

MOÇAMBIQUE₃ eReady?

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Executive Summary

offer me a fishing rod – rather than a good catch

Mozambique, a country that is one of the poorest in the world, yet one of the fastest growing, has a strong potential to become a competitive asset in the new world economy. There are many obstacles to overcome – such as severe illiteracy rates, lack of basic infrastructure, such as teledensity and electricity in many areas - yet there is room for great improvement. This report endeavors to provide an overall picture of the status of information and communication technologies in Mozambique in the year 2001. The country is led by many bright minds who are tirelessly striving to lay the foundations and building blocks of an economy that can compete in the new world order, an economy that has only recently ended two wars, one civil and the other of independence, not so long ago.

This report aims to present the country's national background, furnishing information about its economy, demography, political situation and providing basic information about the Internet, information technology and telecommunications environment. The readiness methodology developed by Harvard's Information Technologies Group: "Readiness for the Networked World¹" will be used to analyze the status of ICT in Mozambique. Then it provides a description of Mozambique's telecommunications policy and ICT trade policy and analyzes whether these policies facilitate or obstruct ICT development in Mozambique. The following section moves on to describe the networked access environment, discussing information infrastructure, Internet availability and affordability issues and related software and hardware environment issues. Within this context, the use of the Internet and information technology in various applications such as learning, health and economy will be addressed. Finally, an analysis of how IT is used by society at large will be presented. The last part of the report will portray a set of potential recommended actions that may be taken by the Mozambican government, as well as private sector and could be absorbed within the strategy that is currently being shaped within the ICT Policy.

¹ www.readinessguide.org

National Background

Where is it?

Mozambique is located on the lower southeastern side of the African continent. It is a long strip of land, bordered by the Indian Ocean in the East, Tanzania, Malawi, Zambia, Zimbabwe, South Africa and Swaziland in the North, West and South. The population of 16,841,000 (1999) inhabits a surface area of 799,380 sq. km, most of which – 71% - live in rural areas and 29% in urban areas. Portuguese is the official language while there are various indigenous dialects stemming from tribal groups (Shangaan, Chokwe, Manyika, Sena, Makua, and others) which form 99.66% of the population; Europeans, Euro-Africans and Indians form the remaining percentage. Mozambican religious beliefs are 50% indigenous, 30% Christian and 20% Muslim. The country is divided into ten provinces: Cabo Delgado, Gaza, Inhambane, Manica, Maputo, Nampula, Niassa, Sofala, Tete, and Zambezia.

Politics

Mozambique had been a Portuguese colony for five centuries till it earned its independence in 1975 after an eleven-year war. A Marxist government took over the country at the time, which soon led to a 15-year civil war, ending in 1992. The ruling government formally abandoned Marxism in 1989 making way for free market economy. A UN-negotiated peace agreement with rebel forces ended the fighting in 1992. During the civil war, Mozambique lost nearly its entire infrastructure and hundreds of thousands of lives.

President, also Chief of State, Joaquim Alberto Chissano has been in office since November 1986. He was reelected in 1999 with a 52.29% against Afonso Dhlakama (47.71%). The Prime Minister Pascoal Mocumbi also serves as the Chairman of the ICT Policy Commission.

Economy

Mozambique is among the ten poorest countries in the world, with around 60% of its population living below the poverty line. Since 1992, almost all facets of the economy have been liberalized to some extent. More than 900 state enterprises have been privatized. Since 1996, inflation has been low and foreign exchange rates stable. Mozambique's economy grew at an annual 10% rate in 1997-99, one of the highest growth rates in the world, with a zero inflation rate. The growth rate decreased in the year 2000 to 3.8%, while inflation increased to 11%, due to floods that took place in February of that year.

Mozambique heavily depends on donor funding. It is a four billion-dollar economy, three-quarters of which is funded by donor agencies. Donor funds cover one half of country imports.² As Adérito Robiro³ remarks, "We don't own our destiny yet;" Mozambique imports almost everything. Per capita GDP is 230 USD while the PPP is in the range of 800 USD. According to the Household Sample Survey of 1996-1997, 69% of the population has been living in absolute poverty.⁴ Most people live within thirty kilometers from the nearest health center, are illiterate and have no clean water. The average standard of living in Maputo, the capital, is nine times that of



² EU, US, and Scandinavia are the major donors to Mozambique.

³ Chief Executive Officer, Connection Time (an Internet café in Maputo).

⁴ Absolute poverty is defined as daily consumption of 2100 calories and a PPP of 50 cents/day.

the average standard of living in the rest of the country. The average illiteracy rate is 60.5% and average life expectancy is 42 years.

Most Mozambicans are subsistence farmers, with less than 5% using modern technology for farming (pesticides, tools, etc.); agriculture forms 32% of the economy. Maputo suffers from power cuts once a month; other provinces suffer from power cuts daily. Since its independence in 1975, the processing of cashews, of Mozambique's highest export commodities, has completely collapsed. Trees are not being properly treated and maintained for the past twenty years due to disruptions of the independence war.

The Bare Facts

Item	Value
Population	17 million (1999)
GDP	3.9\$ billion (1999)
GNP per capita	230\$ (1999) 193 rd /206
PPP per capita	797\$ (1999) 191 st /206
Exports	\$300 million (f.o.b., 1999 est.)
Export Commodities	prawns 40%, cashews, cotton, sugar, copra, citrus, coconuts, timber (1997)
Imports	\$1.6 billion (c.i.f., 1999 est.)
Structure of Economy	Agriculture: 32% Industry: 24% (of which mfg 13%) Services: 44%
Labor force	agriculture 81%, industry 6%, services 13% (1997 est.)
Child malnutrition under 5	26% (1992-1998)
Life Expectancy	44 men 47 women (1998)
Under 5 mortality	213/1000 (1998)
Adult Illiteracy	42% men 73% women
Population Growth	2.2% 1990-1999
Poverty	<1\$/day PPP 38% <2\$/day PPP 78%
Human Development Index	0.341 (UNDP 1997)

Source: World Development Report 2000/2001

Mozambique has one of the richest titanium deposits in the world, which is yet to be exploited. The Mozambican economy is very strongly linked with that of South Africa. Mozambique's service industry (44%) consists of transportation, trade and telecommunications. A quarter of the GDP depends on industry - there are six major textile companies operating in Mozambique. The largest industrial sector is food and drinks processing. Most of the local industry is inward looking, lacking the knowledge about export, international markets and competitiveness. "There is too much thought from the outside and too little thought from the inside," comments José Murta, Managing Director of EXI. Patricio Sande "It's not cooperation - it's mono-operation."

MozAl, an aluminum smelter has opened its business in August, 2000. This was the first foreign investment project in Mozambique. MozAl is a one billion-dollar investment contract for 25 years. The main production capacity is ports, railways, cashew nuts, tourism and prawns. The country is highly dependent on the railway and port companies.

Internet and Telecom Background: *History and Key Players*

The Internet and telecommunications in Mozambique have grown on the shoulders of a few players that are worth noting:

The **University of Eduardo Mondlane** was founded in 1962 by the Portuguese people to provide education for their children. Most Portuguese professors returned to Portugal, at the time of independence from Mozambique in 1975. The University was left with ten Mozambican teachers and less than one thousand students.

In 1992, a university-wide information policy was designed aimed to create a common view of how ICT should be integrated in the university. In 1993, Mozambique became the 4th country in Africa to be connected to the Internet alongside Tunisia, Egypt and South Africa, providing a 9.6 Kb dial-up connection to three hundred users.⁵

CIUEM is the Center for Informatics at the University of Eduardo Mondlane. It is a technical unit responsible for the development of ICT policies and operations at the University. The CIUEM was established in 1979. In 1982, it became a formal computer center, but also explored research issues around soft computer science and informatics. The Center also functions as a commercial ISP providing Internet services, training, software analysis and design, web design and hosting for private clients as well as for the University. CIEUM provides access not only to students but also to NGOs, businesses, government and members of the international community. It also operates the largest Internet service. The CIUEM was the first public ISP (?) for Mozambique. It initially provided free Internet accounts for the first one hundred users in order to build awareness about the Internet.

