ICTs and Caribbean Development
What are the Prospects for Bridging the Digital Divide?

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INTRODUCTION

Despite the optimism that pervades much of the neo liberal literature on Information Communications Technologies (ICTs) and development, one must be cognizant of the stark socio-economic conditions of a large portion of the world's population, many of who are not yet equipped to benefit from ICTs. Still there is great anticipation that ICTs will enable Third World countries to circumvent the traditional barriers to economic growth and development. The new techno-economic paradigm will provide new mechanisms for peripheral countries to escape the economic bondage of being producers of low value added primary goods and raw materials, to perhaps becoming producers of high value added technology goods and services.

The ability of Caribbean countries to compete economically in the emerging global economy – one characterized by technological innovation, the ubiquity of computers, the internet, mobile telephony, and the increasing reliance on knowledge creation – gives a sense of urgency to discussions such as this one. Not least because of the changing global political economic landscape, where preferential treatment is fast becoming a thing of the past and the principles of neo-liberal economics and its emphasis on free trade are fast taking root. Special attention is being given to the development problematique of the Caribbean, with the objective of highlighting the particularities of Caribbean economies and to illustrate how these define the economic possibilities in the current techno-economic context.

The world is witnessing the creation of a new social stratum: the 'technology-poor' who (for economical, geographical, social, cultural or political reasons) cannot gain access to the emerging technological resources needed to ensure productivity in an increasingly digitized global economy. The digital divide defined as the uneven access to and diffusion of technology is not exclusive to the 21st century. (Human Development Report 2001:38). Issues of accessibility and affordability have dominated development literature for decades. However, the difference in the current techno-economic context is the nature of the technology has changed, with the emphasis being on digitized information and communications technology (ICT). Additionally these technologies have become critical to productivity growth and competitiveness in the present context. (Ousmane Kane, 2000)

The fundamental challenge for developing countries, especially small states, is to overcome the underlying historical, political, economic and socio-cultural factors that historically have seen small/peripheral countries perform particular roles in the International Division of Labour (IDL). Technological development is itself a product of, and determined by a wider politico-economic context. Hence, any effort at bridging the digital divide of necessity must challenge the historical role of peripheral countries in the IDL.

The digital divide is a complex, dynamic and multifaceted phenomenon, which demands a similarly rigorous diagnosis and appropriate recommendations and solutions. The narrowing of the digital divide therefore involves a complex interplay of various factors: technological, economic, social, political and institutional. (Freeman and Perez 1988)

MEASURING THE DIGITAL DIVIDE IN THE CARIBBEAN

While telephony access and Internet penetration data for the Caribbean region reveal that its citizens and communities are using ICTs, serious questions abound about the extent to which these are being utilized for productive or developmental purposes. Between 1999 and 2003 the number of internet users per 100 population grew from 2.73 to 10.60 in Trinidad; 1.87 to 5.59 in Barbados; 1.33 to 8.24 in St. Lucia while the data for the USA measured 30.81 to 53.75. (ITU 2003) So while these countries are making relatively impressive strides in gaining access to PCs and telephony services (land and mobile services) and the Internet, they still face the challenges of a yawning access gap.

Additionally, in the recently published 'Network Readiness Index' (The Global Information technology Report 2001-2002) out of 75 countries, Trinidad and Tobago ranked 46, while Jamaica came in at rank 67, not a very encouraging indicator at all. The United States tops the list, the implication being that the US is best poised to take advantage of the opportunities introduced by the ICT revolution. In order to exploit the full potential of the information society, a quantum leap into the tech-era is necessary, if not urgent. Furthermore, without wanting to sound a death knell for the region, there is little in place to ensure that the region will soon emerge out of the gaping digital divide!

