# Transforming Digital Divide into Digital Dividend:

# South-South Cooperation in Information-Communication Technologies

BY K.J. JOSEPH

*Countries in the South are making widespread use of information-communication technologies (ICTs) adopted from the North, but have largely neglected their domestic production. To reduce this technological dependence, countries should integrate both production and use and draw on the substantial ICT capabilities existing in the South through bilateral, regional and inter-regional cooperation. Such broad pooling of resources would achieve economies of scale and minimize risks, according to K.J. Joseph, Professor at the Centre for Development Studies, Trivandrum, Kerala, India. He is also Visiting Senior Fellow, Research and Information System (RIS) for Non-Aligned and Other Developing Countries, New Delhi.*

THE ONGOING 'REVOLUTION' in Information-Communication Technologies (ICT) is generally perceived as capable of bringing about major socio-economic transformations in the South. Improved uses of ICT can enhance development efforts through — for example — e-commerce, e-finance, e-governance and e-tourism. These possibilities and the need for South-South cooperation in ICT were underlined at a special ICT Round Table held during the recent High-Level Conference on South-South Cooperation in Marrakech, Morocco, convened by the Group of 77 (for details see http://www.g77.org/marrakech/RT-ICT.htm).

Too often, however, initiatives and strategies of developing countries that aim to harness ICT for development

place them in perpetual *attente* — waiting for technology transfers from the North and working to attract transnational corporations to their shores. Such an approach, it has been argued, ignores the extent to which technological capabilities have been built in the South over the past two decades and the opportunities to build on those capabilities through mutually beneficial cooperation.

## ICT AND THE DEVELOPING WORLD

In his analysis of capitalist business cycles, Schumpeter (1939) shows that spurts in human progress have been associated with technological innovations. The first industrial revolution and related economic growth between the 1780s and the 1840s was associated with major innovations in textiles and related areas. Innovations in steam power and railways provided impetus between the 1840s and the 1890s. Electricity and steel were at the centre stage of human progress during the 1890s to the 1940s. Innovations like mass production, especially of automobiles and synthetic materials, have been instrumental in economic growth since the 1940s (Freeman and Soete, 1991). Now we are at the threshold of the era of Information-Communication Technologies, which are generally seen as the technology of the new millennium.

These new technologies are playing an increasingly important role in improving the competitiveness of enterprises. They help in reducing transaction costs, provide opportunities to increase exports, open up wider markets (thus promoting diversification and employment opportunities), increase management efficiency and enhance flexibility in production. The technology is so ubiquitous that ICT is often considered a General-Purpose Technology (GPT) characterized by network externalities, low fixed costs and relatively low entry barriers for newcomers. However, ICT-induced productivity and growth still remain a phenomenon of developed (Organization for Economic Cooperation and Development) countries and developing countries have yet to catch up, giving rise to a new digital threat to development (Kraemer and Dedrick, 2001; OECD, 2000). Many developing countries have initiated policy measures and institutional interventions to harness the new technology as a shortcut to prosperity.

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Unlike earlier technological waves over which the Western world held monopolies, ICT capabilities are more diffused and Asian countries possess significant capabilities. Japan and South-East

Asian countries hold leading, internationally competitive positions in the manufacture of ICT goods and achieved high economic growth that led to increased ICT use domestically, and the recent emergence of China is well documented. While they have leading roles in hardware production, their success in developing an internationally competitive ICT software base has been limited. India, however, has emerged as a major player in the world market for software and services (Schware, 1987, 1992; Kumar, 2001a and b; Arora et al., 2001; Joseph and Harilal, 2001). Software exports from India have recorded a sustained annual compound growth rate of over 45 per cent during the last decade. Today many of the Fortune 500 companies outsource to software services in India in their attempt to harness ICT to enhance their efficiency and competitiveness.

While some Indian ICT firms focus on the low end of the ICT value, a large number of firms are operating in high value-adding activities and have built up substantial technological competence and capability (Joseph and Abraham, 2002). Positive results are also seen in value-added per employee, profitability and the net foreign exchange outflow of the software sector (Kumar, 2001a). India is also known for a number of ICT applications in e-governance and poverty alleviation, though its progress in ICT use so far has not been as remarkable as in ICT production. India's ICT

**TABLE 1: NETWORK READINESS INDEX AND RANK OF SELECTED COUNTRIES (2002-03)**

| Name | NRI Score | NRI Rank | PCI |
|---|---|---|---|
| Chile | 4.14 | 35 | 9417 |
| South Africa | 3.94 | 36 | 9401 |
| India | 3.89 | 37 | 2358 |
| Latvia | 3.87 | 38 | 7045 |
| Poland | 3.85 | 39 | 9051 |
| Slovak Republic | 3.85 | 40 | 11243 |
| Ecuador | 2.6 | 75 | 3203 |
| Paraguay | 2.54 | 76 | 4426 |
| Bangladesh | 2.53 | 77 | 1602 |
| Bolivia | 2.47 | 78 | 2424 |
| Nicaragua | 2.44 | 79 | 2366 |
| Zimbabwe | 2.42 | 80 | 2635 |
| Honduras | 2.37 | 81 | 2453 |
| Haiti | 2.07 | 82 | 1467 |

Note: NRI = Network Readiness Index. PCI = Per capita Income at purchasing power parity.
Source: World Economic Forum and INSEAD 2003

boom has had adverse impacts on other sectors competing for skilled personnel (Joseph and Harilal, 2001), and ICT remains an enclave with limited backward and forward linkages.

