

ICT Investment Opportunities in East Africa

Regional Market Analysis: General Conditions and State of Technology in the East Africa Region

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Context

This regional report accompanies four country reports produced for the International Finance Corporation (IFC), covering the East African countries of Kenya, Uganda, Tanzania and Mauritius. It consolidates the findings from the four countries and looks at the overall key trends and market opportunities. There is also a confidential report on potential investment possibilities, based on interviews and discussions with business people and public sector officials and other research conducted. The four country reports present an overview of the current situation in the information and communications technology (ICT) sector in each country, and include information on the economy, education, policy and regulatory environments, status of specific ICT markets, challenges and concerns and potential market trends likely to rise, and investment opportunities.

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LIST OF ACRONYMS

BPO	Business Process Outsourcing
CAGR	Compound Annual Growth Rate
CCK	Communications Commission of Kenya
DAI	Digital Accessibility Index
DMC	Digital Media City
EAC	East African Community
EPZ	Export Processing Zone
ERP	Enterprise Resource Planning
Gbps	Gigabytes per second
GDP	Gross Domestic Product
HDI	Human Development Index
HPI	Human Poverty Index
ICT	Information And Communications Technology
IFC	International Finance Corporation
ISP	Internet Service Provider
IT	Information Technology
ITES	IT-enabled services
ITU	International Telecommunications Union
IXP	Internet Exchange Point
Mbps	Megabytes per second
MCSE	Microsoft Certified Systems Engineer
PC	Personal Computer
R&D	Research and Development
RTDF	Rural Telecommunication Development Fund
SAFE	South Africa Far East
TCRA	Tanzanian Communications Regulatory Authority
TTCL	Tanzania Telecommunications Company Ltd
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
USD	United States Dollar

1. Introduction

This report consists of a regional market analysis associated with the “Survey of Investment Opportunities in the Information and Communication Technology Sector” in four East African countries: Kenya, Uganda, Tanzania, and Mauritius. It summarizes the state of the ICT sector in the region, provides an overview of its developmental state and offers observations as to the future of the industry. It highlights the similarities and differences between the countries and provides a current outlook of the ICT sector. Kenya, Tanzania and Uganda make up the East African Community (EAC) and will often be referred to in that way since there are many pertinent similarities between the three countries. By contrast Mauritius is distinctly different in many respects and will often be contrasted with the EAC countries.

2. Global and African ICT Markets

Africa at large is the least developed continent regarding the ICT sector, and East Africa is no exception. Due to widespread poverty and lagging economic development, East Africa, along with most of Africa, has fallen far behind the majority of countries in the world in the development of its ICT sector. The region studied here is not homogeneous, however. Mauritius is by far more advanced than the remaining countries, both economically and technologically, and has a much stronger historical focus on ICT. Yet, regarding the technology environment, Mauritius faces many of the same obstacles and challenges to its development as Kenya, Uganda, and Tanzania - lack of funding for ICT initiatives, shortages of ICT skills, and difficulties creating export markets. Mauritius also differs in some other respects:

- It is an island state with small population of about one million as compared to the very much more populous EAC countries.
- It has few natural resources.
- It tends to draw on its strong links with India for technology transfer and financial arrangements.
- It can and does seek niche markets within French communities.

One way to compare the four countries in the sample for the purposes of this exercise is in terms of the so-called Digital Accessibility Index (DAI) developed by the ITU. The DAI is a “measure of the overall ability of individuals to access ICT’s” and is shown with its components in Table 1. Appendix 1 explains the DAI in some detail, but here it is simply presented as a basis for comparison.

Table 1. Digital Accessibility Index for East African Group.

Country	Tele-density	Mobile Density	Infra-structure	Afford-ability	Knowledge	Quality	Usage	DAI
Tanzania	0.5	1.9	0.01	0.00	0.61	0.14	0.00	0.15
Uganda	0.2	2.0	0.01	0.00	0.69	0.13	0.00	0.17
Kenya	1.0	4.2	0.03	0.00	0.73	0.19	0.01	0.19
Mauritius	27.0	28.9	0.37	0.95	0.80	0.29	0.12	0.50

Source: International Telecommunications Union, 2003

The similarities between the EAC countries and significant differences with Mauritius are clear.

3. Key Characteristics

3.1 General Overview

The economies of the countries under review are all small as shown in Table 2 below. Because of its small population, the absolute size of Mauritius's GDP translates into a much higher per capita GDP. Whilst Kenya, Uganda, and Tanzania have sizable populations, the economic base of the countries is narrow, manufacturing activity is low, the financial sector is quite new and underdeveloped, economic deregulation is relatively recent and growth in many areas has been slow. In summary, the EAC countries are still relatively poor and have a long way to go in lifting their populations out of poverty.