The causes for inequalities in access are many and are attributable to varying extents to the existence of a digital divide both intra and inter nationally. In assessing the dimensions of the digital divide in the Caribbean the focus is on the most significant factors determining technology production, diffusion and use. These are the (1) access divide; (2) skills divide; (3) social capability divide; (4) knowledge divide; (5) technology production divide all of which inform the economic opportunity divide. Emphasizing these respective divides makes more intelligible the complexity of an emerging dimension of the broader "development divide" which is of primary concern to the developing world.

THE ACCESS DIVIDE

While the global market for ICT goods and services is expanding, still benefits accrue disproportionately to the countries of the core, followed by those of the semi-periphery and with the very least benefits trickling down to the countries of the periphery. Low levels of information access & literacy are pervasive in the developing world when compared with the developed world (Table 1).

Table 1 Selected Technology use and production indicators

Technology and Infrastructure	Low Income			Middle Income			High Income		
	1990	2001	2002	1990	2001	2002	1990	2001	2002
Fixed line and mobile subscribers (per 1000 people)	7	32	40	43	261	316	463	1190	1283
Cost of 3 minute local call ($)	0.06	0.05	0.07	0.04	0.06	0.05	0.08	0.09	0.07
Personal computers (per 1000 people)	..	6.0	7.5	2.5	36.7	45.3	111.6	431.9	466.9
Internet user (per 1000 people)	0	6	10	0	53	80	3	311	364
High-technology exports (% of manufactured exports)	..	8	9	..	18	19	18	24	23
Total debt service (% of goods & service exports)	22.8	13.4	13.7	17.6	20.4	18.5	..	..	..

Source: Little Data Book, The World Bank, April 2004

The problem is particularly acute in the Caribbean region. The consensus is that without adequate access nations cannot expect to be competitive.

Table 2 below indicates the relative cost of a Personal Computer for countries within the Caribbean region, and between the region and other nations, based on 2004, GNI per capita income.

Table 2 Average Cost of a PC as Percentage of Per Capita Income

Country	GNI Per Capita Income ($)	PC cost as %age of GNI
Antigua and Barbuda	9, 720	8.23
Barbados	8,790	9.10
Dominica	850	94.16
Grenada	3,530	22.66
*Guyana	860	93.02
*Haiti	440	181
Jamaica	2,690	29.74
St. Kitts & Nevis	6,540	12.23
St. Lucia	3, 750	21.33
St. Vincent & The Grenadines	2,820	28.37
Trinidad & Tobago	6,750	11.85
*United States of America	35,400	2.26
*Singapore	20,690	3.8
*India	470	170.2

Notes: The calculation assumes the cost of PC with basic features is equal to USD $800.00. The countries denoted by an asterisk have been included for comparative purposes.
Source: GNI data extracted from Little Data Book, World Bank, April 2004. The calculations are the author's own.

Governments of the Caribbean region, motivated by the issues of access and affordability, have made incremental steps towards addressing the issue. Trinidad and Tobago for example in 1997/98 lifted the duties on computers and computer products. In September 2003, the government of St Lucia undertook a special initiative for increasing access to computers among teachers and educational personnel on the island. Under what it calls, the 'Digital Divide Initiative' the government introduced an affordable PC package comprising computer (Desktop or Notebook), printer, digital camera or scanner, software and Internet access. The desktop computer package can be had for EC$3,476.04 (US$187.42) while the bundle with notebook computer cost $5,958.80 (US$2206.96). Customers also benefit from six (6) months free Internet access, after which various discounted Internet packages be available.

However, equipping people with ICT tools such as computers and the Internet, and teaching them how to use computer and Internet tools, are wholly inadequate for realizing the economic growth potential of ICTs. Hence, a more promising line of enquiry would be to examine the appropriateness of ICTs to existing production systems in the region, cognizant of the fact that "Technology transfer from developed nations is not always appropriate because of the huge technological gap …" (Hokoon Park 2000:94).Scant attention is being given to the dynamics of the wider global political economy that go a long way in determining what is feasible and what is not within a stratified and hierarchical world system. For example analysis of the composition of exports of developing countries reveal that export of raw materials still account for a disproportionately large portion of their merchandise exports. So the expectation that developing economies will participate fully in the knowledge economy is yet to materialize.

