

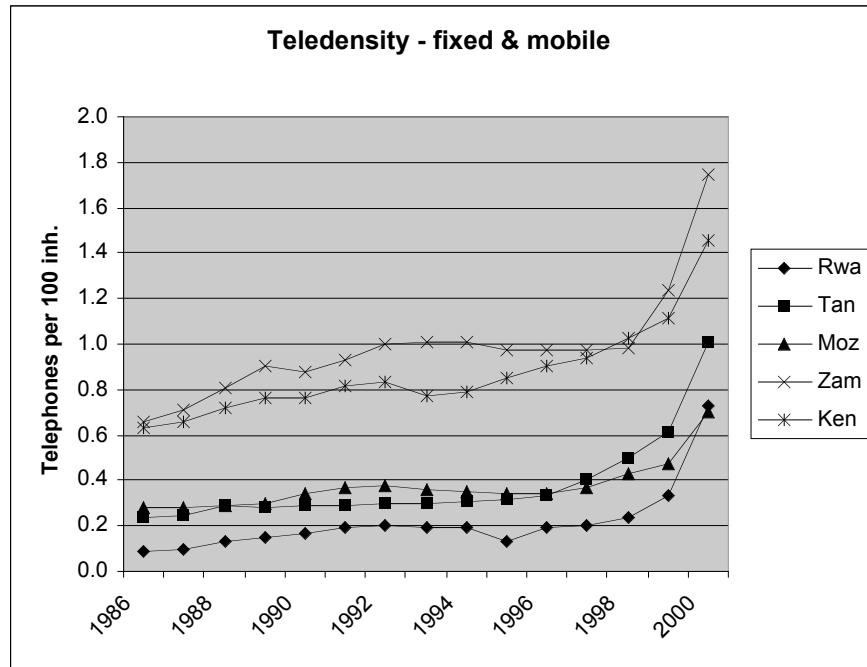
ICT in Five African countries

Introduction

During 2001 and 2002 Sida commissioned ICT studies for five African countries – Rwanda, Tanzania, Mozambique, Zambia and Namibia. The studies have followed a similar framework and this is an attempt to draw some general conclusions from them.

ICT stands for Information and Communication Technology. Because of the poverty in four of the five countries, electricity and the fixed telephone networks have low coverage, and the number of PCs is small. Few people have heard of, let alone used computers, and in remote areas this is true for telephones too. Still it is interesting to see and compare how new telecom technology is penetrating these impoverished economies more rapidly than any other technology has done before.

Connectivity, access and prices



Teledensity is a measure of the number of telephones per 100 people in a country. The chart above shows how teledensity has progressed over the last fourteen years in four of our countries plus Kenya. Total teledensity, i.e. the sum of fixed and mobile telephones is shown. Zambia and Kenya have a greater urbanized population than the other countries, and that probably explains why these two countries start on a higher teledensity level than the more rural countries. Until 1998, there were no GSM phones, so the first 10 years reflect the development in the fixed line network. There has been a slow increase in teledensity, which indicates that the number of lines grew at a slightly faster rate than population. The growth after 1998-99 is almost entirely from mobile phones. By 2002,

the number of mobile phones was greater than the number of fixed lines in all the five countries.

Fixed line network

All our five countries have only one fixed line telecom operator, all majority owned and controlled by the state. There are great differences between the operators' technical, managerial and financial capacity. The monopoly status allows the companies to control supply, demand and prices of all voice services, and data/Internet services in all countries except Tanzania. As a result, all the operators except Zambia Telecom turn out impressive profits – Rwanda Telecom made an impressive 75% of turnover in operating profit in 1998. Sheltered by the monopolies, prices for fixed line services are very high in all cases – especially for international traffic where they are 10-30 times higher than in many OECD countries. Local charges are in money terms similar to the OECD countries, but in relation to the average income in these poor countries, phone services are very expensive.

