth in the region. In addition to participating in presentations to help increase the knowledge-base on this highly topical development issue, participants worked in small groups to tackle a number of policy problems related to ICT development in the Asia-Pacific region.

3. The workshop covered four important areas, namely, ICT and development, strategies for e-based businesses development, policies, strategies and experiences in ICT development, and group work on formulating ICT development strategy.

4. During the inaugural ceremony, **Mr. Lim Eng Hoe, Deputy Director, Technical Cooperation Directorate (TCD), Singapore Ministry of Foreign Affairs**, welcomed all participants and speakers to the workshop. Lim pointed out that since 1992, Singapore has sponsored training courses and study visits for over 13,000 officials from more than 138 developing countries. The workshop was intended to provide a bird's eye view of the entire spectrum of ICT strategies for developing countries, especially in view of the rapid global changes in market environment and Asian competitiveness. Lim wished all the participants a productive and memorable stay in Singapore.

5. **Mr. David Edwards, Assistant Chief Economist, Economic Development Resources Center, ADB**, joined Lim in welcoming the participants and speakers. Edwards noted that one major purpose of the workshop was to provide a forum for policymakers from ADB member countries to exchange views and share their experiences in embracing new development challenges and opportunities that the recent rapid evolution in ICT has brought about. In discussing an ICT strategy for developing countries, it is important to put the discus-

sions in the context of regional development. An ICT strategy must be an integral part of a broad development strategy, so that ICT can be effectively utilized to address the fundamental development challenges of poverty reduction and sustainable economic development.

6. Edwards pointed out that ICT accelerates the diffusion of knowledge and technological know-how, and provides a platform for human interactions and a global marketplace. As such, ICT offers new potential for developing economies to leapfrog in technological progress, further reducing poverty and closing the income gap with developed economies at a much faster pace. However, the challenges in making ICT a powerful development tool remain complex and formidable. These include developing an adequate telecommunication infrastructure and providing an enabling environment for the application of ICT in commerce and finance.

7. **Dr. Masaru Yoshitomi, Dean of the ADB Institute**, began his opening remarks by welcoming all the participants and speakers. Yoshitomi noted that this is the first time that the ADB Institute is conducting a workshop on ICT. Over the last decade or so, ICT innovation and advancement have enormously increased human capacity for capturing, analyzing, storing, and sharing information and knowledge.

8. He outlined some of the potential benefits of ICT for developing countries. ICT can: (i) generate economy-wide efficiency gains and new export opportunities, (ii) help small farmers and craftsmen by providing market information, (iii) help the poor by providing them with educational opportunities, (iv) enhance the quality of health in rural areas, and (v) make it easier for governments to provide services to rural areas and to improve the quality of government services by improving accountability and transparency.

9. There are many development issues pertaining to ICT promotion. There is a growing gap in terms of ICT access and use between rich and poor countries as well as within countries, a gap that is popularly known as the Digital or ICT Divide. In order to enhance ICT access to poor citizens, developing countries must adopt a development strategy that is conducive to ICT development. Such a strategy would include: (i) liberalization of the telecommunication sector, (ii) strengthening the national communication infrastructures, (iii) expansion of the supply of required hardware and software, (iv) facilitation of investment in technology infrastructure development, (v) introduction of simple measures to accelerate ICT development such as removing high taxes on imported ICT hardware and software, (vi) development of human resources, particularly technical skills, and (vii) adoption of investor-friendly policies to promote foreign direct investment (FDI).

10. According to Yoshitomi, another key issue is the role governments must play in ICT development, for unleashing private sector response, promoting ICT development, diffusing technology, and focusing resources on strategic development of the national information infrastructure. He noted that the experience of the newly industrialized economies (NIEs) shows that governments can play active roles through (i) making the ICT strategy a critical element of the overall economic development strategy, and (ii) providing an enabling environment by creating synergy between private and public initiatives in ICT development and applications, particularly in research and technological innovations. Other policy challenges pertain to creating a regulatory environment such as building well-functioning legal and regulatory institutions conducive to ICT activities and e-commerce development.

11. Yoshitomi expressed his hope that the workshop would generate detailed discussion and constructive ideas to help address the issue of the ICT divide in the Asia-Pacific region. The knowledge and skills learned by the participants would assist them in formulating an appropriate ICT strategy for their respective countries. Before closing his remarks, Yoshitomi briefly introduced to the participants the role of the ADB Institute and its activities. **For more program details, visit ADBI website at www.adbi.org**

ICT and Development

12. The first session focused on the various conceptual and practical aspects of the relationship between ICT and development. E-based technology can make government services more accessible especially in rural and remote areas. The Internet and e-commerce pose a number of challenges and opportunities for development in the Asian and Pacific region. Singapore's transition to a knowledge-based economy (KBE) is the result of a positive policy approach to ICT, KBE and globalization. The relationship between ICT, growth and poverty is complex and multi-dimensional.

13. **Dr. Paul Schapper, Western Australian State Government**, opened the session with a comprehensive presentation on **Not Just Narrowing the Divide – Leaping Ahead: Leadership in E-Based Public Administration**. The state of Western Australia is a world leader in e-based public administration, particularly in government procurement and provision of community services. Schapper began his presentation by pointing out that the convergence of information technology and telecommunications has already happened. However, the real benefit—the New Economy—has yet to arrive.

14. While the technological achievements have been both extraordinary and unforeseen, the real challenge is still before us, namely the transition to the New Economy or the knowledge economy. Once accomplished, governments, industry and the community will be able to exploit the capacity of the new technology and globalization. Capacity building can increasingly also mean the adoption, adaptation and exploitation of the new technologies that can rapidly produce high returns. This is not so much a technical issue; this is a cultural challenge with dimensions of technical literacy and awareness, policy, training and infrastructure as well as service provision itself. All these dimensions

need to come together for the New Economy to emerge and prosper. But before this can happen for many communities, there is need for a further crucial ingredient to be present—leadership.

15. There are crucial leadership roles for governments and NGOs in initiating the technological enablement of industry and the broader community. This leadership role in the New Economy can have profound results in a short time frame with relatively modest investments. There are perhaps two broad strategies for achieving this objective. The first is through the direct provision of infrastructure, training and education and various other incentives for individuals and businesses to move down this path. The second complementary strategy is for governments and NGOs to adopt the new technologies in their dealings with other government agencies, industry and the community, thereby providing a critical mass of services and information which make further investment at the private level more attractive.

16. Just as the industrial revolution imposed a complexity of technical, social and cultural challenges on industries, governments and communities, so too it is with the New Economy. The New Economy cannot be expected to be cultivated purely as a technical issue. Transition to the New Economy must address a range of complex issues such as existing management practices, policy frameworks and legacy systems as well as community and industry apprehension and awareness.

17. The main lesson of the Western Australian experience for developing countries is that the ICT agenda is not just about technology. In fact, it seems that there is an ability for a developing country to leapfrog the technology gap and by-pass existing legacy systems into the next generation. In Western Australia some of the most successful experiences have been in remote communities with minimal or non-existing infrastructure. The ICT agenda must be based on policy, leadership and above all people.

18. In the **discussion following** Schapper's presentation, a question was raised that while efficiency gains were important, efficiency gains in terms of transparency and accountability in awarding government contracts was equally important. Schapper fully agreed, although he pointed out that those gains were difficult to measure quantitatively. Another participant raised questions about the consistency of on-line government services in the different Australian states. Schapper answered that users were able to register free for all six Australian states plus New Zealand, and that the seven jurisdictions took a cooperative approach on this issue.

19. Some participants were interested in Western Australia's ICT technical assistance to Mozambique. Schapper noted that the focus of the Mozambican government's ICT program was to promote greater competition in its procurement contracts in the hope of improving the overall efficiency of the economy. It was also noted that Mozambique assimilated the new technology very rapidly, and this was evident in the widespread use of satellite technology and mobile phones. This enabled Mozambique to leapfrog several stages of technological development.

20. Schapper also pointed out that the Western Australian government went out of its way to assist the remote areas of the state to gain Internet access by setting up a network of on-line kiosks and offices. He also stated that standards compliance, digital signatures, and other technical measures were implemented with the aim of promoting greater transparency. Some examples of standards are the United Nations Standard Product and Service Classification Code (UNSPSC: **http://eccma.org/unspsc/**) and Open Buying on Internet (OBI: **http://www.openbuy.org/**). The internal Western Australian government system has not fully moved on-line yet although this is more of a management than a technological issue. It was the state government itself that developed the financial (e.g. payment) infrastructure for its on-line services.

21. According to Schapper, although most of the state government's one hundred or so departments have their own web sites, they are required to integrate them with a central super-portal. This super-portal is highly service-oriented and non-bureaucratic in the sense that it has no references to individual government departments but only to the services they provide. The state government performed many services both on-line and off-line during a transition period, and worked hard to promote awareness among small and medium enterprises about the potential benefits of on-line services and also to provide some practical training.

22. **Mr. Andrea Goldstein, OECD**, gave a presentation on **Internet, E-commerce and Asian Development: Challenges and Opportunities**. He focused on the opportunities e-commerce offers to small-scale entrepreneurs in developing Asia and the challenges they face in exploiting e-commerce's potential. In a historical perspective, the Internet has diffused at a much faster rate than earlier generations of communications technology.

23. Although there is a risk that a digital divide will emerge, which may reinforce existing income and wealth inequalities within and between countries, a major potential benefit of globalization is the freer movement of technology, including ICT, across borders. In principle, ICT can have a leveling effect, giving poor countries and the poor access to markets, information, and other resources that would otherwise have been inaccessible.