The CIEUM's first Internet connection was in 1992 through a dial-up link of 9.6Kb to Rhodes University in Natal, South Africa, through UNINET, paying \$14,000 USD/month. In 1993, the Center moved to a leased line of 14.4 Kb, then to 28 Kb and then 33 Kb. Its first VSAT link was through transtel in South Africa (64 Kb connection). It was finally upgraded in 1997 to a 1 MB shared connection with Tanzania and Seychelles. This upgrade was funded through the Leland Initiative⁶. The Leland Initiative is a USAID project that funded five Internet Service Providers from the private sector. The quality was very low for the demand (less than 128 Kb), so a decision was made to move to a dedicated link in October, 2000. This is a 2-way link (394 down and 128 up). The second VSAT link (through the World Bank's satellite channel) is from the US. It is a 512 Kb link to be strictly used for educational purposes (such as video conferencing) and not for commercial purposes. This link was funded through the World Bank.

The CIEUM is licensed to provide Internet services. It maintains its license through payment of \$3'500 USD/year. The CIEUM also has a license for a wireless metropolitan network, which costs the same as the ISP license.

CIEUM's performance is said to be slowing down due to lack of proper organizational structure and business skills. The CIEUM is working on a joint venture with a company that will establish a national telecom backbone. This center has worked on several projects including telecenters and School Net.

Moving from Internet to telecommunications, **TDM** (Telecomunicações de Moçambique), the incumbent telecommunications operator, was created in 1981 as a result of the split between post and telecommunications, becoming a parastatal with limited financial autonomy. Development of TDM was moderate throughout the war. However, with the end of the civil war, it was corporatized, a board of directors was created and its first annual report was produced in 1993. TDM will change to a private company with limited liability that is 100% owned by the State by June 2001. The government is preparing TDM for privatization in 1.5 years and is looking for strategic equity partners due to lack of financial capability. The

⁵ The first e-mail was sent in 91/ 92 at 1200 baud rate with a 286 portable computer.

⁶ <http://www.usaid.gov/regions/afr/leland/>

private sector community is very skeptical that this operation will take place as scheduled⁷. The current problem is that less and less companies are interested to invest in fixed line companies. One possibility is to have a mixed solution, where there is one financial partner.

TDM provides the following services: 1. Fixed Telephony 2. Mobile (the only mobile company) 3. Data communication services 3. ISP services 4. Cable TV 5. Internet access to ISP's 6. Audio-text services 7. Paging 8. Consulting services 9. Terminal equipment 10. Project design of access networks.

TDM started to provide access to the Internet to five ISPs in 1997 (within the Leland Initiative). ISP's are waiting a long time for additional capacity from TDM and are not satisfied with TDM service. TDM has relegated its Internet services in 1996 to one of its subsidiaries – Teledata - via a joint venture with Portugal Telecom. The Internet connection is through MCI to Boston with a down-link of 576 Kb and an up-link of 192 Kb. It is the only company with national coverage? As Mr. Gomes Zita, Operations Manager of TDM, mentions, "we are trying to avoid cross-subsidy between Teledata and TDM. If there are cross-subsidies, they need to be defined."

Mr. Zita mentions that TDM is open to revenue sharing with ISP's, who potentially attract a lot of telephone traffic. TDM verbally mentions that it is open to such schemes, however when speaking to several ISP's the view was quite the opposite. One ISP - Virconn - produces 30,000\$ of minutes/month. "TDM doesn't have the mentality," remarks Helder Santos, Managing Director of Virconn.

Teledata does not provide Internet access to other ISP's. It has one Internet café located at its premises in downtown Maputo, charging roughly 2.3\$/hour. TDM also has its Internet café in the Rovuma-Carlton hotel. Teledata also has a branch in Beira (opened in 1998), Nampula, Quelimane, Lichinga, and Kwamba.

The Internet

There are eight ISP's in Mozambique, all of which run their main operations in Maputo. Five of the eight ISP's listed above⁸ were established thanks to one of the most successful initiatives of US AID for Africa – The Leland Initiative. TDM was one of these five ISP's, allowed to give leased line access and not dial-up connections to end customers. Vircon, one of the leading ISP's has built its own gateway after it requested more bandwidth from TDM, which failed to satisfy its request since it had a proprietary system which could not be upgraded. Virconn started with a 256 down, 128 up link and then it moved to 1 MB down and 384 up link recently?. In December 2000, Virconn opened offices in Beira (capital of Sofala province), Nampula and Quelemane. Virconn was the 1st private company to go to Beira. These offices have been established through DataCon (a joint venture between Virconn and Dataserve, one of the largest hardware suppliers in Mozambique).⁹ Virconn has 1600 users and 30 leased lines (with an average of 80 users per line). (See appendix B to view charges for Internet). Virconn's company is operated through nine people in total. The company started its operations in 1987 with a capital investment of 15,000\$ and has now grown to 600,000\$ of capital.

There are less than a handful of Internet Service Providers that operate solely in ISP service provision. Other companies couple ISP services with other businesses. These are "sub-ISP's" whose ISP operation reflects a very minimal percentage of business. For example, Garp is a company whose business is to do the paperwork involved when businesses import goods from abroad. Emil and Computer Solutions are basically hardware companies that have added ISP service provision as part of the services they offer. CFMNet however is the railway company (public?) which has also ventured into ISP service provision. There are eight ISP's and four gateways. Charges are relatively high since costs for a 1MB link from the US is equal to 19,000\$/month.

One of the major issues that exists is that there is no peering. TDM would allow peering but at very high costs. "It's cheaper to have a leased line to individual ISP's," remarks Helder Santos, CEO of Virconn. He mentioned however, that CIUEM has plans for peering.

⁷ At the time this paper was written, the privatization process did not yet take place.

⁸ These five ISP's are: VirConn, Computer Solutions, Garp, Tropical Net and TDM?

⁹ Dataserve is a dealer for Compaq

Fixed Services

The growth rate of fixed telephony services has been fairly stable (8-10%) in the past five years, heavily dependent on the economic situation of Mozambique. The network is 100% digital (switching), with a 98% digital transmission capacity. There are terrestrial links to South Africa, Swaziland, Zimbabwe and Malawi. The international gateway is in Maputo – connected via IntelSat to South Africa and Portugal.

The network covers all provincial capitals using a backbone provided by satellite connections. Satellite was the preferred technology during the war in the 80s since due to security issues land line infrastructure was not allowed. Hence the satellite covered urban areas only. The current challenge is to build a network to increase teledensity, switching capacity and provide necessary bandwidth. TDM is facing a challenge. There is a built in contradiction with regards to satellite connectivity. There is a need for more bandwidth, while in order to maximize use of the satellite, there is a need to compress and not allow for more bandwidth. This type of architecture is a major constraint. Towns lying between urban areas were cut off without satellite. Another challenge is related to the geographical structure of the country. The country extends from flat regions in the east, towards mountainous regions in the west, requiring different network topologies. TDM is in the process of rolling out a fully-fledged network connecting the main cities along its 1000 km coast – a fiber optic submarine cable with 5 Gb capacity will replace the satellite. By 2003, remote areas in the hinterlands between Beira and Chimoio, Chimoio and Tete, and Nakala and Nampula will be connected with a high capacity SDH microwave system. The cable will eliminate network congestion in the country, particularly in Inhambane. The new system will provide for 6,000 circuits, enabling subscribers to send and receive audio, video, and data signals. There will be links in Xai Xai and Massinga, with connections to Zandamela, Quissico, Inharrime, Cumbana, Morrumbene, Massinga, Tofo and Vilanculos. In the meantime, urban infrastructure in Maputo and urban areas will be upgraded with a new ring structure and intelligent network services. The network contains 120,000 lines of which 82,000 are connected to the fixed network. The Director of Operations at TDM mentioned that ISDN would be introduced through the 1st quarter of this year in full scale.

TDM has 4000 public telephones that are distributed to it has dealers that keep 15-20% of revenue. Dealers who sell telephone cards retain 10% of their sales.

Mobile Services

The phenomenal worldwide growth of mobile phone subscribers in the world has also been reflected in Mozambique. Mobile services were launched in November 1997 – the number of subscribers of mobile services prior to the introduction of prepaid subscribers in September, 2000 was 23,000. Growth in mobile services increased drastically since the introduction of the prepaid scheme. The prepaid scheme has been launched in September 2000 bringing up total mobile subscribers to 55,000. Since the launch of prepaid services, there have been 2,000 new subscribers every week.