All the telecom operators except the Zambian one have made substantial investments in the fixed network infrastructure after 1996. Most exchanges are now digital, and as a result maintenance costs have been reduced. Rwanda, Tanzania, Mozambique and Namibia have more than doubled the number of lines in the last decade without adding staff (see the chart below). Namibia has built a national fiber-optic backbone with substantial capacity for an anticipated increase in Internet traffic. Tanzania is implementing 2 mbps links into all 22 regional centers for similar purposes.

The international gateways in all five countries have inadequate capacity. All five operators seem to follow a wait-and-see strategy in this important area, often using their legal monopoly rights to block alternative solutions and willing investors. As a result, Internet traffic is seriously congested with overpriced facilities. An exception is Tanzania, where considerable enhancements to data traffic using satellite and wireless technology have been made in the last few years. At least three licenses for data/internet services have been issued, and competition has started to bring prices down.

Mobile networks

, Rwanda and Namibia have one mobile operator each, each with the national telecom company as the majority owner. Tanzania has two major and three minor operators, and Zambia has two independent operators with Zambia Telecom opening a third network in 2003. Mozambique awarded a second license in 2002. GSM telephony has more users than the fixed network in all five countries. Prepaid subscriptions is by far the most common payment method. The prices for mobile services are high in all five countries, in the range of US\$.40-.60 per minute for the normal prepaid accounts. The incredible and continuing growth in cell phone numbers in all five countries shows, however, that far from all the demand is satisfied at the current prices. Geographical coverage is increasing rapidly, and in Namibia it covers two thirds of the population. Namibia's population is very concentrated compared with the other mainly rural countries, where the coverage is much lower.

¹ Vodacom has received a second license in 2002.

Internet Services

There are several Internet Service Providers (ISPs) in each country. According to Mike Jensen², users range from one per 3000 inhabitants (Mozambique) to one per 100 (in Namibia). The use of Internet cafés is increasing rapidly in all the countries, gradually spreading to smaller towns and cities. Most people cannot afford their own telephone lines or PCs, and Internet cafés provide affordable access to email and other Internet services to an ever increasing number of users. The Internet cafés are all private owned and operate mostly in a competitive environment. We have observed a tendency towards bigger installations, with 40 to 80 work stations in one café. Economic conditions make them concentrate on what people are willing to pay for, which is access to email services, job hunting services, typing and printing and telephone services. Voice over IP is illegal in many countries, but is definitely offered through some operators. VOIP offers international telephone calls at a fraction of the telecom rates, and many people are content with the lower sound quality when they can call relatives in the US for one US\$ or less for ten minutes.

Telecentres have been promoted by many governments and NGOs as a solution to bridge the digital divide. We have found very few functioning examples in the five countries, and the only surviving instances are heavily subsidized with government or donor resources (free computers, free premises, paid employee salaries, subsidized telecom services). In general, the Telecentre concepts are not sufficiently focused on what the public finds useful and hence is willing to pay for. Their experimental nature burdens them with large overheads and they frequently offer services their promoters believe the public “ought to have”. They become supply driven charity operations rather than demand driven, lean businesses.

Bandwidth is a serious constraint in all five countries. The telecom operators jealously guard their exclusive rights to international telecom services, which in all countries has the effect that the supply of international bandwidth is kept back. As a result, the Internet is badly congested with appalling performance at peak hours. Leased (Virtual Private Networks, VPN) lines allow the same bandwidth to be sold to several users, which is fine when traffic volumes are low. Many ISPs oversell their bandwidth, and blame the telecom operator when they get complaints from their customers. As a result of the supply situation, Internet access is very expensive. Leased lines with questionable capacity cost 10-20 times as much as in countries with a competitive market for bandwidth.

The available international bandwidth per 10,000 people³ was in 2001: (kbps)

Mozambique	1.1
Rwanda	2.0
Tanzania	3.7
Zambia	5.8
Namibia	33.8

² Mike Jensen, Information and Communication Technologies (ICTs) in Africa – A Status Report. UN ICT Task Force 2002

³ Jensen, op.cit.