In an index constructed to measure countries' readiness to enter the digitally networked world (Dutta et al., 2003), India ranked 37th among the 82 countries analysed (see Table 1).

Significantly, other countries ranked at comparable levels in the Index have per capita income three to four times higher than India's, while countries with per capita income comparable to India's were much lower in the Index — in the range of 75 to 82. India is not an isolated success story in the South, and its experience is being replicated in other developing countries, such as the Philippines, Morocco and Costa Rica. Analysis of how these countries managed to build up ICT capabilities might offer valid lessons for other developing countries in the process of harnessing ICT for development.

## ICT AND DEVELOPMENT

Studies have shown that inter-country differences in the rate of ICT diffusion and in the network readiness index are significantly related to the general level of socio-economic development as manifested mainly in per capita GDP, R&D expenditure and levels of human development (e.g., Kraemer and Dedrick, 2002; Dutta et al., 2003). These results tend to indicate that, to achieve ICT-induced development, developing countries will have to wait until they cross the intersection of high per capita income growth and human development. Thus viewed, developing countries are trapped in yet another vicious circle of low per capita income that leads to a low level of ICT readiness and ICT diffusion, resulting, in turn, in low per capita income and growth. Studies have shown a close correlation and significant relationship in different countries between levels of diffusion of old media (television, radio, telephone, newspapers) and new media (PCs, Internet, etc.) This finding suggests that "to them that hath, shall be given" and that ICT sector development depends much on growth in employment and income-earning opportunities in the developing world.

The contribution of ICT to development can be analysed at two different but interrelated levels: in terms of the growth of the ICT sector and the extent of ICT diffusion and use. The former refers to contributions to output, employment, export earning, etc., from the production of ICT goods and services, which are often more visible than those from use (Kraemer and Dedrick, 2001). The latter refers to ICT-induced development through enhanced productivity, competitiveness, growth and human welfare arising from use of this technology in different sectors of the economy and society. In a similar vein, the role of ICT in an economy can be conceptualized in terms of four main sectors (Wong, 2002):

1. ICT goods sectors, which create, make and move physical hardware devices

that process and display information (computers, consumer electronics, telephones, other information appliances);

2. Information content sectors, which create, make and move information (music, video, news, entertainment software, etc.);

3. Communications network sectors, which provide the enabling infrastructures (wired and wireless) to support transmission of information between ICT devices;

4. Informatization sector, which consists of economic use of ICT devices and information contents, either for consumption by household users or for production by enterprises in all sectors of the economy.

Recent literature on ICT and development focuses essentially on ICT use, and only in limited ways on ICT production and diffusion. Studies show that greater domestic availability of technology acts as a catalyst in the process of diffusion, as does demand (Stoneman, 1995), and that diffusion and production are complementary and need each other (Ernst, 2001). To the extent that income levels are important determinants of ICT use, there is no reason for countries in the South to forego the income-earning opportunities offered by ICT production. The limited integration of production and diffusion in the approach towards harnessing ICT for development is clearly evident from the policies of developing countries. In general, they focus on ICT infrastructure, personnel development and use in government, business and other sectors; this can be seen in a detailed account of ICT policies of countries in the Greater Mekong subregion (Joseph, 2004). Such neglect of ICT production is most evident in the Kuala Lumpur Declaration on ICT Policies and e-Strategies in Asia and the Pacific (see http://www.apdip.net/projects/2003/asian~forum/declaration). The Declaration dealt with all aspects of ICT diffusion in different sectors, but did not give ICT production the attention that it deserves.

An implicit argument in such an approach is that the needed hardware and software technologies are available off-the-shelf internationally at falling prices and that developing countries need only choose appropriately from the shelf without re-inventing the wheel. Many studies of technology and innovation in the 1960s implied that the core issue for the developing world was just one of choice and not development. The 1980s, however, saw a number of developing countries begin to build up substantial technological capability, instead of remaining passive adopters of Western technology (e.g., Fransman and King, 1984). The present lopsided approach of developing countries today that promote ICT use but neglect ICT production has the danger of perpetuating technological dependence, on the one hand, and foregoing opportunities for income and employment generation, on the other.

## ICT INDUSTRIES

In the US, where the macroeconomic benefits of the ICT revolution are already apparent, ICT industries accounted for

about 8.3 per cent of the GDP and nearly a third of GDP growth between 1995 and 1999; and the ICT industry, including telecommunications, employed 7.4 million workers, accounting for 6.1 per cent of total employment, according to the US Department of Commerce. ICT production also contributed to lower inflation rates since a growing proportion of economic output has been in sectors marked by rapidly falling prices, including declining prices of ICT goods.

Moreover, early entrants such as Singapore, Hong Kong, Republic of Korea, Taiwan, Province of China, Ireland and Israel have pre-empted many of these opportunities.

A closer look at the characteristics of the ICT industry reveals that the doors are not that firmly closed to newcomers. It's a multiproduct industry that offers ICT goods (consisting of consumer products and capital goods) and ICT services. The two types of ICT goods each include a large number of products that vary in technological sophistication, dynamism and investment requirements. Thus, there exists a wide range of points where newcomers could enter profitably into some product lines, depending on their technological capability, their ability to mobilize capital and the rise in demand for ICT goods. To illustrate the variety of products and entry points, ICT capital goods include medical equipment, control instruments and industrial equipment, computers and communication equipment. The subcategory of control instruments and industrial equipment, in turn, comprises test and measuring equipment, analytical instruments, special application instruments, automation equipment, process control equipment, power equipment and so on.