24. While evidence of real benefits is still scattered and anecdotal, and the obstacles to affordable access remain formidable, e-commerce does present real opportunities to small entrepreneurs in developing Asia. The need to overcome bottlenecks in telecommunications, transport, and logistics must be addressed in parallel with the governance aspects of e-commerce, including consumer protection, security of transactions, privacy of records, and intellectual property. While as far as possible the extension of the telecommunication and Internet infrastructure in developing countries can be left to

private investors, official development assistance (ODA) may leverage private investments.

25. Examples of such leverage include making available excess satellite capacity to extend services to remote rural areas of developing countries and investments in small-scale demonstration projects such as tele-centers. With respect to governance issues, the essential challenge is to create an environment of trust for conducting e-commerce. One possible solution is the adoption of self-regulated codes of conduct by groups of like-minded electronic entrepreneurs. Another is to foster SME participation in internationally accredited web-based online rating schemes. Also, telecommunications infrastructure complements but is not a substitute for transportation and logistics infrastructure since physical merchandise needs to be shipped to complete an e-transaction. That is, realizing benefits from e-commerce depends crucially on complementary investments in other infrastructures such as power supply, roads, ports, and so forth.

26. With respect to legal and regulatory issues, approaches vary widely at present even within the OECD. There are few tested "best practices" to share, but it is important that developing countries have a voice in the early stages of negotiations and discussions that are shaping global rules and protocols governing e-commerce. Capacity building via ODA can be helpful in this regard. Furthermore, thinking 'outside the envelope' is needed with ODA in this age of e-innovation. For example, there may be scope for initiatives targeted specifically at small e-entrepreneurs in poor countries, as with support for their individual or collective participation in web-based online rating schemes or with publicly-sponsored portals for small producers' wares to overcome barriers to trust.

27. In the **discussion following** Goldstein's presentation, concerns were expressed over whether there were any international standards for security, digital signatures, and other issues. Goldstein responded that OECD provided a forum for discussing such policy-relevant technical issues among developed countries but he was unaware of a similar forum for developing countries.

28. One participant pointed out that the penetration rates of telecommunications, PCs and the Internet were increasing rapidly in India. He felt that the presentation reflected the situations of OECD countries rather than developing countries, which lagged behind in terms of telephone access and education and training. There were also concerns that Internet content was heavily U.S. -based and this made Internet access more costly and less relevant for Internet users in developing Asia, which suggested a role for regional Internet sites.

29. The speaker fully agreed that the OECD model for ICT could not be directly applied to developing countries. The important consideration is that ICT poses not only opportunities but also challenges for developing countries. Developing countries can perhaps learn about telecommunications reform from Latin America, which has similar income levels and has experienced a significant fall in telecommunications tariffs as a result of reform. The speaker also pointed out that literacy is important and ODA can help promote local content by building skills in web design.

30. One participant raised a question about the lack of incentives for foreign private sector investors in the telecommunications sector of developing countries, in light of the fact that tariffs must reflect the limited ability of many users to pay. The speaker responded that it is important for developing countries to try to minimize regulatory risks. Goldstein fully shared the concerns of some participants that ICT and the New Economy will mostly benefit developed countries. To reduce those concerns, developing countries must participate more actively in global discussions about ICT and developed countries must help them do so.

31. **Dr. Linda Low, Associate Professor, National University of Singapore (NUS)**, present a talk to the participants on **A Positive Policy Approach to ICT, KBE and Globalization: Singapore's Transition**. The long boom from 1980 to 2020 is set to be a period of remarkable global transformation with a number of major technological waves created by such innovations as ICT; biotechnology transforming medicine and health care; and fuel-cell and other new energy, low-impact technologies among others. As countries move from the industrial to the information age of KBE and New Economy, technology is no longer a major constraint but pooling resources to solve problems collectively will become the primary political hurdle.

32. Low gave a positive and optimistic assessment of globalization, ICT and KBE. The choice is not whether to embrace them or not. What is important is the need to have a thorough understanding and interpretation of each phenomenon and process; the implications for policy design, implementation and facilitation between the public and the private sector; and no more state versus markets philosophies but instead formations of partnerships and alliances. What has to be done in theory differs widely from practical public policymaking as political, economic, cultural and traditional values and systems have to be transformed in tandem. The political commitment and will to stick to the required structural reforms is the biggest challenge facing developing countries.

33. After leveraging up in the first stage of attaining international competitiveness during the miracle years of rapid growth, the wherewithal and capability demonstrated should mean developing countries can move toward ICT and KBE. While the backlash against globalization as seen during the Asian financial crisis has to be addressed, economic isolation is nearly impossible in a globally integrated economy. Developing countries in Asia have to accept the reality, and realize there are no shortcuts and quick and ready ways to leverage into the new economy.

34. Singapore's situation may be unique given its political economy and dependence on globalization. But it is among the more successful countries with characteristic nimble-

ness and pragmatism to invest in intellectual capital besides physical infrastructure, adopting policies to nurture 'technopreneurs' as the new core of the KBE and bringing in as much foreign talent as needed. It has some lead over other developing countries but the competition is intense, since the global capitalist system is relentlessly searching for creative and innovative skills over and above competitive costs and efficiency. In a word, competition in the KBE economy is different. Flexibility and imagination in policy making may not yet be a strong suit in a city-state built on a developmental state; but Singapore has to adjust quickly and decisively, and this has implications for governance and democratization.

35. Developing countries in Asia can meet the challenge of markets through deregulation, privatization and public-private partnerships (PPP). [**See further ADBI publication on PPP at www.adbi.org/partnershipsbook.htm**]. ICT and KBE require the private sector to lead with ideas and innovations, but the state still retains its role as regulator and facilitator. The need to do things right in the domestic arena, including basic human resource development and skills upgrading, as well as in the international arena, including respecting intellectual property rights (IPRs) and forging alliances and networks, is no different in the new than the old economy. Technology alone is not the solution. There are many more intangible and latent policy areas that go beyond technological solutions.

36. In the **discussion following** Low's presentation, a participant wondered whether, given that the digital divide is a long-term phenomenon and that the digital revolution is in a state of flux with an uncertain destination, it might be better to watch other countries and learn from their experience. Low replied that ICT, KBE, and globalization do not give countries the luxury of time, unlike older technologies like railroads and electricity. With the new technology, product cycles have become much more rapid. The most difficult task remains changing the mindset of Singaporeans so that they can better adapt to ICT.

37. Low also stressed that it is important for developing countries to study successful models and benchmark themselves, in terms of infrastructure, education system and so forth. In response to a question about whether the digital divide would become wider within ten years, Low felt that that is most likely. This is precisely why it is crucial for developing countries to get aboard the 'digital train' as soon as possible to avoid being left even further behind. Among developing country groups, such as ASEAN-10, the more advanced countries should help the less advanced ones in the group to preserve the group's cohesiveness.

38. One participant voiced serious concerns about the unemployment implications of the digital revolution. Low agreed that this is a serious problem that governments will find difficult to tackle. The re-training of Old Economy workers to acquire New Economy skills and jobs is a particularly daunting challenge. The Singapore government is now cutting down in the content and curriculum, and encouraging more discussion and interactions in the classroom to promote creativity among the young. Changing the mindset and mentality in tune with the New Economy is not just an old worker-issue but applies to younger workers as well. A Malaysian participant noted that educational reform is also a pressing priority in her country. The speaker and participants agreed that countries should view workers as assets rather than costs in the New Economy.

39. **Dr. M. G. Quibria, Senior Advisor, ADB Institute**, spoke to the participants on **ICT, Growth and Poverty: An Asian Perspective** [**See his Information Technology and Poverty: An Asian Perspective, ADBI Working Paper Series No. 12, Jan. 2001 and online at www.adbi.org/publications/**]. He began his presentation by noting that the ICT revolution has opened up new possibilities of economic and social transformations from which developed and developing countries can potentially benefit. Unlike previous technological innovations, developing countries today have almost immediate access to new technologies and the benefits they can bestow. This raises the tantalizing possibility that ICT may soon herald a new era of economic prosperity for the global economy, greater than anything that has been achieved by previous technological innovation. In particular, ICT can bring about a more seamless integration of the global labor markets than was considered possible before. This integration is likely to be facilitated by the confluence of a number of factors: the dwindling trade barriers from multilateral trade negotiations and rapid dissemination of market information, as well as the efficient delivery of services due to the new ICT. All this will help to bring about a more efficient allocation of labor—including unskilled workers—across the global economy.

40. Quibria stressed that ICT could be used selectively and innovatively to directly enhance the welfare of the poor. However, to reap the full benefits of the ICT revolution and reduce poverty, countries need to address the main impediments to economic development by improving infrastructure, opening up markets, breaking telecommunication monopolies and improving education for all. These are fundamental to economic development. Indeed without addressing these issues, attempts at securing Internet access would not lead to the same economic dividends—at times they can become a recipe for financial disaster. A recent analysis by Pohjola (2000)[†], which investigated the relationship between IT investment and growth in 39 countries over the period 1980-1995, found a paradoxical result. Whereas IT investment appears to boost growth in developed economies, the same is not necessarily true in developing countries, which need to institute other complementary policies to reap economic benefits from such IT investments.

[†] Pohjola, Matti (2000), "Information Technology and Economic Growth: A Cross-Country Analysis," United Nations University (UNU), Working Paper No.173, UNU/WIDER, Helsinki.