Fixed telephony rates are cheaper than those of prepaid – however, prepaid services are picking up much faster. It is a psychological perception that prepaid is cheaper. Many people pay the initial 20\$ (equivalent) fee for prepaid services, exhaust the first free 45 minutes and use the phone to receive calls only. Therefore, the consumers can easily manage their time and don't have the perception that it's expensive. The only limiting factor is the cost of the terminal (phone). Customs duties on phones are 30%. They are so high that they stimulate smuggling of phones. TDM is currently having discussions with the ministry of planning and finance to reduce customs duties. TDM is also rethinking its tariff structure for local calls, but the only solution according to Mr. Zita, would be to subsidize and go back to the old model.

It is expected that mobile services will overpass the fixed network before June 2001. The mobile network used a GSM system, Phase 2 Plus Alcatel equipment and covers Maputo, roads to South Africa, Xai Xai and Chokwe and some tourist destinations (Chimoio, Manica and Machipanda - the Beira Corridor). In May, Nampula, Ilha Mozambique (the Nacala Corridor) will be covered and by July, Tete and Songo and all provincial capitals will be covered.

Telecomunicações de Moveis – TMM - is a joint venture between TDM and DataCon (the German consultancy arm of Deutsche Telekom). TDM owns 74% of TMM and Datacon 26%. The brand name of the service is called

MCell. MCell is the sole provider of mobile telephony services in Mozambique with approximately 12,400 users.¹⁰ The market will soon be open for other mobile service providers. The government is in the process of selecting a consultant to assist in the selection process. It is foreseen that the bidding process will be open within 2001.¹¹

National IT Survey

The first national ICT survey (funded by the government and the IDRC) was conducted during July – October, 2000 in order to understand how information technology is utilized in Mozambique. One of the findings of the survey indicated that most of IT was located in Maputo and that computers are viewed as expensive items. Results were collected from 700 companies. The banking sector is the principal sector that uses information technology. (more info will be sent by Paulo Macluves).

Network Policy

ICT Policy

The Mozambican government has been very forward-looking in designing an ICT policy formulation process:

Date	Event
1995	ISAD Conference (Information Society and Development Conference)
1996	International Symposium on Informatics
1997	Global Information Society Workshop
1998	ICT Commission formed (May)
1999	Retreat
	1 st National Seminar
2000	1 st Draft of ICT Policy submitted and approved (12/12)
	2 nd National Seminar

Background

The first conference of its kind in Africa: The Information Society and Development Conference (ISAD), took place in South Africa in May of 1995. This was the first conference focussing on information society development in Africa. One of ISAD's achievements was to bring to the African continent's attention, the need for IT as a tool for development, through the African Information Society Initiative (AISI)¹². The government of Mozambique returned from this conference convinced of the strategic necessity to devote national attention to information technology. The World Bank and the IDRC together organized the "International Symposium on Informatics" the following year in Maputo, which eventually led to creation of a task force to elaborate an ICT Policy for Mozambique. In 1998, the Council of Ministers decided to form a national ICT Policy Commission (established under a presidential decree in May 1998). The mandate of this Commission was to design and propose an ICT policy, which would then be approved by the Council of Ministers. The Commission would also have the responsibility of monitoring the implementation and evaluation of this policy.¹³ The members of this commission were members from the ministries of Higher Education, Education, Transport and Communication, the Vice Rector of the University of Eduardo Mondlane, and the Telecommunications Regulator. The **ICT Policy Commission** is an independent commission, chaired by the Prime Minister. One of the reasons for the

¹⁰ With the expansion of cell phone services to the rest of the country, this number will dramatically rise, providing an additional means of Internet connectivity.

¹¹ At the time this paper was written, the director of the telecom regulator refused to disclose information regarding licensing procedures.

¹² <http://www.bellanet.org/partners/aisi/>

¹³ It is interesting to note that as far back as 1977, an IT commission was created to design ICT policy for Mozambique. This commission lasted from 1977-1997, but was unable to fulfill this mandate. One of the main reasons could have stemmed from the fact that a "peer" ministry (as opposed to the President or Prime Minister) – the Ministry of Industry and Energy was the head of the commission, the members of which were also ministers.

success of this commission so far is that the Prime Minister and the President are personally committed to IT as a tool for socio-economic development.¹⁴

Before rushing to designing an ICT policy, awareness sessions were conducted with the members of this commission in order to build an understanding of information technology and IT policy. In order to gain a broader perspective and feedback of what an ICT policy would require, a two-day retreat took place where private sector, government representatives, professionals and international consultants were invited to contribute ideas leading to an outline of the ICT policy. Groups of 2-4 national consultants generated ideas around this outline, which was further refined by the secretariat into the 1st Draft of ICT Policy for Mozambique. This draft was approved by the Council of Ministers in December 2000 (12/12) and was released for public debate.

Several measures were taken to obtain feedback from the public on the ICT policy:

- ❖ The Policy was published in major newspapers
- ❖ Debates were organized in radio programs
- ❖ It was published on the Internet
- ❖ Prime Minister appeared on TV and received feedback and queries "on air"
- ❖ Provincial seminars, moderated by members of the commission, were conducted in the ten provinces of Mozambique to disseminate content of the ICT Policy.

This public debate was able to demystify information technology and enabled the public to become aware of the potential of information technology for development. This approach is one of the most transparent approaches to ICT Policy adoption by a developing country. The Commission is working with a group of consultants to draft an implementation strategy; the ICT policy commission will continue to play its role as a coordinating body. The commission will create a forum on information technology. This forum would be more encompassing than the commission since it will incorporate members from all sectors (private, socio-professional institutions, etc.).

The Commission has set forth six priority areas to focus on:

1. Education
2. Human Resource Development
3. Health
4. Universal Access
5. Infrastructure
6. Governance

These areas should fulfill the foremost government priority – poverty reduction. Mobilization of business partners is viewed as a sound methodology that will be used to satisfying these aims.

Some members of the private sector viewed that the ICT Policy adoption process was somewhat flawed since it did not involve all stakeholders such as the banks, large companies and the telecom sector. The banks own 80% of computers in Mozambique. Another criticism was that the process did not take into account other developing country experiences, such as India.

The government has identified priority projects that correspond with the identified priority areas. Following are some of these projects:

1. GovNet – aiming to network government ministries and departments (Most ministries have websites that are mostly in Portuguese. There are a few that are in English ex. Ministry of Tourism).
2. GovSys: This project will focus on building information systems for the government which would centralize essential information in a one-stop shop for access and updating of information.
3. Building Basic IT Literacy: IT training will be provided to leaders, provincial governors, district administrators, ministers and members of the ICT Policy commission.

¹⁴ A New Ministry for Science and Information Technology was formed with the new elections at the end of 2000.

4. Special Project for Women (telecenters): There is a high demand for telecenters. This resulted from the School Net project which was showcased in provincial seminars.
5. Healthnet: to stop HIV/AIDS and Malaria with the help of ICT's.
6. Academic Research Institutions Network
7. Community Access in Rural Areas
8. Women, Youth and ICT's through basic computer skills training for empowerment, self-employment
9. SchoolNet: supplying schools with computers and trainers for ICT.
10. Ecommerce: establishing the legal framework, upgrading the infrastructure and creating incubators.
11. ICT's for cultural development (like culture net).

Telecom Policy

The National Telecommunications Institute of Mozambique (INCM) is the telecom regulatory body. It falls under the Ministry of Transport and Communications (MTC). The INCM was created by the Council of Ministers' decree in 1992. Before 1992, a regulatory body did not exist save for a frequency management division within TDM. The law of 14/99 passed the Telecom Act in 1999. Prior to this law, mobile services were defined under basic telecommunications services. This law maintains monopoly of basic telephony services for TDM for five years after the company is privatized (which is planned to be privatized this year).¹⁵ The INCM has banned wireless networks including two frequencies that are permitted by the ITU to operate without a license. The law opens the market for other companies to provide value added services through a joint venture with TDM, or independently. TDM maintains monopoly over local, long distance and international telephony. Mobile, value-added services and Internet service provision are open to the public. INCM is in the process of creating a board of directors.¹⁶ The current director of INCM has headed this organization since its creation. TDM and its mobile subsidiary do not yet have a license.

VSAT's require a license and must be bought through the INCM. They must be used for data only; voice may be allowed within the nation, for long distance use only. Licensed companies are allowed to have 2-way links. TDM charges 2,400\$ USD/year but this tariff is currently being revised. TDM holds rights to issue licenses to buy VSAT connections and also operates the international gateway for most ISPs through VSAT.

There are no licensing requirements for companies who wish to offer Internet service provision in the market. Companies need to simply fill out an application form, show proof of suitable equipment and office premises, and get registered. The regulator monitors ISPs in the market. ISP's are not allowed to provide voice services under present law, but as Joao Jorge, Director of INCM mentions, "we are researching this issue."