Table 2. Some ICT Statistics¹

Country	GDP US\$ (million)	Population (million)	Computers	Internet hosts	Internet users	Pay phones
Kenya	1231	31.93	204000	2963	400000	9604
Mauritius	4790	1.21	141000	3462	120000	2920
Tanzania	9700	34.44	144000	1731	80000	2000
Uganda	6010	24.7	82000	2242	100000	3243

Source: International Telecommunications Union,
 World Telecommunications Indicators database, December 2003

Table 3 shows the progression of the Human Development Index over time for the four countries.

Table 3. Human Development Indices for the study countries set over time.

Country	HDI Rank	1975	1980	1985	1990	1995	2001
Kenya	146	0.440	0.487	0.510	0.535	0.519	0.489
Uganda	147	-	-	0.402	0.403	0.412	0.489
Tanzania	160	-	-	-	0.408	0.401	0.400
Mauritius	62	-	0.654	0.684	0.720	0.744	0.779

The basic physical infrastructure - roads, railroads, electric supply and distribution, and fixed line telecommunications - are often in poor condition and mostly concentrated in urban areas and along major roads. The price of electricity and unreliability of power supply is considered a severe impediment for the development of manufacturing businesses in the region.

The mobile wireless infrastructure, on the other hand, is modern and growing very rapidly in the EAC countries. Growth is slower in Mauritius, largely because of the pervasiveness of the island-wide fixed line infrastructure.

The lack of bandwidth is a serious impediment in the EAC countries. All international bandwidth is provided through satellites, which weakens the price competitiveness of the countries' telecommunications sector and of those sectors whose main business relies on the bulk use of telecommunications bandwidth.

¹ The figures, especially as they relate to the number of computers in the country, must be regarded with caution. For example, the team estimates that the number of computers in Uganda is over 200,000. This number has been derived by using a 1999 baseline figure of 60,000 computers and an extremely conservative annual growth rate of 5% in sales starting from sales of 30,000 in 1999 computers per year and factoring in a replacement of 20% of the old stock per year.

The planned submarine cable link to the SAFE cable along the Eastern coast of Africa to Djibouti, with planned landing points in Tanzania and Kenya (Mombasa), will radically improve the infrastructure conditions in East Africa. Plans are already underway to install fiber networks inland into Kenya and Tanzania. An IFC-funded feasibility study is ongoing to study the feasibility and economics of the submarine cable. (Mauritius has enjoyed access to the SAFE cable since 2002.) The submarine cable industry globally has experienced major changes in the past few years. Perhaps the most fundamental change facing the industry is the way by which submarine cable systems are financed. The telecommunications industry as a whole has moved from being a collection of largely government-owned and financed monopoly carriers to an increasingly private sector-driven competitive business.²

Entrepreneurial spirit and mindset varies widely across the study region. Kenya has an ample supply of entrepreneurial businesspeople ready to seize new opportunities. So has Uganda. Tanzania, however, is still restricted by the mindset instilled in people during the *ujamaa* period when socialist economic principles were applied. As late as the 1980's, private ownership was not allowed in Tanzania, and the importation of computers was banned until the early 90's. The economy of Mauritius is largely controlled by a few powerful families, whose roots go back to the time when Mauritius was a monocrop sugar economy. The same business groups have diversified their business interests into various industry sectors, including ICT. Mauritius, of the countries surveyed, can best be characterized as an "old boy" economy, where government and business are historically closely connected and where local competition has been limited by mutual understanding and choice.

Human capital in the ICT sector is in short supply in Tanzania and Mauritius. For instance the Mauritius Government has estimated the future supply of ICT professionals to meet their plans to become a "cyber island" and concluded that there will be substantial shortages if training continues at the present pace over the next 3-4 years. In Kenya and Uganda, the human resource constraint is not as big a factor although particularly specialists are in high demand. In all countries, however, ICT industry-related education, both private and public, is expanding rapidly, and few businesses met cited the lack of qualified technical skills as a major constraint. Despite this, there appears to be a higher demand than supply of trained technology professionals, and in each country, major in-house training is required to transform new employees to be fully productive. The skills base seems to be particularly lacking in project management and general management skills—several industry leaders complained about the lack of general business skills of graduates emerging from the universities and that the university education tended to be focused solely on theoretical and technical skills.

Despite the challenges—in the EAC countries in particular—many positive developments have taken place in the region. The ICT landscape has changed dramatically over the last few years, particularly due to the massive expansion of mobile telecommunications shown in Table 4.

² Geoffrey Thornton. The 10 Megatrends of Submarine Telecom. Telecommunications International. 2003.