41. Quibria concluded that in the presence of favorable policies and institutions, the Internet could assist development, and the process can be further helped by globalization, as it tends to magnify the benefits of ICT. Yet ICT is by no means a panacea for lack of growth or pervasive poverty. This new technology may have created a window of economic opportunity for the developing world to foster growth and escape the scourge of poverty. Nevertheless, to seize this opportunity, countries would require sufficiently well developed social and physical infrastructure as well as conducive policy and institutional frameworks. While ICT has generated a new wave of enthusiasm among developing countries to embrace and benefit from new technologies, many of them, unfortunately, do not seem to have the necessary prerequisites to take full advantage of this window of opportunity.

42. In the **discussion following** Quibria's presentation, a participant voiced concerns about the potentially negative implications of ICT for unemployment and poverty in developing countries. That is, there is a real possibility that ICT may worsen the unemployment problem that is already serious in many countries. Quibria responded that he was thinking of some segments of ICT serving as a leading sector and engine of growth, as is happening in India with the software and back-office industries[†] , rather than high-tech economy-wide transformation as in the developed countries. The diffusion rates in many developing countries are currently too low for such a transformation and for the possible unemployment implications to be relevant. On the other hand, the software and back-office industries have already created significant employment in South Asia.

43. One participant pointed out that the Indian example showed that ICT was worsening the international digital divide and income inequality by creating a lot of low-level jobs in developing countries. However, the speaker felt that low-level employment is more desirable than no employment, and that it is unrealistic for poor developing countries to be able to jump straight to the high end of the ICT revolution. A participant agreed with the speaker that low-level ICT jobs would be a significant source of productive employment for poorer countries in the region. The speaker recalled that East Asian miracle economies started out by turning out low-tech products before moving up the technology ladder.

44. One participant argued that consumer tastes could be an important determinant of the adoption of ICT. Quibria noted that while this was a possibility, there was no way to empirically test it. Another participant pointed out that including more variables in empirical tests might uncover a lower level of ICT penetration threshold above which ICT has a big positive impact on total factor productivity. Quibria agreed but noted that this was also hard to empirically test due to lack of appropriate data.

45. Some participants wondered about the usefulness of online kiosks that provide information about weather, crop prices, and other relevant variables. The speaker pointed out that there have yet been no rigorous objective empirical analyses of this approach. Other participants discussed the possibility of exchanging country-specific experiences about such programs in order to identify what works and what does not work. Quibria agreed and encouraged participants to do so. Another resource speaker asked the participants to think about the implications of the fact that intellectual capital is increasingly mobile, especially from developing to developed countries.

46. During a speech at the welcome dinner, **Mr. William Hioe, Senior Director, Infocomm Development Authority of Singapore**, spoke on **Singapore's Infocomm21 Strategic Plan.** Hioe shared with the audience the key policy measures undertaken by the Singapore Government over the last three five-year plans and the key components of the Infocomm21. He said that the first two plans focused on the computerization of the public and private sectors to enhance their efficiency and productivity as part of its move toward transforming the Singaporean economy into a high value-added KBE. The third plan aimed at providing universal and high quality access of people to ICT under the Intelligent Island concept. It focused on improving its information and communication infrastructure. The recent telecom liberalization, which introduced greater competition in the telecom market, and efforts to expand broadband access are integral elements of these efforts. Hioe also noted that while information infrastructure is a necessary condition for a KBE, individual creativity is also critically important for its success.

47. Hioe went on to explain Infocomm21 under which Singapore wants to develop the information and communication (Infocomm) sector as the next major sector of growth; harness ICT to enable Singapore to successfully compete in the New Economy; and nurture an ICT-savvy e-society. Under the Infocomm21, Singapore has a number of concrete programs put in place in addition to the recent telecommunications sector liberalization and broadband infrastructure development. They include a new infocomm cluster comprising interactive broadband multimedia, wireless technology and widespread computing; content hubbing by attracting global content providers; trusted e-business hub by implementing Electronic Transactions Act; e-government; bridging digital gap within Singapore; infocomm human resource development; and further refinement of the policy and regulatory framework. Furthermore, the government is trying to promote greater private sector participation by assisting venture capitalists and e-business start-ups. In response to a question from the audience, Hioe said that a combination of factors, including the government and private sector initiatives, have positively contributed to the ICT development in Singapore.

[†] See also Ted Tschang, The Basic Characteristics of Skills and Organizational Capabilities in the Indian Software Industry, ADBI Working Paper No.13, Feb. 2001 and online at www.adbi.org/publications/

Strategies for E-Based Business Development

48. The second session centered on the practical issues confronting private sector companies when they develop their e-based businesses and the role of government in promoting ICT development. This session opened with two presentations about the key elements and basic approach of developing and implementing strategies for e-based businesses in the private sector. This was followed by three other presentations: two that dealt with the ICT development strategies of the Philippines and Malaysia and the third on the e-ASEAN initiative, a plan to foster regional e-commerce in the ASEAN area.

49. **Dr. A. Gilbert and Dr. P. Periasamy, Associate Professors, Nanyang Technological University, Singapore**, gave a presentation on **Strategies for E-Based Businesses: Key Elements and Basic Approach**. The speakers outlined the major elements private sector companies have to consider in drawing up their corporate strategies for e-business. These include the emerging organizational dilemma, role of e-business, e-business models, e-strategies, business-IT fusion, and e-based project implementation. In the rapidly changing technological environment of the New Economy, companies may have to cannibalize their own products in order to prevent others from doing the same. In a more extreme sense, this means that companies may in certain respects need to commit 'suicide' in order to survive.

50. Gilbert and Periasamy pointed out that there were several potential roles for private sector e-business. These include reducing transaction and other costs, improving the flow of information, improving coordination of actions, improving product/service quality, improving existing markets and create new markets, reaching new customers, improving links with suppliers and reaching new suppliers, creating new ways of selling products and services, and creating new products/services.

51. There are many types of e-business models, including the virtual storefront, marketplace concentrator, information broker, content provider, electronic clearinghouse, transaction broker, reverse auction, digital product delivery, and online service provider. Imperatives for developing the e-business model include maintaining perfect logistics, harmonizing channels, building a powerful portal/hub brand, transforming capital and cost structures, and building value-adding intermediation.

52. In terms of forming e-business strategies, companies have to ensure that cannibalizing existing products leads to creative destruction rather than suicide. Integrating web-front to organizational processes involves front-to-back process re-engineering, supply chain integration, cross-functional teamwork, and 'deciding between mouse and clicks versus bricks and mortar'. There are several considerations in cooperating with competitors and competing with partners. These include channel configuration (i.e. dis-intermediate or re-intermediate), when to standardize and cooperate for cost efficiencies, and when to differentiate and compete for strategic advantages. E-business strategy must have a well-defined vision and goals, a business model that incorporates environmental threats and opportunities as well as the firm's competencies and resources, and finally, the formulation and implementation of e-strategy.

53. There are three main domains of e-business opportunities. First, *e-operations* are initiatives that improve the creation of existing products. Second, *e-marketing* refers to initiatives that improve the marketing of existing products. Third, *e-services* are initiatives that provide customer-affiliated services. E-business can give a firm competitive advantage, but this requires a dynamic fusion of IT with other competitive factors (e.g. existing physical assets) that can sustain competitive advantage over time. There is no such thing as a separate e-business strategy, and IT is simply an integral element of a firm's overall business strategy. It is thus crucial to implement an e-business strategy as first and foremost as an IT strategy. It is also better to adopt to a modular approach based on a series of projects rather than one grand project.

54. The profile of a successful e-business contains a number of key elements. These include: (i) good relationship and high level of trust with customers, suppliers, partners, employees and owners; (ii) customer-focused value creation; (iii) effective cost management; (iv) learning organization; (v) keeping core competence in synch with time and focusing on the core competence; (vi) innovation, flexibility and speed; and (vii) focus on viability rather than profitability.

55. In the exchange of views after Periasamy and Gilbert's presentation, a participant questioned whether traditional strategic management was still relevant in the New Economy. The speakers replied that it was still very much applicable; although business practices change, business theories do not change significantly. Implementation of business strategies still depends on human contact and behavior although some specific elements of those strategies will change as a result of the new technology. Network externalities will alter strategy but not completely since most firms still have physical assets.

56. Other participants asked why business to commerce (B2C) e-commerce was not taking off and why so few major multinational corporations (MNCs) were involved in it. The speakers responded that B2C is still in its infancy, so it is too early to tell whether it will become a major force or not. Furthermore, there are many different possible forms of B2C e-commerce, and many larger MNCs are still exploring B2C. The speakers expressed the view that B2C is not a mere passing fad and that it is here to stay. Another participant pointed out that B2C is growing in some service sectors such as in financial services and entertainment, and sector-specific models are emerging for these sectors.

57. The speakers noted the success of the bookseller Barnes and Noble in relation to Amazon. The former is enjoying greater on-line success because it has effectively carried out

a fusion of its physical assets, core competencies and brand name with e-commerce whereas the latter does not have strong complementary resources to its on-line presence. The speakers emphasized that B2C was still very much a new frontier with a lot of potential and uncertainties. They also stressed that technology was readily available for most countries, but good infrastructure, human resources and skills, and sound policies are not. That is, technology is no longer a differentiator these days. The new technology helps developing countries export services, as it is happening in Bangalore, India.