Therefore, the telecommunication environment is still "standing on its feet" in terms of transparency and clarity of the regulatory environment. The private sector does not maintain a favorable standpoint regarding the regulator. It strongly believes that the regulator would like to maintain the upper hand position and is purposely delaying liberalization of this market.

Trade Policy

The current commercial code is being reviewed by a group of Brazilian Consultants for the Ministry of Trade and Industry, to update the 19th century Portuguese code that is still in use. These business, financial and social laws were implemented by the Portuguese government that ruled the country until 1975. There is no explicit requirement for revisions to address issues, such as e-commerce. A potential problem lies in the fact that while Europe is Mozambique's main trading partner, Brazilian commercial law in recent times has been drawing on US commercial law and practice. A foreign company is only allowed to operate in the market if it was to create a fifty/fifty partnership with a local company?

Mozambique does have an investment code, but it does not refer explicitly to e-business. Commerce as such is not promoted. To promote foreign direct investment, a series of facilities are offered, namely on import duties and taxation benefits for a certain period of time. But these benefits are for traditional investments that involve fixed assets, machinery, buildings and the like. No modalities have been introduced in the economy for public-

¹⁵ Privatization in this context implies that a small percentage of TDM will be issued for Initial Public Offering.

¹⁶ This board has not yet been created.

private risk-sharing in e-commerce. The country has no sources of venture capital or of angel finance to facilitate the growth of e-commerce or for piloting projects in e-business to the "pre-competitive" stage.

Network Access

Information Infrastructure

Mozambique's figures for teledensity¹⁷ rose from 0.35 in 1997 (the lowest in the southern African region where the average is 3.18) to 0.45% in 2001. However satisfied demand is as high as 77% indicating the low purchasing power in Mozambique. This sector has recently been the focus of a significant development effort and investment per line is in the order of US\$1,013, increasingly above the regional average of US\$367. Revenue per line is also above US\$1000 and tariffs are relatively low compared with African averages ('97 figures). A fund is currently being created for universal access. There are about 75,000 fixed phone lines ('98), 50% of which are in the capital, Maputo. Local telephone costs US \$0.80 per hour.

The national telecommunications backbone was rehabilitated following the war. The transmission capacity is being expanded significantly, from 3,542 circuits in 1994 to 9,500 in 1999. Switching capacity has likewise been expanded since then. In 1995, the infrastructure had 59,904 connected direct lines. The annual growth of connected lines is between 7% and 8%. By 2000, 79,000 subscriber lines were in operation. The average cost per new line is US\$4,500. MCell, the sole cellular provider in Mozambique, has budgeted US\$33 million for remote connectivity construction during 2000-2002. Telecommunication expenditure as a percentage of GDP is 5%.

Internet Availability

As with most developing countries of the world, it is very difficult to assess the number of Internet subscribers or users in Mozambique. It is estimated that there are 6,000 Internet subscribers in Mozambique. Nearly all ISPs are concentrated in Maputo, with a few branches in Beira and...?. There are nine Internet service providers and 16-18 POP's (at least one in each province). Despite having to pay access fees of US\$3.00 per hour at Internet Cafes and dial-up charges of US\$30, the Internet is growing in Mozambique.

One ISP in Beira, the second largest city in Mozambique, estimates that there are 300 users using the Internet for a few minutes a day. There are two ISP's operating? Father Michael, Professor at the Catholic University in Beira remarks, "the mindset is that anything north of Maputo is out in the bush." Indeed, very little Internet activity and edevelopment is taking place outside of Maputo.

Internet in Mozambique

Internet subscribers	6,100
Corporate Accounts	150
Internet hosts	156
Points of Presence	16-18 (verify with teledata)?
ISP's	9
Telephone Lines	75,000
Public telephone lines	1,600
PC's	13,500
Internet cafés	3 in Maputo + 1 in Pemba
Electricity	<200,000

¹⁷ teledensity the number of telephone lines/100 people

Until very recently (check with Helder), there was only one means to be connected to the 'Net in a rural area – via Teledata, which was a very frustrating experience for users with extremely slow connectivity.

Despite growth of the Internet, Mozambique continues to suffer from a variety of issues that force it to lag behind:

- There is **insufficient bandwidth** available to ISP's that are connected to TDM (192K/576K up/down circuits). This link was already not satisfying demand in 1998; since 1998 TDM has added connections to CFM and mCell, and the number of Internet users keeps growing but available bandwidth has remained constant.
- **Limited speed** of TDM-ISP connections. USAID donated top-of-the-line modems under the Leland initiative and it was assumed that after a while better modems or equivalent equipment would be required. Instead, TDM decided to replace the RAD modems by lower quality Portuguese modems that are no longer in production.
- **Telephone lines:** ISP's have had difficulties in obtaining additional telephone lines for dial-up in Maputo and some provinces as well. The standard ratio of lines/dial-up users is 1/10 but 1/8 may be required in case of a significant number of intensive users. The largest ISP in Maputo stopped the admission of new dial-up clients when the ratio reached 1/15. TDM claims not to be able to provide more lines and has refused to adopt other low cost solutions (funded by the ISP) to overcome the shortage of telephone lines. In Nampula, for example, where a minimum of 300 dial-up users are required to ensure the financial viability of an Internet station, the ISP requested 14 lines for a start, but TDM only has 9 lines available and no immediate plans to expand the capacity of the Nampula exchange.
- **Resistance** to adopt and/or to start the operation of already installed up-to-date technologies that would improve Internet services provision and more efficiency of the entire telephone system. TDM installed digital equipment in Maputo, Beira, Quelimane and Nampula, several years ago, which would allow for better quality of connections and services, higher speed, and consequently lower costs for users TDM provincial delegations are ready to start but they have not yet received authorization from Maputo. Several district *sedes* are connected via satellite but they are still run as before the VSATs were installed (e.g. a connection from Quelimane to Mocuba goes Quelimane-Mocuba-Maputo, Maputo-Mocuba-Quelimane) and prices are still calculated on the basis of distance. Thus, a leased line Quelimane-Mocuba is cheaper than a leased line Quelimane-Gurúe, while distance doesn't matter on a satellite connection (space segment does). As a result, areas near capital cities are probably undercharged while remote areas are overcharged, i.e. users in remote areas subsidize services in areas near capital cities.
- ISP's rent Internet access from TDM. In practice, some ISP's claim that TDM uses the link for the its internal access – for free – thus saturating the capacity of the link during the day time.
- ISP tariffs don't follow the cost-base principle agreed with the USAID. Although more ISPs and Mcell have been connected to TDM, ISP tariffs were increased in 1998 and maintained at that higher level since then. This means that ISPs are being charged tariffs above the real cost of bandwidth thus subsidizing TDM and mCell that are receiving bandwidth for free.

All of the aforementioned issues penalize the most active ISP's in Mozambique. As mentioned earlier, TDM is viewed as a tremendous obstacle and deterrent to the growth and accessibility of the Internet in Mozambique.

Internet Affordability

Local telephone costs are seen as one of the highest deterrents to the use of the Internet in Mozambique. Dial-up Internet costs average US\$ 31 for 20 hrs/month. However, there are several hotels that offer free Internet to their hotel residents via dial-up to PBX's from hotel rooms. A local telephone costs .8 of a US dollar/hour. If the Internet were to be used for one hour a day, this would imply a cost of 288 USD a year which is roughly equivalent to the country's per capita income!

The tariffs for local calls had been subsidized by TDM to 3 cents a minute. Under rebalancing schemes to bring down international call costs that were surcharged to cover local calls, local call rates increased to 9 cents a minute (for calls less than 50 km radius). International tariffs were reduced by 8% and national calls increased by 38% last year. High telephone call costs are one of the major complaints revolving around Internet usage. TDM has had a lot of withdrawals of fixed lines. Among every 3 lines, 2 are suspended since payments cannot be made. The cost of the line is 10\$ plus 40\$ for an application fee which is a huge amount in relation to Mozambique's per capita income of 230\$. The potential market of people who could afford telephones -

140,000 - is already covered. 20,000 lines are installed a year, but subscriber growth is < 10% (or equal to around 2,000).

The import customs duty on personal computers used to be 40% (when?), but it has been brought down to 7.5% (customs tax) and 17 VAT. Decreases in taxes and component prices have brought down the price of PC's to an average price of 1200\$. Computers are also cheaper because businesses are bringing in computers from Asia and the US - not only South Africa, which used to be the main market for imports.