*Developing countries that promote ICT use but neglect ICT production risk perpetuating technological dependence and losing opportunities for income and employment generation.*

In countries like the Republic of Korea, Singapore, Finland and others, ICT industry has also become a major source of economic output, exports and job creation. However, it has been argued that ICT production is not necessarily an easy proposition for the countries in the South, given the present international structure of ICT production and the high entry barriers. Some industry segments — such as microprocessors, operating systems and packaged business applications — are almost closed, because standards are set by leading ICT players, mainly US companies such as Intel and Microsoft. Other segments of ICT industry are highly capital-intensive and scale-intensive and require specialized skills that only a few countries can hope to achieve (Kraemer and Dedrick, 2001).

Promoting the use and production of ICT calls for targeted policies, including those relating to trade and investment and to organizational innovation. Trade policy reforms, among others, play a dual role in promoting both use and production of ICT by operating from both demand and supply sides. From the demand side, one of the best ways to promote ICT use is to reduce or remove barriers to use. Lowering taxes and tariffs and dismantling non-tariff barriers could help promote demand and use through reduced prices and increased access. Trade policy reforms also can help ease domestic supply constraints and create a more competitive environment, leading to lower prices and better quality services and products, thus promoting the use of ICT.

Production of ICT goods essentially involves assembling a large number of components. Since no country can afford to be fully self-reliant in production of all these components, there is the need for appropriate trade policy reforms that ease the availability of required components and lower their costs.

The Information Technology Agreement of the World Trade Organization (WTO) that today governs global trade in ICT goods was not framed to take developing countries into account. Some ICT goods like radios and TVs that are important ICT goods for countries in the South have no place in the Agreement.

To promote ICT production, there is also the need for appropriate investment policies that a) encourage Foreign Direct Investment in joint ventures and subsidiaries, b) promote private sector investment, including small and medium enterprises (SMEs), by creating an appropriate climate and providing financial and other support. There is also a need to create information infrastructure, generate human capital and promote an innovation system. These are some of the important aspects to be considered in an integrated ICT policy and much could be learned and gained by countries in the South through sharing their experiences.

## BUSINESS PROCESSING OUTSOURCING

Recent developments suggest that the primary producing countries in the South have not benefited from globalization. As the United Nations Conference on Trade and Development (UNCTAD) points out, the decline and instability of world commodity prices and the resulting terms-of-trade losses have reduced the import capacity of many developing countries, particularly the least developed countries and African countries, and contributed to increased poverty and indebtedness. This situation is further complicated by the emergence of increasingly concentrated market structures at the international level and stringent standards and requirements in developed country markets. Various studies have shown that value retention by developing country producers of commodities is decreasing. Hence, while there is the need to give a renewed impetus to the 'commodity problematique',

there is also the need to search for new avenues of income and employment for survival in the less than friendly international trading environment.

Such an inquiry will naturally lead to exploring ways and means of making effective use of the abundant factor, namely labour. Labour is the major input in the production of services, and the generally lower cost of services in developing countries translates into low production costs. Yet developing countries in general have been unable to benefit from this cost advantage, because export of their services would have called for the movement of labour, which — unlike capital — was subjected to series of restrictions. Though the momentum of globalization, which implied free movement of products and factors, accelerated during the last two decades, for obvious reasons there have been hardly any relaxations in the restrictions on labour mobility. However, more recent advances in information-communication technology have enabled services to be provided at remote locations, with no international mobility of labour, in what is often called the 'offshoring of services'.

No wonder that India, with a large pool of skilled ICT manpower, has emerged as a preferred location in the international division of labour in knowledge-intensive industries and in business process outsourcing (BPO). In India, an estimated 245,000 people work in the information technology sector, generating export earnings of about US$3.5 billion that grew more than 51 per cent during the last three years. Current exports from India, however, account for less than 0.5 per cent of the global market of about US$773.6 billion; the world market is expected to grow at an annual growth rate of 8.6 per cent, reaching US$1,079 billion by 2006 (NASSCOM 2004 global IT conference). To put ICT in perspective; the total primary commodity export from low-income countries in 2001 was of the order of only US$882 billion. If the low-income countries could manage to have at least 50 per cent of this growing market in the near future, ICT could contribute significantly to their growth. In fact, India is not the only country that benefits from opportunities offered by BPO services. Countries like China, the Philippines and Costa Rica, among others, are also emerging as providers of BPO services to the developed countries (see Box 1). Given the fact that BPO services are not very skill intensive and the required skill can be acquired relatively quickly, the developing countries need to adopt appropriate policies to exploit this growing opportunity.

*Recent advances in ICT permit the 'offshoring of services' — services provided at remote locations with no international movement of labour.*

## BOX 1: INFORMATION TECHNOLOGY IN COSTA RICA

Costa Rica is by now well known for its export-driven development strategy based on its advantage in the ICT sector. During the 1990s, when the country's overall exports registered an increase from $1.6 billion (1990) to $6.7 billion (1999), the exports of ICT-related products alone grew at a rate of 500 per cent (1998). Further, the establishment of Intel (the world's largest producer of electronic components) resulted in a single product category — computer parts/modular circuits — accounting for the largest share of exports in 2001 (15.6 per cent). This success can be attributed to the country's favorable geographical location, political stability, educated workforce and advanced infrastructure, coupled with policies favorable to inflows of foreign direct investment. Lately, the focus has shifted to the export of computer and information-related services. Estimates are that Costa Rica's software exports produce a national value-added of 90 per cent.