Although Namibia is much better off than the other countries, it is sobering to express its international capacity as “one slow modem per 10,000 people”. The emerging competition over satellite/wireless solutions in Tanzania seems to be increasing available bandwidth, and prices are slowly falling. Prepaid Internet cards have been introduced as a new payment form. These cards work just like prepaid telephone cards, enabling the Internet user to pay by the minute he is connected. For users who are connected just one or two hours per week, this is a cheaper solution than monthly subscriptions. Another advantage is that the account can be used from anywhere. The hourly charge is similar to using an Internet café.

According to Jensen and other sources the rate of increase in new Internet users in Africa has started to decline, indicating a market saturation of some sort. In other countries, Internet expansion has been accompanied by falling prices and rapidly increasing capacity. In our five countries, Internet demand is, on the contrary met by constant prices and increasing congestion. This should explain most of the slow-down in adoption.

The number of web sites and Internet servers is increasing rapidly in all the countries, although a search for content about e.g. business in Rwanda often refers to first world sources. Local businesses show an increasing presence with simple presentation web sites. This is very common for tourist establishments, and bookings and reservations are increasingly done via email. There are as yet few professional web site developers, and only a number of newspaper web sites offer daily updates, chat forums etc. There is virtually no e-commerce. Some e-banking services are beginning to show up, especially in Namibia where the banks are closely connected with their South African head offices. There are few Government web sites offering information beyond simple introductions and presentations. Statistical information is offered in some cases, for example the Central Banks and national statistics offices have some limited tables available. There is only a small proportion of websites that are in local languages or dual languages.

The ICT policy process

Rwanda, Tanzania, Mozambique and Namibia all have started an ICT policy process as a result of NICI initiatives in 1998. Zambia has had a number of false starts, but disagreements within the Government have prevented a coordinated ICT policy process from starting. The policy processes are in different stages of implementation and have had some effects to raise the awareness of ICT as a development agent. The main obstacles for ICT development in all the countries are the same: The high prices and low capacity in the telecom networks, and lack of trained ICT personnel.

All country documents, however, lack strongly worded recommendations regarding privatization and deregulation of the telecom market. The issue of reformed telecom legislation was not addressed by some ICT policy commissions, and has been handled by other committees. The political strength of the incumbent telecom companies is evident in all countries. At the national Policy conference in Maputo in October 2001, the CEO of TDM stated rather clearly that the ICT policy process had nothing to do with the running of his company. In Zambia, the chief executive of the regulatory agency is a board member of Zambia Telecom. In Tanzania, the monopoly powers of the telecom

remain in place until 2005, which presumably encouraged a European consortium to purchase 35% of the company. The high cost of telecommunication in the monopoly environment is simply taken for granted – as if nothing can be done.

The lack of manpower and of training facilities is another key area for the policy creators. Although all countries have some university/polytechnic ICT training, the institutions are all rather new and have low capacity and little resources (exceptions are the Polytechnic of Namibia and the University of Dar es Salaam). The need for training is great on all levels, from existing PC users to technicians and teachers. In all countries, overall education resources are under great stress, and reallocating resources to ICT is not easy. The solution is a variety of donor-funded education initiatives, largely uncoordinated by national education authorities.

The policy processes have had a strong general development focus, starting with the vision of ICT as a development agent. Buzzwords like digital divide, e-commerce, e-government occur frequently, and the use of ICT in health, education, agriculture and other sectors is frequently mentioned. The policy documents are generally optimistic in their tone, painting images of how ICT will promote the general development of the country. The restrictions imposed by infrastructure are often discussed, but the analysis usually ends with stating the facts that ICT resources are limited and expensive. The relationship between monopoly and high prices is not seriously investigated, and the policies do not focus on how costs can be reduced and more ICT resources can be mobilized. As a result important structural causes are overlooked, and too much attention is given to “activities” of different kinds, often various donor funded projects.