Network Speed and Quality

The waiting time for a line is around two weeks – 1 month in Maputo and much less outside Maputo. However, areas not covered by the network could wait for years at length. While overall teledensity is 0.46-0.47 in Mozambique, it is less than 5% in Maputo and certain rural areas. A typical flipside situation exists where 98% of the network exists in urban areas where only 20% of the population are living and reversibly, the remaining 80% live in rural areas are covered by only 2% of the network. The number of faults per line is around 80/100. However, TDM has a subsidiary, which provides customer support to its clients that tackle faults within 2 days in urban areas and slightly more in rural areas. In Beira, an international call to countries other than South Africa and Zimbabwe must be made via an operator.

Hardware and Software

Mozambique's market for IT products and services is still very small and not fully developed, even compared to many other LDCs¹⁸. With only 13,500 computers, 6,000 Internet subscribers and a high cost of telephone calls, the software industry in Mozambique mainly revolves around two or three companies that produce software mainly for accounting and resource management. These companies develop their own products. Piracy is an issue when it comes to the software market. There are as of yet no controls regarding copying of software. These companies have not reached mature market levels to specialize in niche areas. Most of these companies' activities cover several areas including hardware sales, software development, networking and web development. Mozambique does not seem to aspire to get involved in software export or offshore development as most other LDCs. Moreover, software is still charged 35% import duties. The new ICT policy proposes revision of this policy. International hardware vendors do not have branches in Mozambique. They have local hardware resellers or agents who sell their brands¹⁹.

Existing IPR laws have not yet been amended to regard software products as intellectual property (there are no provisions to register software). Parliament is currently conducting discussions of intellectual property rights and laws.

Networked Learning

At the time of independence in 1975, there were less than 10 college educated Mozambicans. With a population of over 16 million, Mozambique has 93 first level schools (grades 8-10) and 20 second level schools (grades 11 to 12). With illiteracy rates of 42% in men and 73% in women, it is hard to be surprised that there are currently 50 Phd holders and 200 masters degree holders in Mozambique. In Tete and Niassa provinces, there was only one secondary school up to 10th grade until 1997. Around 60% of primary school teachers have not gone to secondary school.

Schools' Access to ICTs

Most computers in schools are connected to the Internet through a dial-up connection. The flagship project that is seen to be a source of success for ICT in schools is **SchoolNet**. SchoolNet is a project that is undertaken by the Ministry of Education with funding from the World Bank's World Links for Development program with the objective of arming pre-university level students with useful IT skills throughout their college years. The project was initiated in 1997, providing the first opportunity for schools in Mozambique to connect to the Internet, have computers in the classroom. (Prior to this project only one school was equipped with computers, with no

¹⁸ LDC's = Least Developed Countries

¹⁹ 1. Bytes and Pieces: dealer for Dell 2. Dataserv: dealer for Compaq and Acer 3. Emil 4. EXI.

Internet connection) and training teachers on the use of computers for education. There are currently thirteen schools in three regions – within the School Net project. Each school (with around 400-500 students operating at three shifts per day) is equipped with 12-13 computers. The project includes higher secondary schools,²⁰ technical, commercial and industrial schools as well as teacher training colleges (which prepare teachers for primary education). The project will soon be handed over to the Ministry of Education. The SchoolNet project was able to build awareness on the importance of computers for education and train teachers on the use of IT.²¹

However there were some logistical problems encountered by this project, namely:

- ❖ Security – physical security of the computers
- ❖ Budget – Cost of telephone lines – Internet connection is expensive
- ❖ Sustainability - Some schools charge students and use the money to get trainers. Other schools were not able to pay for internet connectivity due to high dial-up costs.
- ❖ Electricity and Telephony: Many of the schools needed to have electricity connections and telephone lines installed.
- ❖ Maintenance – The World Bank donated 125 second-hand computers, 100 of which were functioning properly – there was a need for technical support. These computers were 486's that were not compatible with much of the available software.
- ❖ Cost of telephone bills: TDM refused to offer lower rates for schools participating in the project since it insisted that it could only reduce these rates if the government offered to reduce its tax requirements. All schools were connected to the 'Net via dial-up to the CIUEM, some of them making long distance phone calls which were very costly. Consequently, schools were unable to pay telephone bills and resorted to asking for fees for usage of their computers by the learners.

Other more logical challenges were:

- ❖ Implementing an IT project in institutions with no previous tradition/culture of using IT.
- ❖ No attention was paid to curriculum and content development.²²

Schools that do have reasonable access to computers are private schools – ex. Swedish and Portuguese schools. This is usually the case for developing countries. Till this date, there has been no assessment of how teachers and students are using the computers and the Internet.

Enhancing Education with ICTs

Universidade Eduardo Mondlane (UEM) is the focus of much of the country's networking activities. This is the only public university in Mozambique. Smaller private universities have recently been established in Beira and Nampula.

Until September 1997, the CIUEM was the only source of low cost Internet access in the country. The CIUEM has been responsible for establishing the university's LAN which provides e-mail services and Internet access to students and also to members of the community. Its connectivity is based on a 64 Kbps VSAT link with the University of Witwatersrand, via PanamSat to Transtel's earth station in Johannesburg. A second VSAT has been installed for the University's distance education training facility with a 384 Kbps link to Washington D.C., USA.

The CIUEM is the registry for the .mz domain. The domain registration is a simple procedure whereby a form is filled and a fee of 100\$ is paid one time for two years.

²⁰ There are lower secondary (9-10 grade) and higher secondary (10-11 grade) schools.

²¹ Other project objectives include: a) Sensitize educators, researchers, policy makers and communities on the need to change existing concepts of education... b) Promote the introduction of computer literacy and develop a culture in secondary education where technology is integrated into the teaching process c) Providing training opportunities for teachers and their students, researchers and policy makers on effective use of e-mail and Internet applications in the context of improving teaching and learning towards the creation of a national school network.

²² An interesting observation made by the IDRC officer, Marielle Rowan about the project is that the problem of AIDS in Mozambique would pose a serious problem to the project due to the minimal level of human resource capacity available in Mozambique.

The Catholic University – a Church university - is the only university north of Maputo. It is located in Beira, capital of Sofala province. This university was founded in 1995 and started its operations in 1996. The university can not depend on the use of Internet as a tool for learning since Beira suffers from many electricity outages. Moreover, it is expensive to use the Internet since the dial-up connection is based on a phone call to Teledata in Beira. Prior to 1998, the University had to make a long distance call to Maputo in order to obtain Internet access. The Catholic University of Mozambique (UCM) is the second largest institution of higher education in Mozambique, with an enrollment of nearly 1,500 students. The university has used Mozambicans with bachelor degrees to teach university undergraduate courses. Furthermore, most instructors teach part time. As the enrollment increases and students move towards completion of their undergraduate degrees, UCM faces the serious difficulty of finding qualified professors who can teach courses at the undergraduate level. Roughly, half of the lecturers at the university are expatriates. In UEM, seven students were awarded bachelor degrees in the faculty of economics and only two the following year in 1996. The University has a consultancy office UCM-Gea.Consult that provides its expertise to local firms based in Sofala, Manica and Tete provinces (a very similar "model" to that of the UEM).

Developing the ICT Workforce

When the Director of Planning at the Ministry of Education was asked about one of the obstacles to introducing IT in Education, Mr. Virgilio Juvane said "We have a subject called Introduction to Information and Communication Technology but it was not taught (in schools) because of lack of teachers with ICT skills."

According to the ICT policy, among the principal challenges to developing the ICT workforce today are:

- The existence of a very limited pool – both in quantitative and qualitative terms – of well qualified professionals in the area of ICT's
- Weak quality of training courses in informatics
- Absence of a national hardware or software industry to stimulate training and specialization in these areas
- Absence of professional requirements and of a system of evaluation and certification informatics courses

The Department of Mathematics, Statistics and Informatics at the UEM is staffed with six members; this is the largest department in the UEM - the only public university in Mozambique. The department runs a five year degree (licenciatura) which is two years plus a bachelor's degree in informatics. Bachelor degrees in computer science (3 year long) are not offered. This has not stopped students from quitting university after completion of the 3rd year without obtaining the bachelor degree due to high demand for jobs in IT. This has resulted in a low number of official graduates of informatics – around 20-30/year. Many students quit their undergraduate courses to take job offers. Others "consult." Natividade Bule from netcom is an entrepreneur who provides several services (marketing for microsoft, conference organization, photocopying services) and is also studying law (doing a bachelor of law). At the same time she is consulting with the Ministry of Justice!