The share of computer-related services in the total services exports of Costa Rica increased from nearly zero to as much as 3.2 per cent between 1997 and 2000. In the same period, the value of these exports increased from $16,000 to $60 million. This development can be attributed partially to the already growing ICT industry and the favorable environment created. There was a trend of venturing into e-commerce, e-banking and e-tourism by a significant number of enterprises varying from small to large. Over 80 per cent of the firms are locally owned and half of them export their services.

The international market orientation began in the post-1999 era. The software production derives mainly from s to medium-sized enterprises, of which 88 per cent offer tailor-made software services, 60 per cent software packages, 39 per cent software consulting and 22 per cent other services. Moreover, 55 per cent of these companies expected to double their sales between 2000 and 2003. As mentioned earlier, the export orientation is newfound. Export growth rates accelerated between 1997-1999, and as many as 14 per cent of the companies increased their exports by more than 100 per cent; 26 per cent by more than 51 per cent; and 45 per cent by more than 30 per cent.

What made this phenomenal success story is the strong and consistent policy environment fostered by the government. It has created and maintained highly skilled labour by continuously expanding the education system and including ICT in the curriculum. Funds that would have been spent on defence are also channeled into education. Currently (2001) the country spends 6 per cent of its GDP on education. To aid the domestic effort, some foreign institutions have also offered assistance. An example is an Inter-American Development Bank project aimed at improving global market competitiveness, especially of local software producers, and aiding in the process of development by generating substantial revenues and creating high-paying jobs.

Source: UNCTAD (2002)

In order to equip themselves to address this issue, developing countries need to work together and much could be learned from India. One issue that developing countries should jointly address in the near future is the restrictive practices currently being adopted by the developed world, so that outsourcing finally does not end up as limited as labour is today with respect to cross-border movement.

## LAST-MILE CONNECTIVITY AND AFFORDABILITY

Today the intra-national digital divide is as acute as the international digital divide. In countries like the Lao People's Democratic Republic, Cambodia and Myanmar, for example, the capital city accounts for nearly 70 per cent of the total number of telephone lines in the country (Joseph, 2004). Thus access to the Internet as well as telecommunication is confined mainly to the urban centers, and the rural areas that accommodate the bulk of the population remain beyond the ambit of the new technology. For most of the less developed countries, the landline and cellular telecom systems work well in metropolitan areas and smaller cities, where subscribers are located in dense clusters that justify the high cost of installation. However, connecting rural areas is a bigger challenge, because subscribers are geographically dispersed, sparsely populated and economically weak. Telecom companies, in general, may not venture into remote villages because the purchasing power in these villages is not enough to recover the cost of connecting them. Therefore, affordability, ease of deployment and appropriate organizational innovations are critical to sustainable deployment of telecom systems in the countries of the South.

In India, some of these issues have been effectively addressed by a radio technology called CorDECT Wireless in Local Loop Technology, developed by the Indian Institute of Technology in Chennai (see Box 2). Another technology project that has gone on to pilot stage is DakNet in the Indian state of Karnataka, which offers Wi-Fi-based asynchronous broadband linkage where wired communication is not available.

The issue of affordability arises mainly because the prices of hardware and software are high in relation to average income levels of people in the developing world. Today's pricing mainly reflects developed-world market conditions. Existing business models of software vendors and hardware manufacturers are not designed for widespread use in less developed countries where annual per capita income is only a fraction of their developed country counterparts. Developments in Free/Open Source Software (FOSS), though in its early stages of development, are likely to provide an alternative for the developing world, and the role of South-South cooperation for pooling resources to reap economies of scale and scope and reduce risks cannot be overemphasized (UNCTAD, 2002, 2003). Several Indian

## BOX 2: CORDECT: AN ANSWER TO LAST-MILE CONNECTIVITY AT AFFORDABLE COST?

Even though they live in this Information Age, people in most developing countries cannot afford to spend much on telecommunications. In India, where over 65 per cent of the billion-plus population hails from the rural hinterland with low levels of income, affordability is the key issue in the provision of telecom services. The income levels of most rural households hover around $40 to $60, from which they can spend no more than $2 to $3 a month on communications. This calls for the development of a technology that has a very low capital expenditure, such as the WiLL (wireless in local loop).

One system that is now becoming increasingly prevalent in India is the CorDECT WiLL, developed by the TeNeT Group of IICT Madras and Midas Communications in Chennai, (a company incubated at IICT Madras in India). DECT stands for Digital Enhanced Cordless Telecommunications, a radio technology suited for voice data and networking applications. This low-cost fixed wireless access technology aims at connecting primarily homes and small offices in rural areas and small towns. CorDECT provides two lines to each subscriber, a voice line and a 35 kbps dedicated Always-ON Internet connection (a premium rate at 70 kbps). Capable of being used in both rural and urban areas, its cost effectiveness is highlighted better in the rural case where using the Relay Base stations it can serve users at a radius of 25 to 30 kilometres. Such rural deployment costs less than $300 per line, making CorDECT the lowest-cost connectivity solution.

To bridge the gap between technology development and technology access, the developers of CorDECT have promoted a company called n-Logue Communications in Chennai, India. This company is an Indian rural Internet Service Provider (ISP) set up with the idea of providing telephone and Internet services solely to rural India. The key to n-Logue's business model is aggregation of demand in a village to be served by an entrepreneur in each village. In each village, a small entrepreneur is assisted by n-Logue to set up a kiosk. The kiosk is equipped with a CorDECT wireless connection, a PC with multimedia, Web camera, printer, power back-up and a suite of Local Language Applications and finally, a low bit rate video conferencing application in addition to a telephone. It is made available to the kiosk operators at a total cost of $1,000, which includes training and maintenance for a year. With a revenue of $60 per month serving about 1,000 villagers an operator will begin to break even.