In a policy perspective, one of the most important aspects is how the Government looks at its telecom monopoly, and how the monopoly views itself. The telecom companies are all very profitable, except in Zambia. They pay occasional dividends and considerable amounts of company tax to the Government, and therefore are important in the overall fiscal picture. The Zambian situation is different from the others. The main cause for the poor financial performance is the fact that about one third of Zamtel’s customers, mainly the Government and its parastatals, do not pay their telephone bills. In return for Zamtel profits and taxes, the Government thus gets “free” telephone services for some of its units. This perverse commercial arrangement has now gone on for a decade, weakening Zamtel and seriously hurting ICT development in Zambia. The telecom companies themselves use the profitability to enhance their images as efficient public service providers, showing off often impressive investment records, and strongly resist competition if not privatization. Foreign investors have entered as part owners in several African countries. In many cases, this has led to improvements in management and – sheltered by extended monopoly protection – large profits. A good example is Sonatel in Senegal, where France Telecom purchased a 42% share in 1997. In five years, the equity capital increased threefold from accumulated profits – an impressive performance. At the same time, Senegal has one of the best ICT infrastructures in Africa, but no competition. The Senegalese Government has sold out part of its shares, and the public now owns 20%. In this case, it is hardly likely that the current owners want to compromise the value of their holdings by proposing a second operator. The situation in Namibia is similar. A proposed Communications Bill proposes that the telecom market be opened to competition. As a measure against discrimination of new entrants it is proposed that the

incumbent Telecom Namibia will not be allowed to use past capital investments in the network as a basis for pricing when network resources are rented to competitors – the full “sunk cost” principle. This is likely to be hotly contested by Telecom Namibia, because it will obviously wipe out their monopoly profits – which after all is the general idea.

On the whole, some Government owners will have a difficult time accepting such competition-guarding principles, and it takes a very liberal mind indeed to see that this is the only way to get lower prices for ICT resources. The situation will not be easier when foreign owners - mostly European telecom incumbents – see their African investments threatened by such liberal legislations.

E-government

In the last few years, e-government has become a concept of fashion among people concerned with the Digital Divide. E-government refers to the delivery of public sector services through different ICT tools, mostly the Internet. It’s a catchy concept, and has rapidly become a buzzword in ICT policy circles in developing countries. It can cover anything from civil servants’ ability to communicate via email, to the ability to file tax returns over the Internet. But to be meaningful, e-government has to be able to deliver actual services, and these can only be produced in stable, “old-fashioned” IT systems, for example automated land and property registers which provide information to facilitate the sales, purchase and valuation of all individual properties in a country. Another example is a national vehicle register, through which the registration of all vehicle transactions such as change of ownership are transacted. These types of basic IT systems and databases are almost totally lacking in developing countries, and in the OECD countries they have been built at great expense over many years. ICT can be extremely helpful in solving the costly last step of delivery of services, but for many years to come, e-government will be a marginal issue in almost all developing countries.

There is progress in Government IT development in all five countries. Tanzania and Zambia are in the process of creating new national Financial Management Systems, a new Government Personnel system is implemented in Mozambique and there are many other examples. Plans for the networking of all government offices have been made in all countries. This progress must, however, not be mistaken for e-government. Wiring all offices is a *condition* for e-government, but it will be a very costly exercise and it will be long before it is completed. Replacing old IT systems, long past their useful lives, is an ongoing activity in all administrations, and it has nothing to do with e-government.

The ICT sector

The ICT sectors in all five countries are naturally dominated by the national telecom company and the various GSM operators. Together, they have two thirds of all ICT related revenues and manpower in the countries. There is no computer assembly or manufacturing evident in any of the countries, there is very little program development, and the IT sectors consist mainly of retailing, networking services, computer maintenance and training. On the user side, the banking and finance sector is dominating as the main user of ICT (except in Rwanda, where government and parastatals dominate).