There are no courses offered in electronic commerce. The department interestingly enough (as the CIEUM) provides consulting services to the private sector.

Various computer science degrees and programs are offered at:

- ISCTEM: Instituto Superior....?
- ISPU: Instituto Superioro Polytecnico Universitario (BSc. + 2) (private)
Both the latter institutes have "joint venture" programs in information systems with Portuguese universities. The university suffers from a lack of human resources in the area of information systems and therefore uses Portuguese expertise.
- Telecom Institute: Offers courses on informatics.

However, the three institutes listed above have just started to offer these programs/courses three years ago. There are no graduates as of yet.

- ESCTEM – technical university (private)

(Learn from Muchanga about the “new University of Stockholm graduate program in information and communication studies for students from Mozambique and Tanzania.”)

The private sector has a strong skills shortage. IT companies usually train their recruits that have graduated from the UEM. They require an average of six months training before they can start work. Due to the strong influence of socialist and Marxist regime prior to independence and to the fact that many Mozambicans were educated in Russia, and Cuba, there seems to be a strong shortage of marketing skills. According to José Murta, Managing Director of EXI, “there are lots of economists in the country, but we don’t have managers.”

There are currently two private companies that are providing IT training – Matrix and Rumo. However, their services are very expensive. Multinational companies such as Microsoft, CISCO and Compaq are operating out of Johannesburg, providing training in South Africa. Many managers are seeking training and skills development through graduate programs in South Africa or Portugal. Companies doing in-service training order customized training services that are delivered by subcontracted trainers. Some of this training is done abroad. However training is very expensive. It either involves bringing in teachers from abroad or sending off trainees abroad – which involves accommodation and travelling expenses.

Training the workforce with IT and management skills is seen as national ICT priority from the private and public sectors’ viewpoint. Moreover, the government has a very strict policy about bringing in foreign expertise, arguing that it is protecting local expertise. Countries such as the United Arab Emirates have grown tremendously, partially due to the incredible numbers of foreign workers.²³

Networked Society

People and Organizations Online

According to Tropical Connection, an Internet service provider, the number of users country-wide has more than doubled from 5,500 to more than 12,000 during the last two years. Around 75% of the users are located in Maputo and surrounding communities and the remaining 25% at the provincial level. This phenomena is aligned with the disparity of economic growth countrywide for the past 5 years, where the focus has been in Maputo, the capital city.²⁴ Rural communities in Mozambique compose 13 of Mozambique’s 15 million population.

Connection Time to Mozambique

Adérito Robiro is the manager of Connection Time which is the first Internet Service Provider in Mozambique. Users of Internet cafes have been young people, travelers or few fixed customers who do not have a PC at home, who come to chat and use e-mail facilities. Their ages range from 35-45 years of age. The café charges 80,000 meticais/hour (approx. 4\$). The least amount of allowed time for Internet use is one quarter of an hour. Adérito is writing his own software, which is used to measure usage time on the computer because the software is too expensive. He is not able to market the Internet café because he does not have enough funds to do so. The Internet café is not the soul source of income, since it does not potentially bring in enough to support Adérito. He is also a certified novel network engineer (one of very few) through his training in South Africa and uses these skills to do freelancing in network support.

Locally Relevant Content

There seems to be little locally relevant content. Most of the official pages are in Portuguese and have no mirror English sites. A local software company developed content on CD’s in order to target a larger community beyond the 6000 Internet subscribers. This company, Pandora’s Box was able to document all published laws since 1965 on CD’s and sell them to interested government ministries and firms. This seems to be a workaround solution to provide content offline. Content is not bound by any regulations as of yet.

²³ Emirateans account for only one quarter of the two million people who live in the UAE.

²⁴ “An Internet Boom in Mozambique.” www.balancingact-africa.com/news/back/balancing-act42.html

ICTs in Everyday Life

The CIEUM has participated with the IDRC²⁵ (International Development Research Center) and UNESCO on several telecenter projects. There are currently two to three Telecenters in Mozambique. These projects have been launched in August 1999 with the aim of bringing ICTs to rural communities. There is one telecenter in Manhica and the other in Namaacha. These telecenters have been running in a pilot project phase since August, 1999. Each telecenter is equipped with four networked computers that together have free (except for the telephone call, which is paid by the user) Internet access via a modem (28-33 Kb dial-up access) to the CIEUM. These telecenters are supplied with a small library, photocopying machine, typing services, fax services and telephone services. Mostly students and companies have been the "clients" of these telecenters. The cost of one course is 1.5 Million meticaís (80\$). This involves providing 1.5 hours/day lessons for 1.5-2 months to teach MS Office using manuals that have been written by the teacher. The Namaacha telecenter frequently suffers breakdowns in electricity. There are two feasibility studies for telecenters in Manhica and the flood affected areas of Chokwe. Evaluation of the success of these centers was taking place at the time this paper was written. The main complaint from the telecenter users is that telephone charges are very high. These centers have not yet reached sustainability level, although they are making limited revenue. Donor funding for these centers will discontinue after August, 2001.

There are very few public places with Internet connectivity – Internet cafes do not seem to be common in Mozambique. There are three Internet Cafes in Maputo. 1. Connection Time 2. TDM has an Internet café in the Rovuma-Carlton hotel and 3. Teledata (downtown). There are a few other very small Internet café operations.

ICT's in the Workplace

There is not much information about use of network by businesses – but it does not seem to be wide-spread in the capital.

Networked Health

Three dollars are spent on health care every year. According to the Demographic and Health Survey of Mozambique (1997),

- ❖ The proportion of children who had received all vaccines under the Expanded Program of Immunization is 90 percent for children whose mothers have secondary or more education versus 31 percent among children of uneducated mothers.
- ❖ Approximately 40 percent of women and 30 percent of men in union have never heard about modern contraceptives. The proportion of women using modern contraception increases markedly with educational attainment – from 3 percent among uneducated women to 27 percent among those with secondary or more education.
- ❖ Infant and child mortality rates are significantly higher among children whose mothers are uneducated and reside in rural areas. The probability of a child dying during first year of life is 4.4 times (49/1000) higher for a child born in Nampula than for a child born in Maputo City (216/1000).
- ❖ About 40 percent of those interviewed declared that they did not know of any means to prevent AIDS.
- ❖ A rural village is as likely to have a pharmacy as it is to have a health center, but only 4% of villages have either, while 69% have a primary school.²⁶

The survey concludes, "to counteract the inequalities found in this survey, it will be necessary to give priority to information and education as well as the distribution of financial and human resources." Information technology can be used as a tool to disseminate information and educate people, especially those living in rural areas, about best health practices and prevention mechanisms. One of the policy recommendations of another

²⁵ This is one of IDRC's ACACIA projects. The IDRC is a Canadian government agency.

²⁶ Beattie, Allison and Kraushaar, Daniel. Health Expenditure in Mozambique: An Analysis of Major Policy Issues Volume 1. Mozambique Health Financing Studies. Ministry of Health. Management Sciences for Health.

survey²⁷ mentions that although literacy should be increased in both men and women, "information availability should be developed for illiterate men and women." Again, information technology may be used as a medium to convey information for the illiterate. This is an area of research that is yet to be tackled.

Moreover, the most disadvantaged provinces in terms of health workers are also those with the lowest per capita health expenditure. The most favored in terms of both overall staff availability and medical doctors are Maputo city and Sofala province (the second richest province in Mozambique). Salary distribution points to a similar pattern, with 43% of the national personnel budget spent on provincial-level and central employees.²⁸ The survey makes many policy recommendations, none of which refer to the use of information technology as a tool for increased efficiency, planning and organization; whereas IT could prove to be an excellent mechanism for organizing the health sector in Mozambique.

Maputo Central hospital is the referral hospital for the entire country. Mozambique is divided into three regions – North, South and Central where each region is served by one hospital. There are seven provincial centers at the 3rd level and 27 district hospitals. Furthermore there are 1000 health centers which provide preventive, basic and curative care (this does not include surgery).