58. In their second presentation, **Gilbert and Periasamy** led discussions on **Strategies for E-Based Businesses: Case Studies** with the participants. The speakers started the discussions by outlining major technological developments behind the emergence and growth of mobile commerce (m-commerce), utilizing Wireless Application Protocol (WAP) and other wireless communication technologies. The speakers noted that open (especially Internet Protocol) standards served as a powerful force driving the convergence of fixed-line and mobile telecommunications, which, in turn, extends the reach of the open-standards-based Internet and made possible mobile access to e-commerce. The advent of the 2.5 and third generation (3G) networks will geometrically expand the scope for such convergence. Combined with falling barriers to market entry, convergence will render obsolete many of the premises underlying current business models. On the demand side, B2C is an obvious target for m-commerce opportunities.

59. Gilbert and Periasamy then divided the participants into small groups and assigned them a **case study** to discuss and analyze. The participants were to represent the management team of a Singapore-based telecommunications firm that wants to exploit its network resources. All the groups were assigned the task of formulating a strategy that will position a new venture for a successful launch in "convergent" e-business markets in South-East Asia and beyond. The critical decisions that each group had to make related to: (i) target markets, (ii) technology-based business practices, (iii) alliances and strategic partners, (iv) specific products, services and revenue sources, and (v) business name and Uniform Resource Locator (URL) for the new venture. After each group presented its business proposals, the speakers discussed each proposal in terms of various performance criteria such as ability to cope with growth and change, whether the venture takes full advantage of network resources' economies of scale, and whether venture exploits current customer relationships and public image. Interesting business proposals emerged from the small group exercises – such as "world4u.com" (information and payment services), "exoticasia.com" (tourism services), "staralliance.com" (market intelligence).

60. In summing up the case study presentations, Periasamy noted that it might be worthwhile for telecommunication companies to diversify into education, tourism, market intelligence, and other areas, rather than limiting themselves to telecommunication services. In forming partnerships and strategic alliances, companies need to ask themselves what potential benefits they can provide for their partners. That is, what's in it for the partners? Companies should also view partnerships as a means of outsourcing and sticking to core competencies. This is particularly valuable in the New Economy, where things move fast and it is crucial to get the business up and running as soon as possible.

61. Periasamy pointed out that while some traditional business strategies were being challenged by the new technology, others remained as relevant as ever. In the New Economy, it is especially important for companies to know what their competitors are doing, and what they can do better relative to their competitors. They should also position themselves strongly first, and only then build up their strengths. They should also be aware of their weaknesses and limitations so that they can concentrate on their core competencies.

62. Periasamy stressed that success in the New Economy requires the involvement of both the government and private sector, multinationals and domestic firms, among others. That is, all the major players in the economy must be actively involved. Success in the New Economy also requires balancing one's strengths and carving out niches in which one excels and thus acquires bargaining strength in dealing with potential partners. Singapore is a good example of an economy that has achieved a lot by effective self-positioning and building-up strengths in a few areas of comparative advantage.

Policies and Strategies for ICT Development

63. This session focused on potential policies and strategies for ICT development in developing countries as well as their actual ICT development experiences, particularly with reference to ICT access, tele-centers and Internet access by satellite.

Access Gap

64. **Mr. Andrew Dymond, Intelecon, Canada,** gave a presentation on **Closing the ICT Access Gap – Policy Issues**. He noted that there is a growing telecommunications gap between developed and developing countries. Key elements of the ICT environment include infrastructure, commercial incentives, regulatory environment, skills and knowledge, and content. Policy objectives must be to encourage a commercially healthy telecommunication sector, liberalize the sector to the maximum extent possible, promote access to all, create interest in serving the poor and rural areas, minimize subsidies and cross-subsidies but identify the limits of the market, and optimize the environment for service provision in marginal areas.

65. Dymond noted that the technological trends were pointing to lowering costs and promoting greater access to telecommunication services. In particular, the proliferation of wireless technology meant that wireless/cable telecommunications is effectively substituting fixed service in poor net-

work areas. At the same time, some new technologies fail and more importantly, new technology needs policy facilitation. For example, "technology neutral" regulation encourages innovation.

66. Dymond emphasized that universal access is a business, offering people the right to spend a portion of their income on telecommunications and improving their productivity. As such, it is crucial to get the private sector involved in the provision of telecommunication services to rural and marginal areas, and the government can help in this connection by developing policies to create incentives for operators, new entrants and tele-access businesses to serve those areas. One interesting example of such a policy is a development fund or subsidy for rural areas in which potential service providers competitively bid for the subsidy, with the contract award being given to the lowest bidder. Such market-based pro-competitive policies can significantly improve telecommunication access for rural and marginal areas.

67. What is often ignored is the fact that there is significant latent demand for telecommunication services in these areas, as evident in high telecommunication expenditures, which means that it is possible to mobilize the private sector to supply the services. Encouraging private sector involvement through new entrants and rural licenses is more effective than imposing obligations on incumbents. The former approach entails more motivated operators, faster roll-out and growth, and more creative and entrepreneurial ideas. Incumbent obligations often result in poor service and lack of innovation.

68. There are also a number of developing country governments that have or plan to have universal access funds. Universal access does not mean private subscription. Rather, it means telephone calls are made available to the general population, for the price of a call via public access vehicles such as payphones or kiosks. This makes telecommunication provision commercially viable in communities that can support only a few lines. The interconnect regime, or mode of revenue-sharing between the incumbent and other telecommunication players, is the single most important element of regulation in market liberalization. In particular, if the originating urban operator pays a share of call revenue to the terminating rural operator who, in turn, pays the kiosk operator, this would create an additional revenue stream to create incentives for kiosk operators to terminate incoming calls. Those additional revenues can help to reduce the price for outgoing calls and thus increase affordability for rural residents.

69. In the **discussion following** Dymond's presentation, a participant stated that universal access to ICT was not an end in itself, but the means to empowerment. In this connection, he wondered whether there was any technology in the pipeline that will make the content more relevant to the poor in rural and marginal areas of developing countries. The speaker agreed that content is very important. However, ICT is a means of delivering content effectively and efficiently, and in this sense, connectivity and universal access matters a lot. For example, connectivity can improve the provision of market information and education, which can promote income growth and development. Ultimately, what empowers the poor are content and applications, not technology. There is no magic box technology that can make ICT more developmental; this is a service rather than a technology issue.

70. Another participant pointed out that some countries have had little success in obliging private sector telecommunication companies to provide ICT services to rural and marginal areas. Dymond responded that a more effective approach to encourage private sector participation would be to use competitive subsidies (i.e. competitive bidding for subsidies in which the lowest bidder wins) from revenues set aside from a healthy and profitable telecommunication industry, rather than imposing mandates and obligations. The government itself does not have to provide the subsidies as long as the telecommunication sector is strong and viable. Use of market mechanism and incentives generally evokes widespread private sector interest and a realization that the commercial potential of rural and marginal areas is much greater than expected.

71. One participant noted that granting a telecommunication license for lucrative urban areas with the proviso that the licensee must also provide service in less profitable rural areas is also a policy option. The speaker agreed that such a carrot-and-stick approach was indeed possible but noted that the evidence on the success of this approach was not clear so far. He also emphasized that the available evidence indicated that market-based mechanisms such as competitive subsidies worked well and simply mandating incumbents did not. The former also results in significant efficiency improvements and lower costs relative to the latter. Furthermore, imposing prohibitively high telecommunication license fees will result in a one-off revenue gain for the government, but will reduce the quantity and quality of telecommunication services, hurting growth and development.

Tele-centers

72. **Ms. Sonja Oestrmann, Intelecon, Canada** spoke on **Tele-Centers: Experiences, Lessons and Trends**. She pointed out that at present, tele-centers are almost exclusively funded by governments or international aid agencies and owned and/or managed by NGOs or community groups. The private sector is usually only asked to sponsor equipment and not offered any other possibility for attractive involvement.

73. Tele-centers offer far more scope for exploration of new models of ownership and financing, and interest is growing among private sector telecommunication and IT players. This is not to say that government or aid funded tele-centers, managed by NGOs, do not have their place. Such tele-centers, although struggling with issues of self-sustainability, are pioneering in this field and will continue to play an important role in testing new services and applications, creating awareness and incubating ideas and opportunities for rural communities. But they may not provide the model for large-scale

replication that is needed for widespread socio-economic development in developing countries where government funds are limited. And only economically successful models are likely to replicate themselves in larger numbers and spread the benefits beyond single locations.

74. New approaches involving the private sector are required. But how and with which policy measures can commercial telecommunication and IT players be attracted into serving the ICT-based needs of rural communities and developing countries? The solution is not simple and several avenues may need to be explored. Public Call Offices (PCOs) have been encouraged to reach beyond urban areas by a mix of obligations and incentives, which offer private sector players an attractive investment opportunity.

75. Similar fundamental principles guiding such a process for tele-centers might be as follows. First, the use of demand-driven models: instead of starting with huge investments and the whole range of possible equipment, services and applications, smaller tele-centers could be designed that expand and grow only if and when demand and affordability allow it. Second, commercial models: tele-centers planned and run on a commercial basis and managed by local and 'highly spirited' entrepreneurs capable of developing a business and management system. Preference should be given to tele-center solutions that have a 'franchise' element and can establish a *network* of tele-centers through the involvement of national telecommunication and Internet players.