Table 4. Cellular Subscribers in Kenya, Uganda, Tanzania and Mauritius³

Country	Cellular Subscribers				% of total tele- phone sub- scribers 2002
	1995 (x1000)	2002 (x1000)	CAGR (%) 1995- 2002	Per 100 in- habitants 2002	
Kenya	2.3	1325.2	148.3	4.15	80.2
Uganda	1.7	393.3	116.8	1.59	87.7
Tanzania	3.5	427.0	122.7	1.27	74.2
Mauritius	11.7	350.0	62.4	28.91	51.7

3.2 Policy and Regulatory Environment

The table below provides an overview of the status of ICT policy processes in the four countries under study.

Table 5. Status of Policy Processes

Country	ICT policy process since	Status
Kenya	2001	Draft policy document was available in 2002 but not endorsed; The Communications Commission of Kenya (CCK) is driving a universal access policy process. Redrafting of the existing draft ICT policy appears likely under the leadership of the new Minister of Communications, appointed in July 2004
Mauritius	1998, revised 2004	Government has been developing and implementing multiple policy policies to address ICT and eCommerce needs.
Tanzania	1999	Spearheaded by a loose informal group – eThinkTank, but later taken on by government; formal ICT policy adopted in 2003.
Uganda	1999	Draft ICT policy endorsed and action plans being developed

The perceived success of the policies varies from country to country. Industry representatives and entrepreneurs generally felt that the ICT policy processes had improved the enabling environment for the ICT sector, but common criticisms were:

³ Extracted from tables at www.itu.int/ITU-D/ict/statistics/

- The lack of transparency in the process;
- The slow rate of adoption and ratification by governments (Kenya and Uganda); and
- The lack of leadership and vision from government to coordinate and integrate various elements of the ICT policies.

Interviewees in Tanzania and Uganda were the most satisfied with how the ICT policies have progressed whilst there has been much criticism and some confusion in Kenya and Mauritius. Mauritius already has a package of telecomm policies in place and is gearing up for the information economy. That country, however, does not have a single overarching ICT policy.

The Kenyan situation has changed very rapidly since the fieldwork was undertaken in July 2004, Kenya has seen

- A new Minister of Communications and Permanent Secretary put in place, both of whom are well regarded by the industry;
- The telecomm monopoly ended and a Second National Operator to be appointed;
- The monopoly international gateway expired and the market opened to other players; and
- The ICT policy likely to receive new direction and impetus under the new Minister. This illustrates well the rapidly changing nature of the ICT sector.

The national telecommunications operators have been commercialized and privatized to varying degrees, and in Kenya and Uganda a second national operator has been operating for several years.

The structure of the telecommunications industry is different in each country. In Uganda, there is a duopoly situation, which has not encouraged competition at large. The duopoly is scheduled to end in July 2005, when fuller market liberalization is expected. In Tanzania, the incumbent TTCL's monopoly will expire on February 22nd, 2005, and the regulator (TCRA) is conducting a review as to how to open up the market after that date. The key issues TCRA is considering are whether to create a duopoly or allow more players in the market, and how to open up international gateways. In Mauritius the incumbent operator is Mauritius Telecom. A new operator, MTNL from India, has been licensed, and will start island-wide wireless services in early 2005.

All countries in the study have independent regulators for telecommunications. Here the phrase 'Independent Regulator' simply means that a body or structure with a separate identity to the Ministry of Communications or the Government telecommunications operator exists. The actual independence of the Regulator has not been assessed. The status in each country is summarized in Table 5 below.

Given that a number of countries in the region will see the end of the exclusivity period of state-owned telcos or increased liberalization in 2005, there is likely to be much activity in this sector in the near future. This should provide some potential investment opportunities with new players in the telecomms arena.

Table 6. Telecommunications Regulatory Environment

Country	Regulatory Body (Year created)	Website	Liberalization and Privatization
Uganda	Uganda Communication Commission (1997)	www.ucc.co.ug	Duopoly in place. Full liberalization expected in 2005
Kenya	Kenya Communications Commission (CCK);	www.cck.go.ke	Major change from duopoly to full liberalization has just taken place.
Tanzania	Tanzanian Communications Commission(1993)	www.tanzania.go.tz/tcc.html	Monopoly telecomm company partly privatized (35%). Full liberalization of sector expected February 2005.
Mauritius	Telecommunications Authority of Mauritius (1988).	http://ncb.intnet.mu/govt	Monopoly telecomm company partly privatized (40%). Sector is fully liberalized but second national operator only expected to commence business in 2005.

3.3 Access to Telecommunications Infrastructure

Access to telecommunications services in the EAC countries is challenging because the countries have large land areas (in the case of Kenya and Tanzania), most of the populations live in rural areas and as shown in Table 7, poverty levels are high.