Suppliers

In our five countries there are few, if any, IT companies with one hundred employees or more. Most companies have less than 30 employees, and offer the usual IT services – PC sales and maintenance, network design and maintenance, and user training. There are very few professional web designers – not even in Namibia – and few data processing or data base professionals. Tariffs and taxes on computer equipment and software have been a problem, but there is a tendency towards lowered or zero tariffs on these items.

In addition to the traditional IT suppliers, there are the Internet Service Providers, usually very specialized on their core business. These companies rely on a handful of well trained technicians in their supply of web servers and network capacity.

Users

The banking sector is a major ICT user in all countries except Rwanda. In Zambia, Standard Chartered Bank has connected all its branches using satellite communication, which gives on-line transaction processing from all its branches, as well as some Internet banking functions for companies. Namibia has a number of well developed companies with sophisticated IT solutions. In all countries, the use of ICT is highly concentrated to the capitals, and in each country it is safe to say that the 50 largest companies control three-quarters of all IT resources and investments. It is in these companies where the largest networks are found. The Governments as a rule have little money, and are lagging behind in networking. Namibia has started to develop a Government Intranet, but so far it only covers a small part of the Government offices in Windhoek. The situation is even less developed in the other four countries, where isolated departmental PC networks may exist, but without external communication links. In many cases Internet access goes via stand-alone PCs, where Government officers communicate using their private Yahoo or Hotmail accounts. Universities have sometimes impressive computer labs, but unbalanced financing arrangements create situations as in the new library at the University of Namibia. Over 100 state of the art PCs are installed in beautiful premises, but only ten have an Internet connection. The reason is the prohibitive – and unbudgeted – cost of a high capacity Internet connection. A 512 kbps line would cost US\$20,000 per year, a lot of money for the University administration.

Human resources

Estimates of the total number of PC users are uncertain, but in the five countries we have studied, there are probably altogether between 200,000 and 400,000 computer users in the year 2003. The growing number of PC users in Africa are largely first time users, self-taught or with only very limited computer literacy training. In general they are not good at using their equipment, and because of lack of adequate on-the-job training, they are constantly left behind. Except in Namibia and in a limited number of large institutions in each country, internal networks in companies and institutions are either absent or fragmented, and where Internet access exists, it is limited to one or a few PC's per office. Most ordinary users have so far no experience of the “networked world”. Technical skills for maintenance, networking and training are in short supply. ICT studies is included in the school syllabus in most countries, but few schools have computer labs for students, even if the number is slowly increasing as a result of different initiatives.

In Namibia, we asked a professor of Computer Science if his students in general are familiar with computers when they enrol in the CS course. The answer is that few, even in this group, have ever used a computer before they start university. The approximate output of ICT graduates from universities and polytechnic schools is shown in the following table.

	ICT BSc per year (2001/2002)	Diplomas in ICT per year (2001/2002)
Rwanda	10	30-40
Tanzania	25	50-150
Mozambique	15	20-50
Zambia	10	20-30
Namibia	10-15	150

The number of annual graduates (Polytechnic and University) per million inhabitants is about 90 in Namibia and 5 in Tanzania. This number is now increasing rapidly as the academic programmes are becoming more established. As a comparison, the annual number of *university* ICT graduates in Sweden was 160 per million in 2000, almost 20 times as many as Namibia.⁴

Manpower

Formal university level training in ICT was only introduced in the last decade in our five countries. Before that, ICT training was either obtained abroad or on the job. In Zambia much of the training was done by the Zambian copper mining company (ZCCM), where a large computer center was established around 1970. Many Zambian ICT professionals got their skills from this center. There are also many young people from all the countries who have studied in Europe or the U.S.A., and in recent years they all return with computer literacy as a matter of course.