76. There are additional options, too. First, is the use of rural funds for tele-centers. Such a policy instrument could provide 'smart subsidies' for commercial tele-centers in rural areas to help offset the large start-up costs and/or subsidize tele-centers on an ongoing basis in areas which are truly beyond commercial viability. Second, different funding options for tele-centers, such as micro-loans and seed finance on a matching basis could be explored and offered by, for example, international aid agencies and organizations depending on local market conditions. A third option is for international development NGOs or agencies to align themselves with a national tele-center operation and sponsor services and applications which are not self-supporting while the profitable services are commercially run and managed. Fourth, international NGOs, development institutions as well as local governments can also be a major *user* of tele-center facilities and services if they involve the tele-center in, for example, an education outreach, rural development, public governance or health program.

77. There is a need to explore an approach to tele-center development whereby the private sector and local entrepreneurs are supported and encouraged by favorable policy and regulation to provide a range of ICT-based services and applications on a for-profit basis to rural areas. Such an approach needs the support of international development banks and institutions to kick-start larger-scale deployment with smart subsidy and seed finance. This would also require the involvement of the local community and NGOs in education, health, rural development, micro-credit and other areas, that can enrich tele-center services by adding their development assistance. Here a true public-private partnership is required.

78. In the **discussion following** the presentation by Oestrmann, it was noted that there was still a role for the middleman or intermediary in the New Economy because, at the end of the day, the goods or services still have to be physically delivered. But ICT does improve the quantity and quality of information for the poor and disadvantaged, and thus their bargaining power. In response to a question about whether it was possible to replicate the Canadian-type community access programs, the speaker replied that such programs would not be suitable for developing countries due to their lack of resources and funding.

79. One participant argued that we should not under-estimate the role of the governments in ICT because government-related content and government services are a big component of ICT in many developing countries. The speaker responded that while it was critical for governments to provide sound development-enabling policy environments (e.g. telecommunication deregulation and competitive subsidies for universal access), the private sector generally does a better job of running and managing actual ICT operations such as tele-centers. That is, the role of governments should be to provide appropriate incentives and environment for local entrepreneurs to start and operate tele-centers.

80. Oestrmann emphasized that tele-centers in developing countries should be privately owned and commercially viable because the government and local communities usually do not have enough resources. She could not think of a single NGO- or government-run tele-center that had become self-sustaining. In response to a comment about private sector operators charging high prices, the speaker replied that government could help by leveling the playing field and promoting competition. High license fees may also be a deterrent against the lowering of price by private sector operators.

81. In response to a participant's suggestion about using tele-centers for distance learning, Oestrmann argued that it was essential for tele-centers to focus first on basic telecommunication services and move on to more advanced applications such as distance learning later on. She also pointed out that it was important for local entrepreneurs to form effective partnerships with big national players such as telecommunication companies and Internet Service Providers (ISPs). Finally, in the context of local content development, she pointed out that governments and NGOs could play a more active role, although there is also a role for the private sector as well, especially through industry associations (e.g. national farmers' association) that may receive some external funding for this purpose.

82. While everyone agrees on the desirability of universal access as an objective, there are many different ways to achieve this. Network effects and economies of scale also render tele-centers and PCOs highly beneficial to developing countries but there is some disagreement as to how to

set them up. Domestic "ownership" and local content development will also accelerate the ICT revolution in developing countries. Finally, those countries should explore and take advantage of the potential complementarity between ICT and financial services.

High Speed Access

83. In his second presentation on **High-Speed Internet Access by Satellite: Is It the Great Equalizer?** Dymond noted that his presentation was a primer on developments in the use of satellite—in particular Very Small Aperture Terminals (VSATs)—for Internet service provision, and related policy issues. With the general growth of wireless access technologies, the traditional hope for satellite technology – that is its 'go-anywhere' qualities that would bring a massive and beneficial VSAT market into being for developing countries – has hardly been fulfilled.

84. In the case of Internet and ICT access, however, there is a real potential of VSATs to provide equal access to high-speed communications for urban and rural users, and by that narrow the 'digital divide'. Through the roll-out of new low cost VSAT-based Internet services in the United States, Latin America and major Asian markets, the technology is becoming available at a price comparable to earth-bound technology and affordable to consumers. On the back of this, VSATs could bring significant opportunities in lower income markets, rural areas and ICT programs, including public kiosk-based Internet access, distance education, tele-health, e-commerce and cost-effective information delivery.

85. In fact, in many developing countries, satellite technology will be the only means by which significant portions of the population can obtain high-speed Internet connectivity. For satellite-based systems to fulfil this role, policymakers must create an enabling environment in which satellite technology has a chance to succeed. Key policy issues that must be tackled include promoting telecommunications privatization and competition, expanding the scope of universal service/access policies to incorporate Internet access, and reducing regulatory barriers to VSAT adoption. The latter include high licensing fees for operators and for individual VSATs, restrictive policies such as a 'Closed Skies' policy whereby service providers are required to use only locally owned satellite capacity when providing VSAT services and cumbersome red tape.

86. Another alternative whereby policymakers can encourage Internet and ICT access to be supplied economically outside the main urban centers is by allowing operators to bundle voice and Internet together. Some operators, especially competitive new entrants may find it economic to offer services to small and medium enterprises (SMEs), farms, institutions and public access points in one package. The benefits to non-urban and remote areas from recent developments and trends in satellite technology for delivery of Internet and ICT services could be significant. Realization of the opportunities, however, requires policymakers to consider some important issues. If these are addressed in an enlightened fashion, enabling the benefits from innovation to be widely applied, satellites could finally be poised to fulfil an important role in helping to bring Internet access to many areas and communities which would otherwise be left behind by the 'digital divide'.

87. In the **discussion following** Dymond's presentation, one participant wondered whether VSATs might have only limited applicability in light of the extremely high fiber and cable density in many parts of the world. Dymond responded that fiber and cable traffic does not affect getting connected via VSATs. In fact, it is precisely its ability to leapfrog over traditional ICT infrastructure that makes VSATs such a promising tool for distributing Internet and data to remote and less developed areas. Rapid technological developments that are bringing costs down make it all the more likely that VSATs will serve as the great equalizer of ICT access by providing high-speed Internet access via satellite. In particular, the development of high-speed satellites means that VSATs will be able to reach a large number of people and provide them with increasingly affordable Internet access in the near future.

88. In response to an inquiry, Dymond pointed out that there are three main components in the cost of establishing Internet access via VSATs. They are: (i) the central hub, which costs about US$1 million and must be shared by all users, (ii) the cost of the VSAT terminal, which costs as little as US$1,000, and (iii) user fees that vary according to intensity of use. This means that if there are 1,000 users, establishing Internet access via VSAT, the cost can be as low as $2,000 per user. Furthermore, costs are declining sharply as a result of continuous technological developments.

89. Dymond agreed with the participants that restrictive government policy was inhibiting the spread of the VSAT technology in many developing countries (e.g. high import duties on equipment). A pro-active approach to providing Internet access to remote areas via satellite, such as those taken by the state government of Western Australia, can greatly expand access. He also shared the opinion of many participants that it would be beneficial for developing countries to set up regional ISP exchanges in order to avoid routing even intra-regional Internet traffic through the U.S. In response to a question, Dymond noted that VSAT could operate with both Low Earth Orbit (LEO) and Geostationery Earth Orbit (GEO) satellites although the costs of operating with the LEO satellites still remain too high to be practical.

Experiences in ICT Development in the Region

90. **Mr. J. A. Chowdhury, PortalPlayer, India**, gave a presentation on ICT developments in India. Chowdhury outlined the competitive advantages of India, which has become a global force in ICT, particularly software, over the last decade. Many economists have pointed to India as a classical example

of how ICT can accelerate economic growth in developing countries. India's competitive advantages in this sector include a large economy and a growing domestic economy, strong recent macroeconomic performance, stable political and legal systems, rapid approach to globalization since the early 1990s, availability of human resources, good educational infrastructure, adequate and improving ICT infrastructure, and time zone advantage. Chowdhury focused on human resources, good educational infrastructure, and the economic reforms of 1991-92 as the key ingredients of India's software boom.

91. According to Chowdhury, India already had no less than 340,000 employed software professionals as of March 2000. This number is likely to grow further to 2.5 million by 2008. India also produces 122,000 engineers every year, of which 73,000 are in the ICT area. In addition to this large stock of ICT-capable human capital, the fact that a large segment of the population has been educated in English also works to India's advantage. At the same time, had India remained the closed and autarkic economy that it was before the 1991-92 reforms, it is highly unlikely that India would have experienced its ICT revolution.

92. What is often ignored in discussions about India's success is that 'high quality' has been the key focus of ICT development. India's ICT sector simply could not have grown as fast as it has without establishing a reputation for quality, performance and reliability among foreign clients. Many 'Fortune 1000' companies rely on leading Indian IT service companies, and many tech giants such as Sun and Microsoft are using India as a research and development base. India is home to 18 out of 34 SEI CMM Level 5 companies worldwide. Out of the top 300 software companies, 170 have acquired ISO 9000 certification. The output of India's IT software and services sector has reached around $9 billion in 2000, and is expected to accelerate further to almost $90 billion by 2008. India has also managed to complete the transition from the low-end IT consulting to the high-end IP development.

93. Chowdhury noted that India's strategy for sustaining high ICT growth in the future comprises several main elements. They include (i) high quality physical infrastructure (including technology incubation labs), (ii) high quality and scalable educational infrastructure, (iii) good financial infrastructure (VC/angel funds, etc.), (iv) cost-effective and high bandwidth data-communication infrastructure, and (v) the creation of a large domestic market. He concluded his presentation by expressing confidence that Indian software companies are well positioned to continue to provide products to global customers in less time and at lower costs.