THE SKILLS/KNOWLEDGE DIVIDE

As the world economy evolves with ICTs playing a fundamental role in defining the transformative capacity of nation states, the education system needs to remain relevant responding to the emerging skills requirements. Knowledge intensive services are becoming more central to economic performance; hence the skill profile of employees has changed. (Freeman and Perez 1984:29)

The region historically has faced acute shortages of highly skilled employees. As a result, the Caribbean faces some tough challenges in responding to the demands of the digital economy if the quantum jump in productivity that is expected is to be realized. This is particularly evident in the education sector, where more needs to be done to address the techno-deficit that currently exists.

The use of technology for pedagogic purposes is a response to that need, and has now found expression in The EduTech 2000 Initiative; Fast Forward Initiative, establishing of the University of Trinidad and Tobago; and the OECS Education Reform Project.

The EduTech 2000 Initiative

Through its Education Sector Enhancement Programme (ESEP), commonly referred to as the edutech2000 initiative, the Barbados government embarked upon a comprehensive education reform program for its primary and secondary school system, with ICTs at the core. The goal was to "ensure that all children leave school with the basic skills and abilities that are required to participate productively in the skill and information-intensive job market."

Despite funding constraints, the government was able to finance 45% of the US$ 213 million program, while the Inter-American Development Bank and the Caribbean Development Bank provided the remaining 40% and 15% respectively. The Barbados example (although thwart with many teething problems) can serve as a benchmark for the rest of the region.

The OECS Education Reform Project: Implications for St. Lucia

The project's goals include: The development of curricula for Forms I-III; to train trainers/educators in select areas; the establishment of learning resource centers, and expansion and upgrade of learning centers, including science and information technology labs. The project costs an estimated US$19.15 million.

The Ministry of Education, in St. Lucia has provided computers to schools, with a plan to increase those numbers yearly. As of 1998, IT has been offered as a subject at the CXC O'Level, with the St. Joseph's Convent being the first secondary school to offer the subject. Over the last 7 years there has been a notable increase in students opting for IT. Given the limited physical resources and the small size of labs, not all students wanting to study IT have been able to do so. At that school in particular, unable to meet rising demands has led the administration to institute a set of selection criteria as a measure to control the number of students being admitted into the program. This has been one of the greatest lamentations of the Ministry of Education: not being able to satisfy the demand for IT tuition at the secondary school level. While neither computers, nor CXC qualifying subjects do not on their own bridge the digital divide, however, they sure are important prerequisites for bridging the knowledge/skills divide and eventually equipping people to participate fully in the digital economy.

One of St. Lucia's manifold expressions of trying to boost its education sector is reflected in the ranking/priority given to that sector and the corresponding expenditure vis-à-vis other sectors. Table 3 below shows that for the year 2002/2003 Education and Human Resource Development absorbed the second highest total expenditure accounting for EC$138.2 million, second only to Finance, International Financial Services and Economic Affairs.

St. Lucia registered a 'combined primary, secondary and tertiary gross enrolment ratio' of 82%. This implies that over 18% of children of school going age are being denied secondary or tertiary level education. The gap becomes even more evident when these figures are compared with those of the United States, Norway, and Canada all of which recorded ratios ranging from 94 -98%.

Table 3 Allocation to Education Sector in Relation to Current and Capital Budgetary Expenditures, 2002/03 and 2003/04