To provide this basic connectivity, n-Logue sets up an Access Centre (consisting of a CorDECT Exchange and Base Stations) in a typical Indian town, and provides wireless connections to the villages around the 30-kilometre radius. This typically covers around 300 to 400 villages. N-Logue partners with a local businessperson termed as a Local Service Provider (LSP) to run the Access Centre, serve the kiosks in the villages and act as an interface between the villagers and the company itself. These kiosks

**BOX 2:** ***CONTINUED***

are now finding increased acceptance throughout small towns and villages and are disseminating the goods of the information era to the last layer. Common uses range from typing and word processing to taking photographs on the Web camera and exchanging video mails. Use of video conferencing to consult veterinary doctors and agricultural specialists, remote tutoring, and banking and finance are at the promotion stage.

In replacing the copper wires in the provision of last-mile wireless connection, now major telecom players are also considering the use of CorDECT. The Chennai-based Internet service provider Satyam Infoway Ltd. (Sify) is exploring possibilities of using ICT to connect its cybercafé chain in small towns. BSNL (Bharat Sanchar Nigam Limited), on the other hand, has chosen the CorDECT WiLL technology to connect 570,000 consumers spread across the country. Apart from India, CorDECT is already being used in over 10 other countries, including Egypt, Tunisia, Brazil, Argentina, South Africa and Iran. However, the usage in these countries may be more in urban areas.

Sources: Jhunjhunwala, A. and S. Anitha, http://www.developmentgateway.org/node/133831/sdm/blob?pid=5631.

Best, M.L., 'Wither Wireless Networks for Rural Development'. http://www.media.mit.edu/~mikeb/wither.pdf.

'CorDECT occupies pride of place', *The Hindu,* http://www.thehindu.com/thehindu/seta/2003/03/06stories/2003030600160200.htm.

groups are actively at work localizing FOSS to Indian languages, including groups like Malayalam Linux amd Tamil Linux. Even in least developed countries like Lao PDR, attempts are being made to localize the Linux-based graphical desktop and office tools to the Lao language with the help of the Jhai Foundation (see http://www.jhai.org). Hardware innovations like the 'simputer' developed by the Indian Institute of Science, Bangalore, help to address the issues of affordability and illiteracy being faced by developing countries (see Box 3).

Most of the innovations mentioned above highlight the technological capabilities present in the developing world to address the issues specific to developing countries, like those of last-mile connectivity, affordability and illiteracy. However, the cost of these technologies could be brought down significantly with increased scale and capabilities enhanced by further investment in R&D, which in turn calls for cooperation among countries in the South.

## INITIATIVES IN ICT COOPERATION

While South-South cooperation in information technology has yet to evolve, there are a number of regional and bilateral arrangements for harnessing ICT for development. Perhaps the most notable one is the e-ASEAN (Association of

**BOX 3 : SIMPUTER: AN INNOVATION THAT ADDRESSES AFFORDABILITY AND ILLITERACY**

Simputer (simple computer) was developed by scientists from the Indian Institute of Science in Bangalore, and Encore, a software company. At US$200 each, simputer offers computing facilities at drastically lower costs compared to US$650 for a PC. Apart from the low cost, simputer has many other advantages:

1. It is roughly the size of a hand-held electronic organizer, making it really portable.
2. It can run on AAA battery, not requiring a power connection, which in rural India is unreliable.
3. It uses IML (Information Mark-up Language) to convert English content from the Internet into many local languages.
4. It has a text-to-speech converter that reads out the content.

All these make the interface natural and easy to use, so that first-time users are not intimidated by the technology but rather attracted to the exciting world of the Internet. The most important aspect is that illiteracy is no longer an impediment for the masses to derive benefits from it, given the simputer's voice output.

Even at US$200, the price may be a little too high for rural folks. Hence, the simputer was made to be multiuser compatible. Smart cards help store personal information, thereby making the base equipment shareable with many people. Rural associations, village information kiosks or schools can use this equipment to provide access to the people there.

Source: Sukumar et al. in Dutta at al. (2003).

Southeast Asian Nations) Framework Agreement. This initiative has to be seen against the background of the economic and digital divide between the new ASEAN countries (Cambodia, Lao PDR, Myanmar and Vietnam) and old ASEAN member countries (Brunei Darussalam, Indonesia, Malaysia, Philippines, Singapore and Thailand) The e-ASEAN initiative is an integral part of ASEAN integration efforts, and aims at cutting tariffs and facilitating capacity-building (see Box 4), with the underlying strategy of 'ASEAN help ASEAN'. This differs from the Information Technology Agreement of the WTO, which is essentially a tariff-cutting mechanism agreed upon mostly by the developed countries.

What are the limits of such a regional arrangement as compared to the benefits of broad-based cooperation? To what extent can the old ASEAN countries help in building both physical and human capacities in the new ASEAN countries? The answer depends on the strength of the ICT capabilities of the old ASEAN countries in hardware, software and human resources. As for hardware,

## BOX 4: E-ASEAN FRAMEWORK AGREEMENT

With a view to promote the development of Information Communication Technology and harnessing ICT for bridging the development divide between ASEAN member countries, the Heads of ASEAN countries signed the e-ASEAN framework agreement on 14 November 2000, in Singapore.