94. In the **discussion following** Chowdhury's presentation, a participant inquired about the cost of IT education in India and the availability of private sector education. Chowdhury responded that the government heavily subsidizes tuition fees, even for the top IT schools. Although government provides most of IT education, it has allowed the private sector to set up engineering schools. Even for private schools, however, the government regulates tuition fees. In response to another question, Chowdhury explained that Indian Institutes of Technology (IITs) teach general science and technology, whereas the newer IITs have a more practical IT-specific curriculum.

95. He also emphasized that opening up and liberalizing the economy have been crucial to India's success with ICT. Had India remained a closed economy with high barriers to entry, it is doubtful whether India's ICT sector would have achieved the success that it has. In terms of bandwidth, the government is encouraging investments in fiber optic network by allowing free right of way and providing telecommunication opportunities to investors. One participant added that fiber optic investors also benefit from one-stop investment service, which means they do not have to deal with multiple government agencies.

96. In response to another inquiry, the speaker argued that Indian-type transition toward higher stages of ICT (i.e. intellectual property creation) would be possible in any developing economy as long as there was a pool of talent and a sound policy environment. The government is also cooperating with the private sector to set up IT kiosks and other means of providing IT access for the common people. India's comparative advantage is in software but lags behind in hardware due to its general comparative disadvantage in manufacturing. Absence of high-speed telecommunication links and high import barriers had been the primary obstacles against ICT prior to its economic liberalization and reform since the early 1990s.

97. **Dr. Dong-pyo Hong, Korea Information Society Development Institute (KISDI)**, spoke on the **ICT sector in the Republic of Korea – Its Recent Performance and Future Policy Directions**. He started off by saying that perhaps more than any other developing country, Korea is caught up in the midst of an ICT revolution. Penetration rates for PCs, Internet and mobile phones are among the highest in the world. Furthermore, ICT products account for a large and growing share of Korea's industrial output and exports.

98. The total output of the ICT sector, comprising the hardware, software and service sub-sectors, reached around 130 trillion won in 2000 and grew at an annual rate of almost 20 per cent during 1997-2000. A notable characteristic of Korea's ICT industry is its heavy bias toward hardware as opposed to software and services, reflecting Korea's comparative advantage in manufacturing. Furthermore, the production of components accounts for roughly half of its total ICT output. ICT products have served as the main engine of growth in the Korean economy's recent recovery from the financial crisis of 1998.

99. In terms of the government's role in ICT development, the Korean government established "Cyber Korea 21" in March 1999 aimed at creating the framework for a KBE that will improve national competitiveness and the quality of life. Three key policies have been undertaken to achieve this goal: (i) strengthening information infrastructure, (ii) improving national productivity by utilizing information infrastructure, and

(iii) promoting new ICT businesses. The government is also pushing ahead with deregulation and market liberalization, especially in the telecommunications sector. Another liberalization initiative is a more favorable policy orientation toward FDI in the ICT sector. Furthermore, the government is involved in promoting R&D in core ICT technologies to increase the localization rates of ICT products, strengthen human resource development and foster venture capital companies.

100. According to Hong, the Korean economy faces unprecedented challenges of transforming itself into a KBE. In spite of impressive achievements in infrastructure development and ICT hardware sector, efficient use of ICT remains elusive. A well-established network and hardware system may be a necessary condition, but it is not necessarily a sufficient condition for a KBE. As Brynjolfsson and Kahin (2000)† point out, digital economy (i.e. KBE) is not a physical concept, but a socio-economic concept.

101. The Korean economy has recently experienced high growth and low inflation. Some observers attributed such performance to the possibility that the Korean economy might be entering the New Economy. However, many domestic and foreign research institutions seem to share the view that recent economic performances can be attributed to favorable cyclical factors. Hong concluded that social and economic systems need to be reformed before one can meaningfully talk about a knowledge-based Korean economy or improvements in Korea's economic efficiency through effective use of ICT.

102. In the **discussion** that followed Hong's presentation, there was a consensus that content development is what drives the demand for ICT services. A participant asked whether lack of English fluency was a barrier to promoting ICT use in Korea and what policies the government is pursuing to reduce the digital divide in Korea. Hong responded that although English is a problem, all Koreans receive 6 years of English as part of their formal education. Furthermore, the government and content providers try to keep software as user-friendly as possible to ensure broad use and access. Moreover, many content and portal services are in the Korean language. Furthermore, the government provides free IT education for soldiers, women and the disabled.

103. Hong noted that a large number of teenagers use the Internet for playing games. Another potential area of Internet applications is education, given the enormous importance Korean parents attach to their children's education. In response to an inquiry, Hong responded that cable TV plays only a minimal role in Korea's ICT infrastructure. Another participant said that it was interesting that although the Korean government does everything to provide a strong ICT infrastructure, the private sector's use of such infrastructure remains very limited. In this connection, she asked whether the government had any incentives or policies to promote the private sector's ICT use. Hong replied that promoting competition and opening up markets are the main things the government can do, since firms can potentially use ICT as a tool that gives them a competitive edge. Inducing ICT use by economic agents requires a fundamental change in the general public's mentality and mind-set. For example, the public must be convinced that a digital signature is just as valid and safe as a written signature.

104. According to Hong, financial services and telecommunications are two examples of industries where ICT can significantly improve productivity and efficiency. The Korean government provides tax exemptions and other financial assistance for e-commerce. There have been some success stories among Korean venture capital companies, which the government is trying to promote, especially in the hardware sector. However, Kosdaq (Korea's second board, primarily for tech firms) has slumped badly in 2000 and venture capital companies are currently struggling. Finally, the government is focusing on India as a model to promote Korea's software sector, which lags far behind its strong hardware sector.

105. **Ms. Rinalia Abdul Rahim, National Information Technology Council (NITC), Malaysia,** spoke on **ICT Development Strategies: the Malaysian Experience**. According to Rahim, the transformation of the workforce alone will not be sufficient for any nation to survive and compete effectively in the Information Age. What is required is a qualitative transformation of society and nation. This transformation begins with the human factor where people are given the opportunity to improve themselves through learning. Driving the transformation is information made available by ICT to the masses, as well as the knowledge that internalized information creates.

106. Rahim pointed out that to create and manage a national environment of high-level information intensity, several things would need to be in place. First, people must be empowered to make good use of self-advancement opportunities. Towards this end, ICT acculturation for the people is essential; nationwide information literacy must be cultivated; and people must be prepared to learn, to unlearn and to relearn. Second, good infrastructure (both hard and soft infrastructure) is required as poor infrastructure begets an uninformed and unskilled population that lacks the capability to improve themselves or the overall development environment. Third, knowledge workers must be created on a large scale to nurture and amass intellectual capital, and to serve as the vehicle for the qualitative transformation of the nation and society. Fourth, effective planning mechanisms are required if society is to gain optimal control over the trajectory of social change that will come through the wide application of new technologies.

107. Rahim outlined the critical success factors of Malaysia's ICT-based development. They include: (i) a shared national vision: a vision that focuses the nation into achieving a common goal or objective; (ii) strong political will: a strong gov-

† Brynjolfsson, Erik and Brian Kahin (2000), *Understanding The Digital Economy: Data, Tools and Research,* The MIT Press

ernment backing in driving ICT acculturation; (iii) open technology architecture: an acceptance of best-of-the-breed technology regardless of country of origin; (iv) tri-sectoral smart partnerships: a win-win-win national mobilization strategy where not only the interests of business and government are being served, but also the interests of the community as well; (v) dynamic institutional framework: the ability of the government, through the NITC, to change quickly according to changing needs; (vi) leading and learning by doing; and (vii) strong macroeconomic fundamentals: a foundation that supports and funds the development of ICT programs.

108. In the **discussion following** Rahim's presentation, a participant wondered about the amount of resources the Malaysian government allocates to ICT development and the response of the Malaysian private sector to the government's ICT initiatives. The speaker replied that ICT's share of the government budget is typically 5-10 per cent and it has grown rapidly over the past decade. Furthermore, the private sector response has been very good, and this can be attributed to the extremely consultative approach adopted by the government.

109. In response to an inquiry about the tripartite (i.e. government, private sector, community) approach to ICT development in Malaysia, Rahim answered that initially the community was not involved but its exclusion created a sense of superficiality and artificiality. As such, the community was brought in and encouraged to participate actively in formulating ICT strategy. The tripartite remained very much an evolving model with a lot of experimentation and flexibility. In response to another inquiry, Rahim pointed out that wired buses and boats bringing on-line access to remote areas of the country were among many examples of community-based seed projects in the ICT area. [See the website **www.nitc.org.my**, which gives fuller details about those projects and their funding levels].

110. Commenting about the Multimedia Super Corridor (MSC) project, Rahim noted that the project was still very much in its infancy and more concrete results are expected by 2005. That is, the MSC will take some time to meet its ambitious expectations and it is too early to pass judgment on its success or failure. The impact of the Asian financial crisis on the MSC funding has been minimal since this is a top-priority project. In response to an inquiry, Rahim stated that the government provides fiscal privileges and concessions to MSC-status companies and it is hoped this will boost private sector ICT activity. She also said that ICT has not yet had a significant negative impact on Malaysian unemployment. In connection with using ICT to reduce poverty and avoiding a digital divide, Rahim emphasized that ICT development is not simply a matter of giving everybody a PC and connectivity. Formal and informal education – in terms of literacy, knowledge of English, and ability to process information effectively – remain critical to using ICT productively to accelerate growth and development.