The Ministry of Health is in the process of developing an information technology policy. Around 10.5-11% of the national budget (39 Million USD) is allocated to the health sector. In 1997, 132 million dollars was spent on the health sector, 72 of which originated from external resources (mainly international agencies). The health sector is highly subsidized. A patient pays 1,000 meticaís, (half a cent) a tenth of the original cost of a doctor's consultation of 10,000 meticaís (55 cents). Nearly all medicine is "imported" from abroad or sent as aid. International agencies are financing critical sector inputs including specific types of personnel, capital expenditures and drugs and pharmaceuticals, with a focus on the primary care level.²⁹ UNICEF poured oral rehydration salts in the country when there was a local attempt to produce these salts.³⁰

The Ministry of Health has an IT section which is manned with one person who subcontracts companies outside the ministry to provide additional support. The IT manager acts more of a customer support person than a manager of information systems at the ministry. In the past ten years, the Ministry has been receiving computers that accompany projects (that are funded by international agencies). However, there was no real policy in place to integrate the use of IT in the ministry's operations.

There is no national database for patients or health in general. A group of Portuguese consultants will be installing two local area networks which will be used for e-mail, browsing. However, there is no sharing of information. E-mail is not a tool for communication at the ministry, even though ministry employees do have e-mail addresses. There is no "culture" there to use e-mail as a means of communication between employees.

There is a computer installed in every province, which sends weekly information about malaria, diarrhea, and measles to the surveillance system through diskettes or e-mail. There are 134 districts in total in Mozambique. Twenty of these districts are equipped with a computer that compiles health information. The health information centers in the provinces receive information from districts, which is then compiled and sent to the Ministry of Health. Dr. Humberto Cossa, National Director for Planning and Cooperation at the Ministry of Health believes that the health sector is not aware of the potential of computers nor is it trained to utilize information technology. He believes that less than 10% of machine capability is utilized. The ministry does not have a website. Dr. Cossa remarked that there is a need to improve the flow of information for macro and micro management. Two areas which require further attention are: 1. Speed with which information is accessed, decisions made and data is processed and analyzed 2. Hospital management and efficiency. Dr. Cossa remarks, "We need to manage the change of culture – We (still) see IT as a magical relationship with computers."

²⁷ Ibid.

²⁸ Ibid.

²⁹ Ibid.

³⁰ One interviewee viewed this as action as killing the industry and that there is a need to invest in local production.

Networked Economy

Banking Sector

The Maputo stock exchange was opened in late 1999. The banking sector was privatized during the beginning of the 1990s. Access to finance is constrained by the relatively high interest rates - around 15%. All land is owned by the state and is leased in parcels to individuals and companies for up to 50 years with an option to renew. Mozambique has scant sources of venture capital or "angel" finance to facilitate IT.

In 1990, there were two or three government banks. Now, there are currently over 10 banks, many of which are private. The only online bank in Mozambique is BSTM (Banco Standard Totta de Moçambique). It currently has 50 users who pay 25\$/month (Corporate users pay 100\$/month) as a subscription fee for this online service. BSTM allows its clients to transfer funds between accounts in the same bank, checking account balances and payment of telephone and water bills.³¹ It however, does not offer credit card validation services. Credit cards were only introduced 2-3 years ago. Another bank is due to come online this year – BCM (Banco Comercial de Moçambique). BCM has recently merged with BIM (Banco Internacional de Moçambique) and has 60% of the market.

There is no electronic clearing system between banks. However, all banks provide branch banking. It can take between 5-7 working days to transfer money between banks. Since BIM and BCM have most of the market share, they would want to dictate the rules, which is not what the smaller banks would want. Banks do not communicate with each other. Each bank has its independent ATM network. Banks are not willing to invest in credit card validation services since they are in the process of recouping their initial investment in branches that they have recently opened in Maputo.

Mozambique is based on financial, business and legal laws dating from 1965 that have been adopted from Portugal a country that is less developed than most of western Europe. The number of credit cards is low and there is a weak judiciary system with low enforceability.

ICT Employment Opportunities

There is a growing demand for people with technical skills. However, the quality and numbers of people graduating from the few universities that provide computer science programs and other related fields is very low. IT companies usually need to retrain recruits – some of which take recruits from any background and insert them into a homegrown training program within the company.

Electronic Commerce

Electronic commerce is viewed as a secondary priority by the government, while egovernment is viewed as a number one priority. There are several projects such as Govsys and Govnet, which are seen as immediate projects. The government views itself as leading the way to ecommerce through creating opportunities and establishing the legal and commercial framework for e-business development. The final draft of the ICT policy showed an evident acceptance by the government to the private sector as a key player in ecommerce. "This acceptance is part of the slow but steady evolution of government thinking away from its past in a centrally-planned economy."³² However, Online business contracts have no legal value and there are no commercial laws to accommodate requirements for e-commerce.

Business to consumer commerce defined as transactional buying and selling over the Internet, is non-existent. Most websites are static.

³¹ The whole process is not executed online, however. After payment is "made" online, the client must go and get a slip stamped by the bank and then submit this receipt to the telephone company. Nevertheless, this process is much simpler than a standard payment method!

³² IDRC Pan African Ecommerce Report: Country Case Study for Mozambique, December 2000.

However, there is strong potential for Mozambique to be a player in the ecommerce arena. Mozambique, can provide services through becoming a conference, and tourism venue. Sports tourism could be a good avenue for economic growth³³. However, there is no awareness of local potential for business to business commerce

A recommendation from the IDRC Pan African Ecommerce Report suggests: "If telecenters were to flourish in Mozambique, they could be employed in a pilot project to promote inter-regional trading within the country and even more successfully if they would encourage the use of e-commerce by the local trucking companies. This could permit the interchange of goods within the country without the need to use Maputo as a national staging point."³⁴

E-Government

The government generally performs its operations manually, although there are some isolated automated pockets. The government does have a few web pages but they are almost all quite static and non-interactive.

As the government of Mozambique addresses the issue of e-government, its own ICT policy admits that:

"There are a variety of problems and challenges to be confronted in the area of governance in Mozambique:"

- Bureaucracy: public and state institutions are slow and of low efficiency in responding to the inquiries and requests from citizens;
- High costs associated with the way in which public services are dispensed;
- Lack of linkages and rapid communications among organs and central departments of State, and between those bodies and their provincial equivalents;
- Lack of centralized databases, with uniform and consistent information, which creates frequent discrepancies from department to department;
- Limited education about informatics of the majority of leaders of State or public institutions and a consequent indifference or apathy in relation to the role which information and communications technologies could play in the development and general improvement of services.

The policy ends its discussion on electronic governance by concluding that:

Therefore, with a view to extracting the best of the potential of information and communications technologies to improve its actions at all levels, the government will adopt the following measures, in collaboration with its partners:

- Establish a plan for the informatization of services provided by the State;
- Define a general plan for the informatization of services provided by the State at all levels, members of the Assemblies, leaders of autonomous bodies and community leaders;
- Establish a network to link the organs and central departments of State among themselves and with their departments or delegations in the Provinces;
- Make available, via the Internet, information needed by citizens, including printed matter and forms for various purposes;
- Encourage contact between responsible officials and citizens via electronic mail and the Internet, without this becoming a substitute for live contact;
- Gradually introduce electronic voting and other forms of automation of electoral processes.
- Create electronic systems to support decision-making;

There is no reference to ecommerce between government and its suppliers of goods and services.³⁵

³³ Egypt hosted several squash championships by the Pyramids and by the Red Sea, therefore capitalizing on its tourist sites.

³⁴ IDRC Pan African Ecommerce Report: Country Case Study for Mozambique, December 2000.

³⁵ IDRC Pan African Ecommerce Report; Country Case Study for Mozambique, 12/2000.

SME's

SME's form a main part of business in Mozambique and require an understanding of how they can best use ICT for their own business development. SME's need a lot of training on how to make business plans and how to generally make their business succeed. Further effort is required (especially for women) to be educated and made aware of opportunities to promote their business. (For example, Mozambican women sell their baskets across the border to middlemen who then export these baskets abroad - as opposed to selling them directly). Solidarity groups could try to work on this issue. Batik is also another handicraft that can be promoted and sold to international markets.. There also is a lack of entrepreneurs and capital to promote initiatives for SME's. In addition, the focus of government is on attracting larger (usually capital-intensive) investments.³⁶

As described by José Murta, "The problem is between the private sector and the government (regulation, laws, open environment). The business mentality doesn't exist. Around half of 16 million people are illiterate. Half of the literate people have no money to buy TV's. Half of the ones who could afford, would buy a TV and perhaps a computer. However, there are very few who have disposable income that can be used to finance other projects. Banks are also not very function in terms of funding and wire transfers."