The specific objectives of this Agreement are to:

(1) Promote cooperation to develop, strengthen and enhance the competitiveness of the ICT sector in ASEAN;

(2) Promote cooperation to reduce the digital divide within individual ASEAN Member States and among ASEAN Member States;

(3) Promote cooperation between the public and private sectors in realizing e-ASEAN; and

(4) Promote the liberalization of trade in ICT products, ICT services and investments to support the e-ASEAN initiative.

Different measures envisaged in the agreement are the following:

(a) Facilitating the establishment of the ASEAN Information Infrastructure, inter alia by enhancing the design and standards of their national information infrastructure with a view to facilitating interconnectivity and ensuring technical inter-operability between each other's information infrastructure.

(b) Facilitating the growth of electronic commerce in ASEAN by adopting electronic commerce regulatory and legislative frameworks and other measures that create trust and confidence for consumers and facilitate the transformation of businesses towards the development of e-ASEAN.

(c) Promoting and facilitating the liberalization of trade in ICT products, ICT services and of investments in support of the e-ASEAN initiative by eliminating duties and non-tariff barriers on intra-ASEAN trade in ASEAN ICT products in three tranches. The first tranche shall take effect on 1 January 2003. The second tranche shall take effect on 1 January 2004. The third tranche shall take effect on 1 January 2005. For Cambodia, Lao PDR, Myanmar and Viet Nam, the three tranches are to take effect on 1 January 2008, 2009 and 2010.

(d) Also facilitating trade in ICT products by Mutual Recognition Arrangements (MRA) covering ICT products, where applicable, and aligning the national standards to relevant international standards. The agreement also calls for promoting and facilitating investments in the production of ICT products and the provision of ICT services.

(e) Developing an e-Society in ASEAN and capacity-building to reduce the digital divide within individual ASEAN Member States and among ASEAN Member States by building an e-ASEAN community by promoting awareness, general knowledge and appreciation of ICT, particularly the Internet. In this regard the policy also calls

**BOX 4:** ***CONTINUED***

for increasing ICT literacy and expanding the base of ICT workers in the region by regional human resource development programmes covering schools, the community and the workplace.

(f) Finally the agreement calls for promoting the use of ICT applications in the delivery of government services (e-Government).

Source: http://www.aseansec.org/5308.htm

Singapore, Malaysia and Thailand are known for their ICT hardware exports and manufacturing base. In most of these countries, ICT hardware investment and production is dominated by transnational corporations and their investment decisions have been guided by the so-called Flying Geese theory (follow the leader).

After detailed analysis of the electronics industries in South-East Asia, Ernst (2001) concludes that export-oriented production can no longer guarantee sustained growth and welfare improvement. Export-led production also faces serious external limitations from volatile global finance, currency and export markets. Three fundamental weaknesses identified by Ernst appear to be highly relevant in the old ASEAN countries in varying degrees: specialization in exportable 'commodities', a narrow domestic knowledge base leading to limited industrial upgrading, and limited backward and forward linkages.

**TABLE 2: STAGES OF LATECOMER DEVELOPMENT**

| Period and stage | Technological transition | Market transition |
|---|---|---|
| 1960s/1970s<br>Original equipment manufacture | Local firm learns assembly process for standard simple goods. | Foreign TNC/buyer designs, brands and distributes. Also gains non-manufacturing value added. |
| 1980s<br>Own design and manufacture | Local firm learns process engineering and detailed product design skills. | As with above, TNC buys brands and distributes.<br>TNC gains non-manufacturing value added. |
| 1990s<br>Own brand manufacture | Local firm conducts manufacturing, product design and R&D for new products. | Local firm has own brand, organizes distribution and captures all value added. |

Source: Hobday (1994).

While the electronics industry comprises a large number of products, most of the old ASEAN countries have specialized in mass production of only a few products to serve the export market. This kind of 'sticky' specialization has limited backward and forward linkages, especially for materials and production equipment, and gives rise to very high import dependence and limited value-added. For example, a recent survey (Mephokee, 2003) notes that Thailand's ICT-related firms play a small subcontracting role by providing minor components to foreign suppliers. The production technology used in this work belongs to the parent companies of the foreign suppliers and is not transferred to Thai firms, meaning that the Thai-produced components can go only to those suppliers. This is easy because ICT fits right into the suppliers' existing long-term relationships with their parent companies, but ICT leaves very little room for Thai firms to play in their domestic ICT industry and markets — not to mention in regional markets.

A striking outcome of this strategy is the mismatch between local production and consumption both at the component and equipment level. To illustrate, in the case of telecommunication equipment, Thailand exports almost 70 per cent of its production and at the same time imports more than 70 per cent of its domestic demand. The case with semiconductor devices is similar (Joseph, 2004). The situation does not appear to be much different in Malaysia and Indonesia.

Moreover, within electronics there is a very high level of specialization. The problem got compounded with limited industrial upgrading and innovation. Following Hobday (1994), three stages could be identified in the evolution of the electronics industry in South-East Asia (see Table 2). Most of the East Asian countries began as 'original equipment manufacturers' (OEM), which enabled their firms to export to international markets and acquire foreign technology. In the 1980s,

**TABLE 3: TECHNOLOGICAL STAGES IN SOUTH-EAST ASIA'S ELECTRONICS INDUSTRY**

| Decade | Singapore | Malaysia | Thailand | Indonesia | Viet Nam |
|---|---|---|---|---|---|
| 1960s | Assembly | | | | |
| 1970s | Process Engineering | Assembly | Assembly | | |
| 1980s | Product Development | Process Engineering | Assembly | Assembly | Assembly |
| 1990s | Research & Development | Product Development | Process Engineering | Process Engineering | Assembly |

Source: Hobday (2002)

'own design and manufacture' (ODM) emerged out of OEM, beginning in Taiwan, Province of China. In the 1990s, some of the leading firms in East Asia moved to the third stage by launching their 'own brand manufacture' (OBM), achieving upward mobility in the product value chain and competing directly with international suppliers from Japan, the US and Europe. Under OBM, the latecomer firms carry out all of the stages of production and innovation, including manufacturing, new product designs and R&D.