Table 7: Human Poverty⁴ Levels in the EAC and Mauritius

Country	HDI Rank 2003	HPI-1 Value (Note 1)	Probability at birth of not surviving to age 40 (%) 2000-2005	Adult illiteracy rate (% Age 15 and above) 2001	Population without sustainable access to an improved water source (%) 2000	Children under weight for age (%under age 5) 1995-2001	% Population below income poverty line : \$2 a day 1990-2001
Kenya	146	37.8	49.5	16.7	43	23	58.6
Uganda	147	36.6	41.1	32.0	48	23	96.4
Tanzania	160	36.2	46.4	24.0	32	29	59.7
Mauritius	62	11.1	4.6	15.2	0	16	-

Note 1: The HPI-1 is based on the same three dimensions – education, health and standard of living, but measures the *deprivation* in these three dimensions. The *higher* the figure, the *greater* the deprivation. For more information on the HPI-1, see the UNDP report.⁵

Note 2: The measurement of human poverty and the associated index is closely related to the HDI but in the UNDP Tables it operates as a measure of deprivation. The higher values thus indicate a greater level of poverty. HPI-1 = Human Poverty Index for Developing Countries

⁴ UNDP Human Development Report 2003, p245-247

⁵ UNDP Human Development Report 2003, p 342

In Uganda over 80% of the population lives in rural areas. The average GDP/capita in these countries is so low that most people can only dream of having their own telephone not to mention an internet connection in the foreseeable future. To provide telecommunications services to the majority of the population, community-based solutions such as community telecenters and cybercafés must be built in smaller towns and villages, and schoolnets, which can double up as community access points after school operations are completed for the day. Schools are extremely important enablers in this process, and the governments in the region must invest heavily to connect schools both to teach the children appropriate technology skills, and to provide up-to-date education to pupils in general.

Mauritius is very different as most households have a fixed line telephone connection, and mobile connectivity is growing. Internet penetration, although not high compared to countries in a similar economic bracket, is much higher than in the EAC countries.

The study countries have mandated various schemes to support the build-out of rural infrastructure. In Uganda, 1.0% of operators' revenue goes to the Rural Telecommunication Development Fund (RTDF). The nationally licensed operators also usually have universal service obligations to extend the networks to certain areas, install public telephones, etc. Tanzania has had a Rural Telecommunications Fund for some time, but it has not been implemented. The Mauritius National Telecommunications Policy of 2004 calls for a Universal Service Fund, with contributions from the operators yet to be determined. Kenya is currently undertaking a study to examine existing situation regarding universal access, and a related policy may be put in place in the near future. The Communications Commission of Kenya (CCK) is driving this effort.

A major factor in improving access is the price of service, which depends, among other things, on the openness of the market. The lack of competition, particularly in Kenya, has led to excessively high telecomms costs, resulting in connectivity continuing to be unaffordable to a large part of the population. This threatens growth opportunities such as the establishment of call centers that will find themselves unable to compete in the global market. Broadband connection prices, primarily sought after by businesses in developing countries, are much higher, and often beyond reach for small businesses. Considering the much higher incomes in industrialized countries and the small size of markets and customers in East Africa, the reality of limited growth potential in the shorter-term becomes evident.

In each country, there are multiple internet service providers competing for customers. The competition is seemingly there but what often prevents prices coming down are the interconnection costs charged by the incumbent operator. This coupled with the absence of an IXP—forcing the use of expensive satellite capacity for transmitting local as well as international traffic—keeps prices relatively high. The EAC countries all seem to be tackling this problem with Kenya having established an IXP, Tanzania having a pilot IXP in operation and Uganda in the process of doing so.

3.4 International Connectivity

Kenya, Uganda, and Tanzania depend solely on satellite for international connectivity. They are examining, together with other countries in Eastern and Southern Africa, the feasibility of building a submarine cable and connecting to the existing SAFE submarine cable that connects South Africa to Asia. That would have the potential of radically changing the current economics of the international connectivity, and enable the provi-

sion of new services. For the price to come down accordingly, it would need to ensure that there is sufficient competition in the distribution of the new capacity. Through the SAFE cable, Mauritius already has access to 10 Gbps of international connectivity that is upgradeable to 130 Gbps.

3.5 Access to ICT Services

The domestic markets in the East African study countries are small and so is the supply of ICT services. Numbers of ICT firms amount to 100-200 per country and virtually all of them employ fewer than 50 people. Systems integration expertise is limited and most local software applications development focuses on business processes such as accounting, payroll, and billing. Web design is perhaps the most common activity, supplied by the largest number of firms. There are a handful of firms implementing ERP and supply chain solutions, which typically rely on imported talent. These are often multinational companies operating through small regional and national offices.