111. **Mr. Gus Lagman, Philippine Computer Society**, gave a presentation on **ICT Developments in the Philippines**. Lagman noted that while the private sector is the leading user of ICT in the Philippines, government initiatives on computerization go as far back as 1969. Most recently, in 2000 the government announced IT21, a 10-year national IT plan that aims to turn the Philippines into a knowledge and e-service in the Asia-Pacific by 2010. GISP, or Government Information Systems Plan, is an integral component of IT21.

112. The underlying principle of the Philippines' national ICT strategy is that ICT development will be led by the private sector. Government intervention will be limited to what is essential and manifested in a manner that is non-discriminatory, flexible, and technologically neutral. More specifically, the role of the government is to provide a favorable policy environment and become a leading-edge user to jump start e-commerce and encourage its use in the private sector. Information Technology and E-Commerce Council (ITECC) has been set up to oversee the implementation of IT21 and its successor plans.

113. The penetration rates of mobile telecommunications and Internet remain quite low, although both are growing very rapidly. Human resource constraints against ICT development loom large due to lack of skilled workers and the emigration of skilled workers to developed countries. More resources have to be allocated to human resource development in order to realize IT21. In terms of creating an appropriate legal infrastructure, the Electronic Commerce Act was enacted in June 2000. The act accords legal recognition to e-documents and e-signatures. Looking ahead, there are plans to establish a Department of ICT as well as a private sector foundation for ICT to further promote the growth of ICT.

114. In the **discussion following** Lagman's presentation, a participant asked about the quantitative level of government funding for the ICT sector. Lagman replied that government funding remains very limited. Another participant pointed out that although income tax holidays for ICT firms can boost the ICT sector, the New Economy could present problems for tax collection due to difficulties in measuring output and revenues. The speaker agreed about the difficulty of measuring the New Economy's revenues, and that the income tax holidays were designed primarily to encourage ICT start-ups and other first movers.

115. In response to a question about a proposed government agency for ICT, Lagman pointed out that the new Philippine government is taking an active interest in promoting the ICT sector. He also stated that the notion of setting up a new department of ICT with its own well-defined budget is gaining momentum. He indicated that the new department does not involve any additional bureaucracy but will simply involve a realignment of existing bureaucracies. The private sector ICT foundation does not require too many resources because it focuses only on collaborative efforts such as market research and research on emerging technology.

116. Responding to an inquiry about the training program for ICT professionals, Lagman said that the government obtained support from private sector firms such as Cisco, Sun, Oracle

and Microsoft, which provided courseware and reduced certification fees. In addition to training the trainers, the program aims to use existing public school facilities for ICT training. Lagman also noted that the Philippine workforce is highly creative and this provides a comparative advantage for the country in the New Economy. Finally, telephone density in the Philippines has risen sharply in recent years and this is primarily due to deregulation.

117. **Dr. Shanker Sharma, Member of the National Planning Commission (NPC), Nepal,** gave a presentation on **Nepal's Policies and Strategies for ICT Development**. According to Sharma, since spatial and temporal distance is meaningless in the age of the digital economy, information technology can be a strong instrument for mitigating Nepal's geographical disadvantages, namely being both landlocked and remote. Nepal's entry into the information age was delayed by many factors. Realizing the fact that IT has tremendous potential for Nepal, however, the government has lately put major thrust on tapping the Nepalese IT potential for all round national development by bringing IT into the forefront of economic activities.

118. ICT remains underdeveloped in Nepal, in terms of infrastructure, ICT service penetration, output of hardware and software products, human resources development, among other things. To accelerate ICT development in the country, the government has recently brought forward a national IT policy. The policy will help to achieve the following objectives: (i) to make information technology accessible to the general public and increase employment through this means, (ii) to build a knowledge-based society, and (iii) to establish knowledge-based industries.

119. To achieve these objectives, the government intends to adopt the following strategic approach. First, the government will act as a promoter, facilitator and regulator. Second, competent human power will be developed with the participation of both the public and the private sectors for the sustainable development and extension of information technology. Third, domestic and foreign investment will be encouraged for the development of information technology and related infrastructures. Fourth, e-commerce will be legalized. Fifth, information technology will be used to assist e-governance. Sixth, information technology will be applied for rural development. Seventh, computer education will be incorporated in academic curriculum starting from the school level. Eighth, export of services related to information technology (software and hardware) will be increased.

120. Sharma noted that the government has also formulated an action plan to implement the national information technology policy and fulfill its objectives. The primary components of this action plan are to (i) promote the participation of private sector players in infrastructure development, (ii) take other measure to accelerate infrastructure, (iii) promote human resource development, (iv) disseminate information technology, (v) promote e-commerce, and (vi) strengthen the institutional framework.

121. In the **discussion following** Sharma's presentation, a participant asked why fixed-line telephony was the only major ICT service not to be deregulated and liberalized. Sharma responded that revenue considerations were paramount in this regard. He also stressed that although the overall levels of ICT remained low in Nepal, they were growing extremely rapidly. He noted that all ISPs are local companies, which have developed the appropriate capabilities and skills. Thousands of web sites have sprung up in a very short period of time.

122. In response to an inquiry about certification and standards of IT training institutes, Sharma explained that quality control has to remain but foreign affiliation and accreditation are possible solutions. Although educational reform in Nepal has produced more private schools with better IT facilities, this entailed the danger of aggravating the digital divide, particularly between urban and rural areas. If resources were available, it would be better to incorporate IT education within the general education system. Sharma also explained that Nepal's short-run comparative advantage in ICT lies in call and service centers, which rely on high-school graduates with three months' training. In the long-run, Nepal hoped to move into sub-contracting software development as well.

Regional and Global Perspectives on ICT Development

South East Asia – ASEAN Initiatives

123. **Dr. Emmanuel Lallana, e-ASEAN Task Force**, gave a presentation on the **e-ASEAN Initiative: Regional e-Commerce**. Lallana introduced the e-ASEAN initiative to the participants by explaining that its mandate is to develop a broad and comprehensive action plan with the objective of evolving an ASEAN e-space, and to develop competencies within ASEAN to compete in the global market. The task force is an advisory body to ASEAN with representatives from the private and public sector, and reports to the ASEAN Economic Ministers and ASEAN heads of state and governments.

124. There are five main elements of the ASEAN Framework Agreement on ICT Products, Services and Investment: infrastructure for AII (ASEAN Information Infrastructure), e-commerce, common ICT marketplace, capacity building and e-society, and e-government. The promotion and development of an ASEAN e-space will both contribute to and benefit from greater intra-ASEAN economic integration and cooperation. This, in turn, will improve the attractiveness of ASEAN as an investment destination for foreign capital.

125. e-ASEAN seeks to enhance interconnectivity and interoperability of national information infrastructures within ASEAN and develop ASEAN content beginning with cooperation in digital libraries and tourism portals. e-ASEAN aims to expedite an e-commerce enabling regulatory and legislative framework in the region. Building a common ICT mar-

ketplace involves liberalization commitments for both goods and services under the ASEAN Free Trade Area (AFTA) framework. Capacity-building efforts include mutual recognition of qualified standards, promoting general awareness and knowledge, and developing HRD programs in school and community. E-government provides a channel for ASEAN countries to improve the provision and delivery of government services to ordinary citizens in the region.

126. In the **discussion following** Lallana's presentation, a participant noted that there seems to be some conflict between the borderless, globalizing economy on the one hand and the formation of regional blocs on the other, especially when information power was weakening the nation-state. Lallana answered that the nation-state will remain dominant in some areas despite the new technology and that, in any case, regional blocs will complement rather than replace the nation-state. Furthermore, regional ICT plans are meant to complement rather than substitute national ICT plans. In this respect, creating a seamless e-market of 500 million in the ASEAN region can increase the attractiveness of all the individual constituent member states as ICT investment destinations.

127. It was also noted that e-learning could help promote education throughout the region. E-learning is a great educational equalizer in that it opens up educational opportunities in many areas hitherto deprived of access to education. The speaker also emphasized that he was strongly in favor of open source, non-proprietary technology since this would improve the accessibility of technology for developing countries. In response to a comment from a participant, Lallana noted that although some ICT MNCs might lose from the e-ASEAN project, others stood to gain, so he did not expect systematic opposition from ICT MNCs to the project.

128. Lallana again agreed with participants about the desirability of open-source systems for developing countries. He also called for a regional ASEAN policy on cross-recognition of digital signatures and expressed his hope that the market, rather than government bureaucracy, will bring about the convergence of technical standards. A good example of market-driven convergence is GSM roaming for mobile phones. The e-ASEAN project is scheduled to hold a forum on ISP soon, and another one on cross-recognition of digital signatures. He also noted that multilateral financial institutions are considering providing assistance for ICT projects throughout developing countries.

East Asia – The Impact of New Economy

129. **Dr. Brahm Prakash, Assistant Chief Economist, Economic Analysis & Research Division, Economics & Development Resource Center, ADB** gave a presentation on **Emerging Trends and Challenges in ICT Development**. Prakash noted that the focus of his presentation was on global contemporaneous policy-relevant issues. In this connection, important issues to consider are the impact of New Economy-related financial developments in the United States on East Asian economies, as well as the role of ICT in the global trading system. That is, ICT will have both financial and real impacts on East Asia.