In all countries, the “shortage” of people with ICT qualifications was mentioned as a problem. Curiously, this shortage exists together with a low salary structure, indicating a labour market failure of some sort. In Namibia, this was investigated by the ICT Policy Report, and a number of explanations were offered. In Government, there is no provision under the present conditions of service to pay a salary premium for ICT knowledge. As a result, qualified staff tend to leave the Government for parastatals and the private sector. This increases the supply in the private sector, and tends to depress salaries there. There is a genuine shortage of people with high level ICT qualifications, especially in the area of data base design, and enterprise systems. Namibia has a relatively large number of SAP R/3 enterprise installations, and most installation work has been done by South African and to some extent German experts. Finally, strict immigration and work permit

⁴ National Agency for Higher Education, Sweden. Official statistics.

rules limits the regional interchange of ICT staff in the SADC area. There is a tendency for well educated mainly white Namibians to move to Europe or South Africa in search of well paid ICT jobs. If this constitutes a genuine brain drain or not is debatable.

In Mozambique the situation is different. The economy is booming, partly as a result of large donor funded investments in all areas of the economy. Much of the investment activity helps to accelerate the modernization of the economy, and a great deal of ICT investments follow from this. The market for ICT services is good, but the supply of local competence is very low. This forces salaries up, as donor funded projects compete for the few available individuals. A significant number of expatriates are imported as technical assistance staff for the different projects, and this of course does not contribute to national capacity building. When we asked a local IT entrepreneur about supply of personnel with ICT competence on the level of the entry level “International Computer Driving License”, we were told:

“Well, if we find one of those, we would make him the computer manager”.

Computers in Schools

The ICT policy papers all emphasize the importance of increasing the computer literacy of school leavers. This, it is thought, will be accomplished by installing computers in schools, through the inclusion of ICT in schools syllabi, and through teacher training. So far, there is little progress except in Namibia. Even with a very moderate level of ambition, with twenty PCs per secondary school, the number of PCs needed is staggering. In Tanzania, there are about 830 secondary schools, and to cover them all would require 16500 PCs and two teachers with ICT training per school. Some secondary schools are still lacking electricity and most have no telephone. The countries’ school budgets will not in the foreseeable future be able to absorb new expenses for investments and operating costs, and other solutions must be found. Schoolnet Namibia and the Computer Education Trust in Swaziland represent two solutions to this dilemma. Both are private non profit organizations, financed through donations of money, goods and work. Schoolnet Namibia aims at providing all Namibian schools with computers and Internet connections. 200 schools have to date received about 2000 second hand computers, and Schoolnet is building its own wireless Internet network of 30 base stations in the northern rural areas to provide Internet access. Computer Education Trust in Swaziland is a small NGO financed by private donations. It has deployed some 500 second hand computers in about 25 schools. In both cases the equipment is second hand PCs from overseas, collected and shipped by voluntary organizations in Europe and the U.S.A. There is no shortage of obsolete PCs in the OECD countries, but collecting and shipping them in large numbers is a challenge. It will also be a huge challenge to maintain 830 computer labs (Tanzania), replacing 7000 to 8000 computers each year as they break down, maintaining network and software integrity and providing teacher training in ICT.

Priorities

In each country, we have tried to identify a few ICT related areas where the local stakeholders have pointed out specific problems or solutions. Common for all countries is the problems with telecom capacity and prices, and lack of competition. This is by far the most important bottleneck for ICT development. Other than this, a large number of

different issues have been mentioned. Lack of education facilities and opportunities is one, and lack of qualified ICT manpower is often mentioned at the same time. In general, the policy processes can be criticized for not involving the private sectors.

Rwanda

It is the opinion of the consultants that Rwanda has seriously under-estimated the effort needed to develop the necessary human resources to fulfil the 5-year NICI plan. An appreciation of the implications of the 2001-2005 5-year NICI plan is limited to a small elite group within Government. The active and enthusiastic support of the President of Rwanda for an ICT-led development process is an extremely strong positive factor but carries the danger of a top-down approach where unrealistic targets are not questioned and cannot be implemented. Our assessment of the planning process to date is that it is not an inclusive process and that the necessary understanding and buy-in on the part of most of those responsible for implementing the programme has not happened. For a considerable time (at least 5-10 years), the impact of ICT in most rural communities will be close to zero and the pressing problems of those communities will not be solved using ICT. The level of ICT use in any country is closely related to the country's income, and Rwanda – one of the poorest countries in the world - is no exception.