In each of the study countries, call centers have been identified as a major ICT opportunity - some projects have just been implemented (e.g. in Mauritius) or are on the drawing board (e.g. Uganda through its planned incubator center in the Export Processing Zone). The industry is in start-up mode; there are perhaps four to five major call center operations combined in the region, including the Rogers 180-seat call centre in Mauritius, another of the same size in Mauritius, and one 200-seat operation in Kenya, which is targeting American callers and is to be operational by October 2004 (set up by a client of NIC Bank). Business process outsourcing (BPO) is on each country's agenda. It is only Mauritius, however, that has an active thrust and real BPO activities underway and the only country where BPO has become a key strategic focus area for the ICT sector.

Universities are major hubs for the dissemination of ICT. They have the largest concentration of ICT skills and generally act as industry dynamos and implement new technology solutions within their own organizations first. The main technology centers are Makerere University in Kampala; University of Nairobi; the University of Dar es Salaam and the Dar es Salaam Institute of Technology; and the University of Mauritius and University of Technology in Mauritius.

3.6 Capital Markets and Financing

The difficulty of obtaining financing to start up or to expand, is the biggest problem for entrepreneurs in the region. The banks require full collateral, or even 120% of the amount required, in the form of real estate assets or deposited funds at the bank. Banks do not generally lend against receivables, although in Tanzania this could be possible to a small degree. Most banks do not provide long-term financing; usually loans are for less than three years. No useful project financing is available. A well-established entrepreneur in Uganda offered as an example that he purchased several properties neighboring his current business to use the properties as collateral when applying for bank loans.

There is no organized venture capital or private equity market in the region for technology start-ups or for existing companies. Technology entrepreneurs tend to be dependent on their own savings and loans from friends and family to get business off the ground. The situation is slightly better in the telecom sector where the more established players have been able to secure capital.

There are several promising technology companies with interesting business plans and proposals seeking funding. Most of them are not however large enough in scale to fit the IFC's current product offerings, a fact well realized within the respective business communities. It was seen as an impediment that the IFC does not invest wholly in companies but often comes in as a small minority investor. Its bureaucracy was also considered a hindrance. A general comment from entrepreneurs was that any potential investor would have to bring in equity and also expertise, as this was lacking in many of their business operations. On the other hand, some entrepreneurs stated that they would be glad to see IFC representation on their boards, which would bring them global experience and solid strategic advice.

Going public is currently not a feasible option for raising funds for technology companies in the region. There is a stock exchange in each country but few companies are listed. None of these are technology companies except the incumbent operator in a couple of exchanges e.g. Safaricom (Kenya) has a bond listed on fixed incomes but no shares are traded.. The stock markets are immature with small market capitalizations.

There are a number of reasons for the reluctance of financial institutions to fund the technology sector:

- They do not understand ICTs, particularly the IT component which generally consists of intangible assets that cannot be seen; intellectual property is not understood and there is no in-country capacity to audit such products;
- In many countries intellectual property laws are non-existent or inadequate, thus providing little protection for any potential investor e.g. Kenya and Uganda.
- Trust is lacking due to the absence of credit checking systems (although such systems have recently been initiated in Uganda and Tanzania.)

Many ICT-related development projects within government organizations are funded through international donors and these do provide a limited amount of opportunity for small ICT players in terms of consulting, provision of hardware and occasionally the development of software. Generally, though, this type of funding does not tend to focus on the private sector, with the possible exception of USAID, and some even have policies prohibiting them from directly funding the private sector. E-government projects have received the attention of some of the larger multilaterals, and the issuing of tenders for such work has resulted in major opportunities for the ICT sector in the EAC countries.

4. Industry Trends

- The growth of the ICT sector in the region is rapid;
- The development of the wireless mobile industry, especially in the EAC countries, has been phenomenal with growth rates well in excess of 100% a year over the last five years (see Table 4). This growth is expected to continue into the future. MTN Uganda is an example of the explosive start of the industry. When it started in 1998, it achieved its first year business objectives in six weeks. The telecommunications industry at large, including voice and data providers and ISPs are aggressively pursuing new, mainly wireless technologies, to roll out services and increase coverage in the rush to lock in customers. New value-add services are being planned by most of the mobile operators. Due to the lack of capital in the region, there is an over reli-

ance on various wireless applications at the expense of more expensive optical fiber based solutions, but which would better enable participation in the global market.