130. There are essentially two types of industrial organization or production systems. The older, more conventional vertical production system, characterized by a lot of internal non-market information communication, was giving way to a newer horizontal production system, characterized by market-based price, information and communication. The global production system as a whole is moving from the former to the latter under the influence of ICT. Not only is ICT itself becoming more horizontal, but more significantly, horizontal systems are spreading to other industries and the government. The inescapable implication is that bureaucratic decision-making is giving way to market-based decision-making, boosting efficiency and reducing costs.

131. A key side-effect of such developments is the obsolescence of a large number of bureaucrats and managers, sunk capital costs and indeed entire production systems characterized by outdated technologies, organization and skills. The flurry of mergers and acquisitions activity, downsizing and structural re-organization are testament to the on-going upheaval brought about by the replacement of vertical production systems with horizontal production ones and the replacement of old with new technology. NASDAQ and other financial markets not only incorporate past obsolescence but also impending obsolescence associated with emerging technological developments.

132. ICT has been a driving engine of global trade, especially since the Asian crisis. As such, it has been instrumental to Asia's V-shaped recovery. This is especially true for the hardware sector, in which Asia leads the world, rather than the software sector, which remains US-dominated. ICT changes skill utilization and under ICT, jobs can be replicated anywhere as long as the skills are available. For example, many back-office functions of big US firms are currently performed in low-cost India.

133. Prakash noted that a top priority of public policy must be to continuously invest in and upgrade the telecommunications infrastructure. At the same time, ICT will help to restructure the public sector from ossified bureaucracies into more efficient organizations. In summing up his thoughts, Prakash stressed that there is a need to de-mystify ICT by understanding its impact on the nature of production system and decision-making. ICT restructures and reorganizes both the Old and the New Economy. The end result of such restructuring and reorganization will be more efficient self-organizing and learning organizations that will make possible a whole new range of productive applications. The emergence of such organizations is ultimately where the true promise of ICT lies for real sector productivity improvements and by extension, growth and developments.

134. In the **discussion following** Prakash's presentation, a participant wondered about the organizational motivation and self-esteem of workers in the increasingly out-sourced New Economy as well as the role of nation–states. He agreed that ICT will affect workers not only in their capacity as workers but also as human beings, and that alienation may grow as a result of loosening organizational identities. Although there is no easy solution to these kinds of problems, they are certainly worth thinking about. In terms of ICT's impact on the nation–state, the roles may become too big for some yet too small for others. In the former case, decentralization is required but regional and even global cooperation is called for the latter case

135. An important lesson of the New Economy, in which production systems change very rapidly and innovation lags last months rather than years, is the need for policymakers to open up to the outside world and take advantage of global opportunities. East Asia has grown fast in this way in recent decades, but the potential for growing fast by opening up further has, in some aspects, become even greater under ICT. Therefore, ICT renders it imperative for developing country policymakers to pursue outward-looking rather than inward-looking policies.

136. In response to an inquiry, Prakash pointed out that the final packaging of ICT products is becoming concentrated closer to the user markets. For example, Malaysia handles a lot of packaging for Asia-Pacific while Mexico and Ireland do the same for the US and European markets, respectively. The production of parts and components, however, remains dispersed and international trade in them continues to grow rapidly. In response to an inquiry about whether SMEs will become more important relative to big companies in the New Economy, Prakash responded that this is unclear. On the one hand, big brand names will remain important in terms of marketing and distribution, especially consumer trust and loyalty. On the other hand, SMEs are set to play a bigger role in the manufacturing process.

ICT Development Strategy: Recommendations by the Participants

137. In the last session, the participants were split in four groups to explore various aspects of ICT development strategy. The first group focused on the broader perspective of ICT and development. The second group examined the business and regulatory framework needed for ICT development. The third group explored the physical ICT infrastructure that needs to be put in place before an economy can begin to enjoy the benefits of the ICT revolution. The fourth group dealt with the human resources requirements of the New Economy. There were resource persons attached to each group, and their role was to facilitate and moderate group discussion and also to interact with the group as necessary. Each group presented their main findings on the last day of the workshop.

138. The first group of participants gave a presentation on **ICT and Development**. The group started its presentation by noting that the use of the open network has led to more efficient inventory management and greater outsourcing and customization of products and services. This has created new opportunities for export orientation and FDIs. ICT improves competitiveness, particularly of SMEs, by lowering fixed costs and barriers to entry. Although there is a risk that a 'digital divide' will emerge, ICT can play a leveling role, giving poor countries and poor people access to markets, information, and other resources that would otherwise be inaccessible. ICT can potentially alleviate poverty in significant ways by contributing toward broad-based growth in income and employment. For example, India's software export boom has contributed to the country's GDP growth rate.

139. The second group of participants gave a presentation on **Business and Regulatory Framework**. The group began its presentation by noting that ICT is now a priority development agenda of many developing countries. Governments are seeking to actively promote the participation of the private sector either through joint partnerships or provision of rules and regulations that are conducive to private sector investment. Key components of the business and regulatory framework include: (i) governance and policy, (ii) law and regulation, (iii) financing, and (iv) management. The group emphasized that deregulating and liberalizing of the ICT sector, especially the telecommunications market, was of paramount importance in getting ICT off the ground in developing countries. It is desirable to do away with licenses and controls, provide investment incentives and reduce red tape. The end result must be an efficient and transparent regime.

140. In the **discussion following** the first two group presentations, one participant noted that ICT could improve not only public governance but corporate governance as well. Another point raised in the discussion was that a key focus of the business and regulatory framework must be to encourage the development of ICT infrastructure. It is also better for the government to provide a sound, broad enabling environment for the ICT sector rather than try to micro-manage the sector through subsidies, soft loans and other mechanisms, which in many cases in the past have failed. While governments should provide overall leadership, they should rely as much as possible on the private sector for ICT development. Although all participants agreed on the need for telecommunication liberalization, they also felt that this could be practically difficult due to the importance of telecommunications sector as government revenue source. Some parallel measures to overcome the revenue implications must be considered for the short term.

141. The third group of participants made a presentation on **Physical Infrastructure**. The group first outlined the various services that require infrastructure support and the available telecommunication technologies. Main infrastructure-related components of the work environment include un-interrupted power supply as well as international connectivity. These are especially required to support a science and technology park. Supportive government policies, quality of life and one-window facilitation are additional elements of the work environment. Although an efficient physical infrastructure is essential

for ICT, this does not reduce the significance of legal, economic and financial infrastructure. Enabling legislation pertains to pricing regulations, licensing and consumer protection. Infrastructure ownership pertains to liberalization as well as monopoly and competition. The inter-connect (basic international Internet network) regime must be clear and pro-competitive. In the area of choice of technology (e.g., VSAT vs. Optic Fiber), policymakers should take into account their relative strengths and weaknesses, and also the purposes and locations while making selection to suit their country specific requirements, since there is no universal model that suits every country. It was noted, however, that VSATs could be more affordable and useful to rural communities, although they have less flexibility and shorter life (approximately 15 years). The group also added in their recommendations that donors should assist low income countries in the region in the area of strengthening information infrastructure and technology related public goods (e.g. research and development, pilot schemes, etc.).

142. The fourth group of participants presented their views on **ICT and Human Resources Development**. The group noted that the objective of ICT and human resource development must be to develop and nurture human resources that contribute toward the knowledge base and competitive value addition. There is a two-way symbiotic relationship between ICT and human resource development (i.e., education and training). While ICT requires technically skilled workers with the appropriate education and training, it is also true that ICT can contribute towards improving quality and access to education in general, which, of course, is necessary for economic growth and social development. ICT education in general is also important. The group concluded that most developing countries faced a severe shortage of ICT personnel and governments must pay more attention to developing ICT skills, both through the general education system and specialized training institutions. It is also desirable to get the private sector involved in this effort.

143. In the **discussion following** the last two group presentations, one participant asked about why all Internet traffic has to go through the United States and the inter-connect regime between the United States and developing countries. The response to it was that it was largely due to historical reasons, in that the United States built up the backbone of the commercialized Internet network. Furthermore, each country should design its own ICT education and training strategy according to its own needs and objectives. Both formal and informal ICT education for primary school students can help familiarize the general public with ICT from an early age. There was, however, a risk that unequal access to education can worsen the digital divide within as well as across countries.

Concluding Session

144. Most participants indicated that they learned a great deal about the relationship between ICT and development from the presentations by the resource speakers, as well as the numerous interactive discussions. The participants noted that in addition to being a valuable learning experience, the workshop had brought together participants from many countries. The time spent in and out of class made for lasting bonds and contacts. They also expressed their appreciation to the ADB, ADB Institute and TCD for organizing the workshop.

145. **Adhikari** congratulated the participants and encouraged them to network with each other as well as the resource persons. He also expressed his hope that the participants would consider organizing in-house workshops on their return to their home institutions to disseminate the knowledge they acquired during the workshop. He suggested that the participants could start an ICT e-mail group and stay in touch and continue sharing ideas. Adhikari finally thanked the TCD and ADB officials for their generous support. **Mr. Jeffrey Liang, EDRC, ADB**, also offered his congratulations to all the participants and expressed his satisfaction that the workshop had been a great success in terms of both learning and networking.

146. Finally, **Mr. Lim Eng Hoe, Deputy Director, TCD,** thanked all the participants and resource persons for their contributions, and expressed his hope that the workshop would contribute toward **bridging the digital divide in Asia**. The participants were then awarded certificates for successful completion of the workshop.

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