Tanzania

There is evidence that the use of ICT in Tanzania is gaining momentum and that the considerable effort made by the government to liberalise economic policy in recent years is bearing fruit. While the rapid integration of ICT into the economy of Tanzania faces difficulties similar to those found in other countries in the region, the government of Tanzania has shown by word and deed (such as the recent elimination of VAT on computer hardware) that it is prepared to make a special effort to try to expedite this integration. The most visible sign of ICT activity in Tanzania is the remarkable growth and presence of Internet cafés across the country. VSAT-based wireless Internet solutions are available from several ISPs, making high capacity connections easier to get. The number of people who actually use the Internet is increasing rapidly through the Internet cafés, which are available also in regional towns across the country. The Tanzanian Telecom company still has a monopoly on voice telephony, but it is clear that services like VOIP must be used extensively in clandestine competition.

Mozambique

The economy in Mozambique has grown rapidly during the last ten years, fuelled by large transfers of donor money. The per capita income has doubled, albeit from a very low level. The capacity of the telecom sector has improved dramatically, and the teledensity has increased from one telephone per one hundred people to seven per hundred. Large investments have been made and continue to be made, increasing telecom coverage outside of Maputo, and cell phone coverage is gradually extended to provincial capitals.

Mozambique has had an active ICT policy process, setting priorities for ICT development in Education and the Development of Human Resources, Health, Governance and

Infrastructure and Universal Access.⁵ The implementation strategy is very wide in its scope and has identified a large number of projects and priorities. Many are already being implemented, such as the modernisation of the telecommunications infrastructure, where the national telecommunications operator, TDM, is carrying out a very large investment programme. Several projects aiming at the modernisation of existing procedures and IT systems in various government departments have also started.

There are a number of areas that are not directly addressed by the implementation strategy but which have to be considered in any future implementation plans, as they present potential opportunities for the future growth of the country.

Little emphasis is placed on developing stronger management skills in the public and the private sector, yet it was raised during our study as a major area of concern. A deeper understanding of the impact of ICTs on increasing effectiveness, and the need for innovation and rapid change in this fast-moving environment requires more attention to the development of management and financial skills for high-level professional staff and decision makers.

In-service training in ICTs of the existing workforce could create major leverage opportunities for creating an Information Society. The strategy does include the development of an ICT institute but does not specifically mention whether it will be able to provide this type of training.

The implementation strategy has a strong social developmental focus with little emphasis on economic growth or competitiveness. Sectors that could produce potential wealth for the country have not been identified, nor targeted for specific action. This appears to be a missed opportunity. Aspects relating to stimulating the economy, for example in agriculture and tourism, need to be developed. The potential of the diffusion of ICTs into specific sectors such as the petrochemical and transportation industries, and the potential savings this may bring about, have been excluded. The role of ICTs in stimulating export markets should be explored.

The high cost of telecommunications, probably the largest constraint in creating an information society, has not been addressed.

The role of the private sector is ill-defined, yet future implementation will rely heavily on involvement and investment by this part of the economy.

Zambia

Zambia's main problem is that there is a decade-long deficit in ICT infrastructure investments. This has left the country with a weak ICT infrastructure and inadequate internal and external transmission capacity. To bring Zambia back to a situation where its ICT infrastructure can match that of Tanzania, Botswana or Mozambique, investments in the order of 100 to 200 million US\$ are needed in a relatively short time. The lack of capacity slows down progress in all ICT related areas, and Zamtel's

⁵ Summary of the ICT Policy Implementation Strategy: ensuring Access to Information by laying the foundations of a Knowledge Society, Maputo 3 – 5 October, 2001

unwillingness to share its monopoly privileges with other potential investors effectively keeps foreign investors away.