- Software piracy is rampant and estimated to be as high as 80% in East African countries. This together with the lack of adequate protection of intellectual property could adversely affect the growth of the software industry. Unless urgent attention is given to putting such legislation in place, it is unlikely that there will be much interest from the investor community in software development.
- Increased liberalization of the telecom sector should provide many opportunities for new entrants in the next few years. Year 2005 sees the end of exclusionary periods in a number of countries. New policy regimes are likely to change the market structure in the EAC countries as well as Mauritius.
- Large private businesses and donors are, as a group, the most e-ready entities in the region and are targeted by most of the operators and ISPs as their target market. The private sector is investing at a steady rate in automation and capacity building, and increased use of ICTs in improving business efficiencies. In the banking sector, usually the leader in technology adoption along with international corporations, automation is proceeding quickly and there are several projects either just completed or underway to upgrade the capabilities of electronic banking, including banking switches and ATM networks. Plans are underway in some countries to expand the networks into smaller provincial towns.
- Despite governments' efforts to develop their ICT capabilities, the modernization work is largely a compilation of scattered projects without clear cohesive national leadership. e-Government in the EAC is not yet happening to any significant degree, but there are some effective applications and processes in place in Mauritius. Most governments do have web sites.

5. Human Capital / ICT Education

Reliable data on the available ICT skills base is not available in any of the EAC countries. At best, the anecdotal evidence seems to suggest that there is a general shortage of trained, experienced and competent ICT professionals. In some countries e.g. Kenya, the recent over-production of MCSEs through private training institutes has resulted in unemployment for many who have no job experience. There is an even greater shortage of business management skills than technical skills, strategic planning and project management skills. This is a major impediment across the region.

Perhaps in recognition of this shortage, ICT related training has been expanding quite rapidly in the region and is generally considered to be of high quality. Universities are diversifying their curricula and taking in more students. Private ICT training schools have also been proliferating, particularly in Kenya. The lack of standardization and the absence of an accreditation scheme for ICT training makes it difficult to judge the actual capabilities and skills of students emerging from the education system. A common platform and certification procedures were regarded as an important requirement in meeting the future demand for ICT skills. The situation is exacerbated by the lack of adequate ICT facilities at some universities, resulting in students with good theoretical knowledge but little practical hand-on experience. The universities provide people with a basic readiness but it is common that very significant on-the-job training must be done for new employees to achieve full productivity. Industry leaders estimated it generally takes 6 –

12 months before a new graduate becomes fully productive. This is a burden that few small companies can bear.

Although technical skills levels are quite high, there is a shortage of skilled and experienced business managers in the ICT sector.

In developing countries, the majority of ICT users are from the most educated part of the population. This means they reap the benefits and economic opportunities while the uneducated are excluded.⁶ It also means that a special effort must be undertaken to bring ICT to the poor, using means such as the Mauritian Cybercaravans. These two buses equipped with PCs and other ICT equipment travel the country offering free awareness and hands on courses in basic IT. 25,000 or more people have received this training.

To fully benefit from ICTs, there has to be a critical mass of skilled workers. An aggressive push to teach IT skills early on at schools is critical for broad-based development to take root. Cohesive development of curricula that takes advantage of technology as a tool in education is imperative.

6. The Internet

Internet use has spread rapidly in the region. Both dial-up and broadband services are available but, except in Mauritius, they are prohibitively expensive for the population at large. A broadband connection can be roughly ten times as expensive as in the industrialized countries. A monthly dial-up charge is not as expensive relatively, but since a subscriber must pay per minute charges rather than a flat rate, the total cost is many times higher than in the industrialized countries. With the exception of Mauritius where many homes have internet access, Internet cafes have increased rapidly, especially in large urban centers where they are very visible and numerous, easy to use and with reasonable access cost roughly USD1-2 per hour. This is still however cost-prohibitive in countries such as the EAC where there is a GDP/capita of around US\$400.

7. Other Developing Countries with Advanced ICT Sectors

India, Taiwan and South Korea are chosen as successful examples of the development of an advanced ICT industry in the developing world although South Korea and Taiwan have subsequently joined the industrialized world.

India

India is a technology success story. Until about 1990 India was very inward oriented and protectionist in its economic policies. Since then there has been a focus on more aggressive reforms and greater openness towards obtaining global knowledge and technology transfer. Long-term growth rate has doubled from an average rate of 2-3% to 6%. The software industry has been particularly successful, with exports projected to reach US\$50 billion by 2008. At the same time, India continues to have some major constraints such as bureaucratic red tape, corruption, low competitive pressure, and

⁶ Contribution of Information and Communication Technologies to Growth, Christine Zhen-Wei Qiang and Alexander Pitt, The World Bank, 2004

poor government effectiveness and rule of law.⁷ Despite the above and the slowdown in the global technology industry, the Indian software and services industry has emerged as one of the fastest-growing sectors in the Indian economy, with a growth rate of over 26% during 2002/03 and turnover of US\$12.7 billion and exports of US\$10.0 billion.⁸