	Expenditure in Millions EC$ 2002/03			Expenditure in Millions EC $ 2003/04			
Sectors	**Recurrent**	**Capital**	**Total**	**Recurrent**	**Capital**	**Total**	**% Distribution**
Finance, Int'l Financial Services and Economic Affairs	170.7	10.2	180.9	184.9	22.4	207.2	24.06
Education and Human Resource Development	108.9	29.3	138.2	109.4	32.3	141.8	16.46
Communications, Works, Transport & Public Utilities	22.3	71.0	93.3	21.0	119.8	140.7	16.34
Physical Development, Environment and Housing	13.2	64.7	77.9	12.5	77.7	90.1	10.46
Health, Human Services and Family Affairs	52.5	8.3	60.8	53.2	13.3	66.5	7.72
Agriculture, Forestry and Fisheries	12.7	50.6	63.3	13.7	32.0	45.7	5.30
Ministry of Justice	---	---	---	35.2	6.0	41.1	4.78
Social Transformation, Culture and Local Government	13.8	15.4	29.3	13.9	9.9	23.8	2.76
Tourism	1.3	23.4	24.8	1.5	21.0	22.5	2.61
Home Affairs and Gender Relations	14.8	10.1	24.8	18.9	3.1	22.0	2.56
Prime Minister's Office	7.7	1.9	9.6	7.6	11.2	18.7	2.18
Labour Relations, Public Service and Co-operatives	14.7	0.7	15.4	15.6	0.0	15.6	1.81
External Affairs, International Trade and Civil Aviation	14.3	0.0	14.3	14.3	0.0	14.3	1.66
Others	5.0	0.2	5.2	4.9	0.0	4.9	0.57
Commerce, Investment and Consumer Affairs	3.2	1.9	5.1	3.4	0.2	3.6	0.41
Attorney General's Chambers and Justice	37.7	0.2	37.9	2.7	0.0	2.7	0.32
Total	**455.2**	**287.8**	**743.0**	**512.6**	**348.8**	**861.3**	**100.0**

Source: Ministry of Finance and Planning: Government of St. Lucia 2002-2003

Although there has been a significant growth in tertiary level enrollment rates over the last two (2) decades in the OECS rates still average 2% which is still way below the CARICOM's goal of 15% by 2005, (See Table 4) compared with middle income countries that average 20-22%. Barbados is the

only country in the region that boasts of an average around 20% of its young people attending university. The average for the rest of the region hovers around less than 10%.

Table 4 Percentage distribution of highest level of education of persons 18 years and older for selected OECS Member States

Country	Level of Education					
	Nursery	Primary	Secondary	Post. Sec.	University	Other/N/S
St. Kitts	0.1	18.1	51.1	7.1	4.7	19.0
St. Lucia	0.5	68.5	20.6	5.0	3.1	2.3
St. Vincent	0.0	71.0	23.6	3.2	0.9	1.2
Grenada	0.2	65.1	21.7	4.1	1.5	7.4

Source: OECS Human Development report, 2002 p. 73

"SOCIAL CAPABILITY" DIVIDE

A combination of social capability and technological competence inform whether a country can be dubbed a technological "leader" or "follower". Under utilisation of ICTs in the region for productive purposes demand a sensitization drive aimed at educating the population about the usefulness of ICTs. In May 2004, countries of the OECS along with Guadeloupe and Martinique came together to launch an Internet Fiesta, designed to expose the population to the educational, economical and informational validity of the Internet. Initiatives such as this are critical in raising technology awareness, and go a long way in addressing the techno-phobia / techno-ignorance that pervades the region.

THE TECHNOLOGY PRODUCTION DIVIDE: WHO PRODUCES WHAT WHERE?

If the emerging techno-economic paradigm in any way marks a distinct break with the past, then this ought to raise some provocative questions, with respect to who owns and controls the technology production systems. If the new techno-economic paradigm is itself defined in large measure by Research and Development (R&D) activities, and that investing in R&D is a crucial prerequisite for entering the digital age, then one can conclude that those unable to finance and/or engage such activities are at a gross disadvantage. Table 5 suggests that R&D activities are concentrated in the core countries, and developing countries such as those of the Caribbean are yet to make any significant contribution in that respect.

It is not by accident therefore that those who invest heavily in science and technology, R&D are not only the lead innovators but also the technology pace setters. Although there is a dearth of data on the region, available data indicate that the region lags way behind the technological leaders in key ICT variables as Table 5 and Figure 1 illustrate.