How have the old ASEAN members fared in this respect? Available evidence suggests the transition has been rather slow; see Table 3, showing the stages of electronics industry development in select countries in the old ASEAN. In general, they have been locked into low value-adding assembly of electronics commodities. Their transition to ODM and OBM status has been limited, with limited industrial upgrading. The problem is further compounded by the fact that the bulk of the investment in the ICT sector of old ASEAN countries has been made by transnational corporations and therefore these countries have only limited say in decisions to relocate production facilities in new ASEAN member countries. In fact, the old ASEAN countries are well aware of this issue and have consciously tried in recent years to move away from the earlier strategy of investment-led growth to a strategy of growth induced by innovation.

Thus there are some limits to a strategy of 'ASEAN help ASEAN' with respect to ICT hardware. This is clear in the low volume of ICT goods imported from old ASEAN by new ASEAN countries. It was as low as around 13 per cent in Lao PDR; the highest was 57 per cent in Cambodia. In other countries, ICT was around 40 per cent. More important, almost 80 per cent of the exports from old ASEAN to new ASEAN countries are from Singapore, with very limited exports from other countries. However, this is not to deny the investment made by firms from old ASEAN countries in the communications sector of new ASEAN countries.

*If more broad-based ICT cooperation could be initiated among countries in the South, there are opportunities to achieve economies of scale and spread the risks and costs of innovative efforts.*

This issue is more acute in the case of ICT manpower, because the old ASEAN countries also face excess manpower demand in both quality and quantity. In Thailand, for example, excess ICT manpower demand in 2006 is estimated at around 26,000 (Puntasen et al., 2001). According to its Infocom Development Authority, Singapore wants to

outsource 25,000 ICT professionals from India to meet its demand in the next five years. To achieve the declared objective of bridging the development divide between the old and new ASEAN members by harnessing ICT, there is room for cooperation among the ASEAN countries, perhaps complemented by more broad-based cooperation with other countries in the South.

Policy makers and academics in the South have underlined the need for greater cooperation with India in upgrading their ICT capabilities. In recent years, both the Secretary General of ASEAN and the Executive Secretary of the UN Economic Commission for Africa have made statements about this. India has signed Memoranda of Understanding for fostering ICT cooperation with a number of countries in the South, and there are also efforts to promote cooperation between the private sector in India and other developing countries. Table 4 illustrates some of these cooperative arrangements. If more broad-based ICT cooperation could be initiated involving other countries in the South, there are opportunities to achieve economies of scale and to spread the risks and costs of innovative efforts.

## CONCLUDING OBSERVATIONS

The current unequal access to ICT notwithstanding, it has been argued that, by harnessing the new technology, the developing countries could break the vicious circle of persistent poverty and underdevelopment. In the context of globalization, the ability to harness this technology improves the capability of developing country firms to withstand competition from transnational corporations or to develop partnerships with them. At the same time, ICT poses a potential threat that developing countries, if unable to join the bandwagon, might fall even more behind the developed countries, posing an additional digital threat to development. Developing countries have shown great interest and high hopes in information technology as a short-cut to prosperity. In transforming the digital threat into a digital opportunity, e-strategies and policies are being devised by developing countries and multilateral organizations and cooperation among countries has been assigned its due role.

In general, the e-strategies so far adopted by developing countries underscore the need to promote the use and diffusion of ICT across different sectors of the economy. This goal is crucial to achieving socio-economic transformation and building competitiveness in the developing world. However, such an approach considers the developing countries as passive adopters, without due attention to ICT production. This approach neglects ICT capabilities that exist in a cross-section of developing countries and foregoes the new income, employment and export earning opportunities offered by ICT. It also has the potential threat of perpetuating the technological dependence of developing countries.