The experience of India with growth of the ICT sectors, especially the information technology (IT) component, has attracted attention for a number of reasons. The pace of growth has been rapid, albeit from a low base, tallying with the dynamism seen as typical of the industry. Thus, according to data provided by Dataquest, over the 12-year period 1990-91 to 2001-02, the annual compounded rate of growth of output was 37.4%. In other words, output was doubling every 2.2 years. The rapid growth has essentially been the result of fast expansion of industry exports. During the period 1990-91 to 2001-02, exports have been growing at 54% per annum, or doubling every 18-24 months. Seen in terms of trend rates of growth, the rate of growth of output valued in dollars rose from 23.7% during 1990-91 to 1996-97, to 29.8% during 1995-96 to 2001-02, whereas the rate of growth of exports rose from 32.5 per cent to 46.6 per cent. As a result, the share of exports in IT industry output, which rose from 20 to 28 per cent between 1990-91 and 1995-96, touched a remarkable 61% in 2001-02. This includes exports of IT-enabled services (ITES) in the value for 2001-02.⁹

The IT sector's growth has been driven largely by the private sector on both the supply and demand sides, though government support in terms of IT infrastructure investments, duty-free access to hardware for software exporters and zero taxation of export profits played a role. Almost all IT firms producing for the domestic and international markets are private firms and the private sector has accounted for a dominant and rising share of domestic IT spending since 1995-96 and contributed as much as 73% of the total in 2001-02, as compared with 15% and 12% by the government and public sectors respectively. These features are remarkable because they reflect tendencies very different from those which have traditionally characterized Indian industrial growth during the import substitution years. This has been taken to indicate the positive effects that policies emphasizing private initiative and minimalist state can have on growth.

However, the real reason why India's experience with IT-sector growth has attracted attention is because it lends credence to the view that hardware and software development, besides being among the most dynamic areas in the global economy, are sectors where the new opportunities afforded are available to small firms, including ones from developing countries. This view is grounded in the perception that unlike the 'routinized' technologies that dominated industry during the post-World War II years, the new 'entrepreneurial' technologies typical of the IT sector are characterized by entry conditions that favor the rapid international and domestic diffusion of the industry. The easy entry conditions are seen to result from two features of the technology. First, the levels of investment required for entry are low and often relatively easily afforded by private investors in developing countries. Second, the knowledge required for entry is in the public domain

⁷ Carl Dahlman, Policy Strategies for a Knowledge Based Economy: The Asian Experience, Workshop Paper, World Bank, 2002.

⁸ Espicom Business Intelligence, 2004

⁹ Annalee Saxenian. Transnational Communities and the Evolution of Global Production Networks. Journal of Industry Studies Industry and Innovation. December 2002.

and is transmitted through open sources such as journals, seminars and universities.¹⁰ Other factors include an environment of certainty for foreign investment, with strong intellectual property laws and technology transfer. The removal of protectionism for local industries resulted in the upsurge in new business in the 90ps, despite concerns that the local industry would suffer.

Not surprisingly, over the years the software segment of the IT sector has come to dominate the industry in India. Entry into this sector requires access at competitive prices to very basic equipment such as networked PCs, to suitable high-speed connectivity infrastructure, and to the appropriate personnel. An easy way to ensure the first is to remove restrictions on hardware imports and reduce import duties on the same. With the sudden and dramatic success on the software export from countries like India, the pressure to liberalize hardware imports, including complete, branded systems, increases substantially, and government finds this route an easy option. Access to imported equipment is combined with public investments in the infrastructure required for connectivity and in training to generate the required personnel, as well as relaxed regulations with regard to private entry into these sectors could open up whole new opportunities for developing countries in the services sector.

Taiwan

Taiwan is an excellent example of the powerful impact that emigrants who return to their country with new skills can have on the economy. The vignette in the box below describes how a Taiwan citizen returned to Taiwan and formed a major semiconductor

company, Macronix Co., in Hsinchu Science Industrial Park. While Hsinchu Science Park was not the cause of Taiwan's successes in information technology industries, its success reflects the fast expanding ties between the two regions. After its first 8 years (1980-88) the Park was home to only 94 companies with under US\$2 billion in annual sales collectively and attracted only a handful of US-educated engineers annually. By the early 1990s the Park had become a destination for hundreds of returnees each year, who started new companies at an accelerating rate. By 1989, 2,840 Taiwanese had returned from the

Miin Wu immigrated to the USA in the early 1970s to pursue graduate training in electrical engineering. After earning a doctorate from Stanford University in 1976, Wu recognized that there were no opportunities to use his new skills in economically backward Taiwan and remained in the USA, working for more than a decade in senior positions at Silicon Valley-based semiconductor companies. He also gained entrepreneurial experience. By the late 1980s, when economic conditions in Taiwan had improved Wu returned home to start his own semiconductor company, Macronix Co. He located the firm in Hsinchu Science Industrial Park and brought 30 senior Silicon Valley engineers, mainly former classmates and friends, with him. In 1995, Macronix went public on the Taiwan stock exchange and the following year became the first Taiwanese company to list on NASDAQ.