Zamtel's situation will not improve until it gets new owners and managers, with enough political and financial clout to withstand pressures from government clients to give them free telecom services. Given the considerable risks of political interference in the operations of a privately owned Zamtel, wholly private investors are unlikely to appear, and an intermediary willing to absorb a greater part of the business risks will have to be found. The government offered a 30% stake in Zamtel in 1998 through the Privatisation Agency, but no deal was made at that time.

At the time of our visit to Zambia, much of the development debate was focused on a recently published "Zambia Poverty Reduction Strategy" paper. The paper describes the deteriorating economic situation in Zambia, and the worsening poverty situation. It discusses various strategies for economic growth and development. Reading this paper with the eyes of an ICT professional, it soon becomes clear that the authors do not recognize the role of an efficient telecommunication system in economic development. In the 141-page document, only one paragraph deals with ICT.

In our view, ICT is and has always been an extremely important factor in development. Information and communication are strong levers in the economy even if they do not appear with big numbers in the resource tables of economic models.

We believe that poverty is made much worse through the lack of communication and connectivity in poor societies. Connectivity can be improved by a new mass communication system, based on email and other forms of widespread and affordable messaging. There is a place in rural communities for computer literacy education as well as many other IT-related services, but in order to be financially sustainable they must be based on a service used and financed by the majority of the people.

The digital divide will be bridged when people can communicate across it. It is the lack of communication facilities that divide rich and poor countries. This difference existed long before the Internet, but modern technology makes it easier than before to lay out the bridges, not more difficult. There is no digital divide, only an historical opportunity for poor communities to rapidly improve their communication facilities. It is in this perspective ICT and poverty should be seen.

Namibia

Of the five countries, Namibia's telecom infrastructure is by far the best developed. According to MTC, the Namibian GSM operator, as much as 65% of the population now live within reach of a mobile signal. On most indicators – teledensity, Internet users per million, telecom investments, ICT graduates output, international bandwidth – Namibia scores five to ten times higher than its poorer neighbors.

The majority of the population, however, live outside of the modern sector, and except for the (potential) access to mobile phones, they are not touched by the ICT revolution. Schoolnet's wireless IP network may change this, as many schools may become local communication centres when they get connected in the next few years. Compared with all other available options, this is clearly the most realistic approach towards more universal access, fast-tracking access by many years—if it works.

There are a number of problems with Internet use in Namibia. Internet access is slow because of local, regional and international congestion, largely caused because there are too many users sharing the available capacity. High prices for bandwidth force many organizations to make do with too little; there are several examples of companies with many users who share a single 64 kbps line. Namibia needs with immediate effect a large addition to its international bandwidth. Telecom Namibia does have the financial means to effect this, but short-term profitability concerns stand in the way; more bandwidth would immediately translate into lower prices for fixed lines. Against this stands efficiency losses in the economy from having to rely on a constantly congested Internet network. Like many other monopoly operators, Telecom Namibia is protected from the public's view, and does not have to face its customers on issues of price and quality.

Namibia still has a long way to go in building the human capacity to accelerate its development as a networked society. Specifically the mainstream educational system has yet to act on its own 1995 policies to strengthen the role of computers in schools curricula and school administration. There is, however, some recent movement in the National Institute for Educational Development and this initiative should be strongly supported. On the positive side, the University of Namibia and the Polytechnic of Namibia are both making strong moves to enhance their technical capabilities, change educational offerings and offer their educational products via distance learning. At the school level, Schoolnet is growing and expanding into new areas

The government is a big user of ICT in Namibia. There is a government IT centre under the Office of the Prime Minister, essentially a relic from the mainframe days, in charge of maintaining a number of legacy systems for central government, such as state budgeting and accounting, and the government payroll. The IT centre has made attempts at coordinating IT technology decisions and purchasing, but apparently with little success. There are plans to create a "Government Intranet," with the objective of facilitating electronic communication within government on a national scale, but little progress has been made in this area. The constraints are mainly financial; the budget allocations to provide adequate communication facilities have not received priority among all other needs of the young state.