Developed countries account for well over 90-95% of global R&D, hence the generation of new knowledge is still very much concentrated in the North. In 2001, OECD countries allotted roughly USD 645 billion (current PPP) to R&D amounting to approximately 2.3% of overall GDP. This represents a steady increase rising by 4.7% annually between 1995 and 2001. Unsurprisingly therefore it is they who lodge the largest number of patents (accounting for about 90% of the patents granted in the USA), whereas, developing countries account for less than 4% of new patents. Of that 4% the Caribbean's input is negligible at best.

The relationship between trade performance and innovative capacity has long been established. Technological development requires large government subsidies and significant injections of private capital, none of which is particularly forthcoming in the region. The resources that are available are absorbed by traditional social welfare expenditures, and financing of outstanding debts to the International Financial Institutions (IFIs), such as the IMF and the World Bank. Consequently, Caribbean countries have not been strong spenders in R&D activities.

The private sector has had little interest in R&D often relying on transnational corporations and academic centers to take the lead in this respect. The industrialization by Invitation experiment in the region was meant to achieve just that. However, that experiment failed miserably as it fell short of spawning R&D activities leading to the production of indigenous technology, or in the least develop the skill sets required to adapt imported technologies to local production needs.

Table 5 Technology Creation

Country	Patents granted to residents (per million people 2000)	Receipts of royalties and license fees (US$ per person) 2002	Research and Development (R&D) expenditures (% of GDP) 1996-2002	Researchers in R&D (per million people) 1990-2001
Norway	88	37.9	1.6	4377
Canada	36	54.0	1.9	2978
United States	298	151.7	2.8	4099
United Kingdom	71	130.4	1.9	2666
Barbados	0	1.9	..	..
Trinidad & Tobago	0	..	0.1	456
Antigua & Barbuda	0	0.0	..	..
Saint Lucia	0	..	..	..
Jamaica	0	2.3	..	8

Source: Human Development Report 2004:180-183

Countries that wish to boost their economic performance and become or remain competitive are being forced to invest more heavily in tertiary education and research and development. The OECD countries continue to maintain their lead in that regard while peripheral countries are noticeably way behind.

THE ECONOMIC OPPORTUNITY DIVIDE

> "The very steps which have been taken in the underdeveloped countries to encourage extractive industries and the provision of raw materials serve to maintain their dependence on industrialized nations." (Yearly 1988:151)

ICTs offer the prospect of overcoming disadvantages associated with vulnerabilities like size and geography. However, improved economic efficiency and competitiveness are contingent on a whole host of factors some of which have been highlighted above. The aforementioned challenges inform the dimensions and character of the development divide. National development cooperation implies engendering cross-sectoral linkages. However, governments and other key economic actors/stakeholders of the region have been slow to incorporate ICTs into the fabric of their economies and to stimulate demand for ICT goods and services, for reasons already highlighted above.

ICTS AND SOCIO-ECONOMIC INCLUSION: PROSPECTS, SCOPE AND LIMITATIONS

ICTs cannot be expected to resolve developmental problems by themselves. Building capabilities and skills - capacity building - for producing and using ICT goods and services is critical to any development strategy in the new economy. E-capabilities constitute traditional literacy (basic numeric, reading and writing skills), technological (computer) literacy and informational literacy. ICTs must be part of a multi faceted approach to economic growth and sustainable development.

Whereas governments of the region have embarked upon some worthwhile initiatives, such as EDUTECH 2000, Fast Forward etc one is yet certain how these can enable the host countries to move up the production chain, from downloader to uploader. Developing countries must seek to develop national ICT strategies that move away from diffusion toward building user capabilities. It is this, which will most likely lead to developing innovative capacities.

The leaders in the markets are those countries that own the innovative capacities and invest heavily in R&D. The Trinidadian government has come to appreciate the importance of this, and has set up a National ICT Strategy Plan to respond to the emerging technological trends and challenges. Many of the other islands, such as Grenada, Antigua and Barbados have embarked upon similar undertakings to a greater or lesser degree.