US to work in Hsinchu Science Park, and these returnees were disproportionately more likely to start their own companies; some 40 percent of the companies located in the Science Park (110 companies out of a total of 284) in 1999 were started by US-educated engineers. These returnees in turn actively recruited former colleagues and friends from

¹⁰ Information and Communications Technology Sectors – Revisiting the Promise. Asia Africa Intelligence Wire. November 26, 2002.

Silicon Valley to return to Taiwan.¹¹ The proximity of the science park to technical universities and other research institutes contributed to the innovative capabilities of the cluster. By the end of the 1990s, Taiwan was the world's largest producer of notebook computers and a range of related PC components including motherboards, monitors, scanners, power supplies, and keyboards-and they had the capacity to shift quickly into new products such as wireless phones.

South Korea

South Korea is keen to position itself as Northern Asia's digital hub. To attract more foreign ICT investment the Ministry for Information and Communication says it will upgrade the standards for intellectual property rights to halt the rampant distribution of pirated software and solutions. In addition to punishing the pirates, the ministry says that it will simplify licensing procedures for the domestic telecom market and improve the interconnection fee system so that foreign companies can operate under fairer market conditions. Seoul's government is committed to building a US\$1.435 billion Digital Media City (DMC) by 2010 to attract both foreign and domestic high tech investment. Foreign investors will be eligible for various tax incentives, financial assistance and low cost land. Located just West of Seoul's business district and close to the city's university district, DMC will include an R&D centre, a state-of-the art science museum, an IT training centre and an urban entertainment center.¹²

8. Concluding Remarks

Various elements can be identified from the short descriptions, not all common to all countries, but all relevant to African countries:

- Outward looking ICT policies
- Minimal state intervention
- Creation of incubators, science parks and other types of ICT hub
- Private sector led ICT development
- Duty free component imports and removal of restrictions on hardware imports
- Low taxes on export products
- Strengthening of laws on Intellectual Property
- Focus on small firms: simplification of licensing procedures
- Encouragement of the Diaspora to return and build businesses in the mother country
- Easing restrictions on immigration of skilled ICT workers

¹¹ Annalee Saxenian. Transnational Communities and the Evolution of Global Production Networks. Journal of Industry Studies Industry and Innovation. December 2002.

¹² Go East: Asia-Pacific has it all - from R&D know-how in the developed economies to massive developing markets on its own doorstep in China. Is this the beginning of the end for ICT manufacturing in the western economies? Euromoney./Strategic Direct Investor. September 1, 2002.

Most of these elements can be seen in one or other of the countries in the present study. Within the broad prescriptions, the more specific opportunities emerging within the study countries include:

- Identification and creation of new services built on new technology neutral telecommunications regulations, including wireless solutions, value-added mobile services
- Business process outsourcing, data centres, etc.
- Call centres, especially exploiting niche markets such as Mauritius targeting French speakers
- Financing new operators as telecomm markets open up.

The follow on confidential report containing specific suggestions and proposals will offer more detailed examples.

It is important to stress the high level of competition that faces the nascent ICT industries in African countries, especially the EAC. South Africa for instance already has some 400 Call Centres and the recent relaxation of restrictions on VoIP, opening up of international access to telecoms, with the associated reduction in telecomm costs is likely to draw many international operators to that country rather than others in the region. The United States backlash to exporting of domestic jobs may well reduce the BPO market and make it less attractive and more difficult for US firms to outsource.

Appendix 1: The Digital Accessibility Index

The Digital Accessibility Index (DAI) is a “measure of the overall ability of individuals to access ICT’s” in as many of the world’s economies as possible. The index is based upon five key variables: infrastructure, affordability, educational level, quality and usage. If there is no infrastructure there is no access. If the services offered are too expensive and no-one in the population can afford them, then there is no access. If education levels are too low, individuals will not be able to use newer technologies. Low quality of telecommunications service will mean lower use by individuals as they get frustrated. The final category is the usage indicator, which indicates the overall usage levels of telecommunications.

In the table, fixed and mobile teledensity provide an example of how the infrastructure category is made up. Teledensity is defined as the number of fixed lines per 100 inhabitants. Similarly, mobile density is defined as the number of mobile phones per 100 inhabitants. Both of these indicators point to the level of access to basic infrastructure for each country. The ITU has chosen certain targets for each of the four categories. For infrastructure, the target is fixed lines per 100 inhabitants is 60, and for mobile lines per 100 inhabitants, it is 100. The actual fixed and mobile line density divided by the targeted line density leads to the infrastructure score that is reflected in the table below. A similar methodology is used for each of the other indicators – namely, affordability, knowledge, quality and usage. This leads to an overall Digital Access Index which is the average of the five categories.