## TABLE 4: ICT COOPERATION BETWEEN INDIA AND SELECTED DEVELOPING COUNTRIES

| Country | Current state of ICT Cooperation |
|---|---|
| Brunei Darussalam | Memorandum of Understanding (MoU) is under discussion. India runs tailor-made Information Technology training programmes for middle-level Brunei officials. |
| Cambodia | 45 Cambodian officers are trained on ITC and networking in India every year. |
| Colombia | MoU on bilateral ICT cooperation signed April 2002. Indo-Colombian Forum on ICT and Communications was organized. NASSCOM entered a cooperation agreement with its Colombian counterpart FEDESOFT for sharing assistance and information. |
| Egypt | A MOU was signed in January 2003 for ICT vocational training by NIIT, which with Virgitech opened four Educational and Training Centres in Cairo and one in Alexandria. NIICT/Virgitech work closely with Egypt's Ministry of Industry and with USAID on ICT. |
| Ghana | Agreement signed August 2002 to set up Centre of Excellence for Training in Information Technology. Indian computer training giant, NIICT, opened two training centres in Accra. A Government of India Enterprise — Telecommunications Consultant India Ltd — has been assisting Ghana Telecom in developing telecommunication networks in the country. |
| Indonesia | MoU was signed with Ministry of Science and technology, including ICT cooperation. Indian ICT firms are active in ICT training in collaboration with three universities. |
| Lao PDR | India provides scholarships and training in various disciplines. 45 Lao candidates trained in India in ICT software and networking. India has studied, and is ready to help in, the establishment of an ICT Centre in the Lao PDR. |
| Malaysia | MoU signed. In 2001 the two countries decided to deepen cooperation in ICT. Indian ICT companies were invited to invest in Malaysia. India's private sector giant, Reliance Group, is collaborating with Maxis Communication of Malaysia, Star Hub of Singapore, and Software Technology Park of India to build a submarine cable linking the three countries, connecting to the broadband nationwide fiber optic network. The Indian company NIIT is collaborating with Tu Abdul Rzak University. |
| Mongolia | Agreements on ICT cooperation were signed in January and September 2001. India granted US$2 million to establish the Atal Bihari Center of Excellence (ABVCE) in ICT and five Community Information Centers (CICs) at district levels. ABVCE has facilities for videoconferencing, data networking, software, JAVA and a lecture hall. India also provided laptops, clients, Web cameras, firewall and Internet connections for all facilities. In October 2002 an MoU was signed for cooperation in telecommunications. |
| Myanmar | MoU was recently signed. Detailed discussions to identify specific areas of cooperation were held in January 2004 when ICT minister of Myanmar visited India. |
| Philippines | The India-Philippines Joint Business Council in May 2002 recommended cooperation in ICT and software. Indian ICT leader Infosys signed a partnership with Microsoft Philippines and Intel Microelectronics Philippines. |

**TABLE 4:** ***CONTINUED***

| Country | Current state of ICT Cooperation |
|---|---|
| Thailand | The Thai Government seeks ICT cooperation and information exchange. It is interested in setting up a Software Technology Park on the lines of STPI India, and plans to develop a Cyber City like Bangalore's. An MoU was signed in November 2001. An India-Thailand Joint Task Force on ICT has been set up. Special work permits allow extensions for Indian ICT professionals present in Thailand. An Indian expert team studied possible areas of cooperation, such as sharing some of India's expertise. |
| Vietnam | India offered a Rs 10 Million grant to set up an Advanced Centre for Information Technology in Ho Chi Minh City to deal with e-learning, ICT training and distance education. A digital library may be set up. Indian firms like ApTech and NIICT are active in manpower training individually and jointly with STP as in Da Nang. Vietnam's Corporation for Financing and Promoting of Technology (FPT) along with its Indian partner, ApTech, have signed an agreement on training ICT human resources at Can Tho University. |

Note: The listing is not all-inclusive. Sources: (1) Joseph, K. J. and Parayil, G. (2004) 'India-ASEAN Cooperation in ICT: Issues and Prospects', RIS Discussion Paper No. 70/2004, New Delhi. (2) Discussions with leading ICT firms and Government officials in India.

Unlike the earlier general-purpose technologies in which Western countries held the monopoly position, in the case of ICT, a cross-section of countries in the South have substantial capabilities. Yet there is the need to scale up these innovations, and South-South cooperation could be instrumental not only in reaping economies of scale and scope but also in mutual learning and risk sharing.

Recent studies suggest that the primary commodity-producing countries in the South have not benefited from globalization, and there has been a renewed impetus to address that problem. At the same time, there is a need to search for new avenues of income and employment. In this process, ICT-enabled services and business process outsourcing offer enormous opportunities for countries in the South. Some countries already have made significant progress. This calls for appropriate trade and investment policies, and much insight about these could be gained from South-South cooperation. What is called for is an integrated approach, an e-strategy of 'walking on two legs' — ICT use and production. Interestingly enough, some of the factors that promote ICT production, like trade and investment policies, will also be instrumental in augmenting ICT use. But these policies should be tailor-made to specific developing country contexts instead of using a 'one-size-fits-all' approach.

This is not to underplay the role of information infrastructure, human development and ICT use, which are often highlighted in the e-polices and strategies of developing countries. Countries in the

South have made significant progress in human resources development. As the South Commission has observed, during 1965-87 enrolment in primary education increased six-fold, secondary education 16-fold, and higher education 25-fold. Needless to say, much has been achieved since then and a developing country like India has the distinction of having the second-largest scientific manpower in the world. The development of 'human capital' has a twin role of helping both to produce ICT and promote its use, and South-South cooperation has much to offer in this process. Given the economies of scale involved in ICT infrastructure development, which is also critical in both producing and using ICT, South-South cooperation is bound to yield rich dividends.

While the need for South-South cooperation is obvious, what is missing is an institutional arrangement for promoting it and 'getting the ball rolling'. What is needed are initiatives to bring together the countries in the South under the umbrella of an e-South Agreement aimed at bridging the digital divide through integrated development of the ICT sector in the developing countries. In working towards this objective, the Agreement, in tune with the Information Technology Agreement of WTO, should facilitate free trade in ICT goods and services among developing countries. At the same time, drawing from the e-ASEAN Framework Agreement, the e-South Agreement should be instrumental in building capacity for both production and use. This calls for measures to promote investment in the ICT sector so that new income, employment and export-earning opportunities are generated. Given the paramount importance of human capital in developing ICT production and promoting ICT use, special focus may be given to developing the ICT human resource base and to relaxing the restrictions on mobility of skilled people across the developing world. In general, the Agreement should facilitate an integrated development of the ICT sector by promoting both production and use, instead of the ongoing lop-sided approach that makes many developing countries passive adopters of technology. We may conclude by reiterating that South-South cooperation should not be construed as a substitute for ongoing initiatives to promote North-South, bilateral and regional cooperation or country-specific policies.

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