EMERGING ECONOMIC OPPORTUNITIES

'Catching up' comes at a high cost. '"Catching up" and overtaking established technological leaders could pose formidable problems for the imitators and aspirants for leadership, since they must aim at a moving target.' (Freeman 1998:73) Nevertheless, in this phase of the techno-economic cycle, the goal should move beyond mere imitation, and greater energy and resources should be devoted to adapting and in some cases producing more indigenous and sophisticated technologies.

At the very least developing countries, such as those of the Caribbean should endeavor to indigenize the existing and emerging technologies to respond to their particular production patterns and needs. This is evermore important given the possible setbacks because of design-reality gaps (the gap between the system's design conceptions and the uses for which it is intended).

ICTs afford the Caribbean several opportunities for enhancing growth and development. These include: (1) Marketing and export of indigenous products: cultural products such as music, art, literature, and culinary delights; (2) Invigorating the tourism industry; (3) Affording farmers greater access to and penetration of global markets (especially previously unexplored markets); (4) Establishing E-education outposts. Already the region is making some inroads in the off shore education market; (5) Offering e-health services and (6) Off shore banking and financial services

A burgeoning service sector globally offers a new lifeline to Caribbean economies. Barbados, the Bahamas, the Cayman Islands and Antigua are already capitalizing on the emerging economic niches. Barbados, for example, engages in data capture, data entry, market surveys, telemarketing, insurance claims processing, computer-aided design, database management, litigation support services and typesetting. (Eastmond 1999/2000) The Cayman and the Bahamas on the other hand are renowned for their off shore banking services.

CONCLUSION

The Caribbean region is currently undergoing a "structural crisis", characterized by Freeman "… a syndrome of a serious mismatch between the techno-economic subsystem and the socio-institutional framework". (Freeman and Perez 1984:9) A 'mismatch' between the institutional best practice that dominated the last techno-economic paradigm and the new best practice of the new or emerging techno-economic paradigm.

Caribbean countries can no longer rely on the wisdom of the Arthur Lewis model – industrialization by invitation - as the new technological paradigm challenges its core arguments. An

abundance of unskilled labour does not offer any comparative advantages in the new techno-economic context of development. The emergence of an information economy and the demise of the agricultural sector pose serious challenges to Lewis' two-sector model.

The Caribbean region must participate effectively in the digital economy to avoid losing out to its competitors. However, the region is plagued by both endogenous and exogenous factors that hinder its ability to not only bridge the digital divide but also participate fully and productively in the new economy. For example, technological dependence persists in the current techno-economic context much as was the case in previous techno-economic epochs. The resolution is no way in sight, in light of the rapid changes in technology; which begs the question can the region really "catch up" and bridge the digital divide?

Caribbean economies are currently facing chronic socio-economic problems, which must be resolved before any technological leaps can be realized. The Caribbean countries' efforts to narrow the digital divide are being hampered by their inability to resolve some of the traditional concerns of debt servicing, chronic unemployment, declining standards of living and more recently the AIDS epidemic with the most affected group being the youths, the workforce of tomorrow on whom the future rests. Additionally the end of the Cold War saw a drastic decline in the geopolitical salience of the Caribbean with implications for FDI and Aid flows. This has had serious developmental implications for financing R&D and propping up industries that are on the downswing.

In the Caribbean context history, culture, economics and politics combine giving rise to a rich milieu of events and structures that are not easily comprehensible through the lenses of any one observer or theoretician. As the Caribbean civilization itself is a product of a plurality of ideological, racial, ethnic and religious influences, so too any development strategy adopted must be respectful of the cultural hybridity, political awkwardness and psychological dilemmas that shape the Caribbean reality. When all of these are historicized, it becomes apparent that there is no one vehicle - not even ICTs - that can bail these islands out of the dungeon of underdevelopment.

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