³⁶ One of the recent projects between the Government of Mozambique and the World Bank is "Projecto para do Desenvolvimento Empresarial" to improve the competitiveness of privately owned Mozambican firms, by increasing their access to finance and business support services and developing capability in key supporting institutions. It envisages to enlarge the level of participation of the private sector in the economic development of Mozambique through promotion of access and usage of services external to the firm (outsourcing), development of a more efficient market for training, consulting and institutional support, and setup of links between buyers and investors, local and foreign. It aims to reinforce capacities of the Ministry of Industry and Commerce, the Investment Promotion Center, and the economic and enterprise associations. It is a scheme to finance 50% of the training and consulting expenses that firms may need to invest to become more competitive.

Thoughts...

Mozambique is in a transitional phase. A country just recently out of a civil war and a war for independence, Mozambique is striving to stand on its feet and catch up with the information revolution. It is led and driven by well educated people that can see a promising future and a potential contribution of their country to the new economy. A socialist mentality dominates the minds of some of its people, yet with adamant energy, and persistence, the mindset will change. In the short term, perhaps some propositions can be taken into consideration.

- ❖ TDM is seen as an obstacle to Internet service provision in Mozambique. A more cooperative spirit would help to provide a better level of service to the public. Perhaps a working group between **TDM**, the Regulator and the private sector could create a forum for communication between these stakeholders and a channel for communication where the voice of the private sector is heard and could have a positive impact on future developments at TDM and NICM.³⁷ TDM needs to resolve several issues with the private sector such as the peering problem, bandwidth and others mentioned throughout the report.
- ❖ Further **research on ICT** (perhaps through GIS systems) and its use in crime prevention, disaster and environmental catastrophe recovery, elections, demographic information, b2b commerce would be beneficial to understanding what Mozambique really needs with regards to ICT. A needs assessment and feasibility study could prove beneficial in directing future investments to specific problem areas.
- ❖ **Human Resource Development:** There is a severe lack of skills and a need for training in IT. The ICT Policy and its commission already recognize this problem. The author would place top priority efforts in the direction of building human resources of Mozambique in all areas, including information technology. The Internet could be used to complement the lack of sufficient number of teacher through provision of training material. This could be done with the use of local expertise to develop the appropriate material.³⁸ Students in schools and universities can be used to build capacity during vacations and the summer time. Moreover, the movement of people that are trained in ICT to the west is a global movement. The government needs to create incentives for people to stay in Mozambique and benefit the country.
- ❖ The efforts of companies such as Pandora's Box should be strongly supported. The creation of **content** in the Portuguese language (and maybe local indigenous languages) is incredibly important to not only build an Internet "product" for Mozambicans but also to create presence for Mozambique worldwide.
- ❖ **Health:** ICT as a tool to reduce health risks and disseminate information re: epidemics. Telecenters may be used to disseminate knowledge about health risks. These centers in more rural areas could simply be information kiosks.
- ❖ It is important to create a viable and business friendly environment for business to flourish. This may be done through:
 - ❖ Promoting Mozambique as an excellent tourist destination using IT
 - ❖ Facilitating innovative practices (ex. Polana Hotel providing free Internet)
 - ❖ Reduction of tariffs on software (35%)
- ❖ **Governance:** The government ministries can provide a model for ICT development in Mozambique through for example, enforcement of standards among ministries – (ex. The European Union recently refused to manually receive tenders; all tenders from a certain date, onwards, were entered on the web).

³⁷ A similar model proved to be very successful in Egypt after the recent creation of the Ministry of Communication and Information Technology. A working group was created with the private sector and for the first time in the history of ICT, the private sector was able to voice its needs with the minister and the incumbent operator.

³⁸ Recent initiatives such as that of Massachusetts Institute of Technology – to provide all courses over the Internet could prove as a good resource for training material - <http://web.mit.edu/ocw/>.

- ❖ **Sustainability of Telecenters:** Telecenters, like other business centers should be thought of as a business in order to build sustainability. Once they are operated as a business, with a successful business model, then they can continue to maintain themselves. Current telecenters need to be evaluated. Since Mozambique is a country that is heavily dependent on donor funding, it is important to evaluate these projects to understand whether the funding is being appropriately utilized and is indeed of benefit to the endusers. It is also important to factor in the cost of maintenance of computer equipment and to ensure that it is feasible to maintain these machines on a frequent basis.

- ❖ **Computers in Schools:** As a result of the World Links for Development program, the government would like to introduce computer science as a subject in higher secondary education. There is also a need to train teachers on the use of computers as a tool for education.

Appendix A Acronyms

BCM - Banco Comercial de Moçambique,
 BIM - Banco Internacional de Moçambique
 BA - Banco Austral
 BSTM - Banco Standard Totta de Moçambique
 BCI - Banco Comercial de Investimentos,
 BFE - Banco do Fomento e Exterior
 UEM: Universidade Eduardo Mondlane
 CIUEM: The Center for Informatica Universidade Eduardo Mondlane.
 INCM: The National Telecommunications Institute of Moçambique
 TDM: Telecomunicaçoes de Moçambique
 UCM: Universidade Catolica de Moçambique

Appendix B Websites

Website Name	Address
National Institute of Statistics	www.ine.gov.mz
TDM	www.tdm.com.mz or www.tdm.mz
Metical (newsletter)	Metical@zebra.co.mz
Mozambique Online	www.mol.co.za
Imensis – (portal)	http://www.imensis.co.mz/
Telecenters	www.telecentros.org.mz
School Net	www.uem.mz/schoolnet
ICT Policy Commission	http://www.infopol.gov.mz/
Dataconn	http://www.dataconn.net/
Review of Commercial Code	www.commercialcodemoz.co.za
National Survey on IT	www.infopol.gov.mz/proj_pol/etado.htm
Mozambique	www.mozambique.mz
CIUEM	www.iscd.mz
Tropical Net	www.tropical.co.mz
Teledata	www.teledata.mz
VirConn	www.virconn.com

Appendix C Internet Subscription Charges

VirConn

Dial-up Access

Time	Charge
30 days	40\$
90 days	105\$
180 days	180\$
365 days	300\$

Teledata

Time	Charge
30 days	25\$
180 days	141\$
365 days	264\$

Teledata brought down the prices to 15\$/month, but there was no change during the three weeks of this promotion (low price elasticity).

Leased Line Access

Vircon

Bandwidth Kb	Charge USD
19.2	400
33.6	800
48	1200
56	1500
64	1800
128	2800

Teledata

Bandwidth Kb	Charge USD
64	\$400
128	\$800 (check with Helder Santos)

Appendix D – List of Interviewees

1. Salomão Manhiça, Executive Secretary, ICT Policy Commission.
2. Venancio Massingue, Vice-Rector for Administration and Resources, Eduardo Mondlane University and member of the ICT Policy Commission.
3. SchoolNet Project, Josina Machel Secondary School.
4. João Jorge, Director of INCM-National Institute for Communications.
5. Helder Santos, Director of Virtual Connection (private Internet service provider).
6. Américo Muchanga, Director, CIUEM, Eduardo Mondlane University.
7. Francisco Mabila, Deputy Director, CIUEM, Eduardo Mondlane University.
8. Bruce Bolnick, CID liaison and Head of Advisory Team, Gabinete de Estudos, Ministry of Planning and Finance.
9. Manhiça Telecenter, Maputo Province.
10. Gomes Zita, Operations Manager, Mozambique Telecom (TDM) and member of ICT Policy Commission.
11. Telmina Pereira, Vice-Minister of Education, Ministry of Education.
12. Fernanda Cabanas, Director of Pandora's Box (private company).
13. Humberto Cossa, National Director for Planning and Cooperation, Ministry of Health.
14. Pascoal Mocumbi, Prime Minister and Chairman of the ICT Policy Commission.
15. Dilip Samji, Director, Computer Associates (private company).
16. Generosa Cossa, SchoolNet Project Coordinator.
17. Rogério Lam, General Manager, Solsuni.
18. Paulo Maculuve, Coordinator of the 2000 National IT Survey and member of the ICT Policy Commission.
19. José Correia, General Manager, Teledata.
20. Natividade Bule, General Manager, CaTucha Trading.
21. Cídia Monteiro, Chairperson, Fórum Mulher.
22. José Murta, General Manager, EXI.
23. Tim Born, US AID.
24. Enrique Portillo, US AID.
25. Felício Pedro Zacarias, Governor of Sofala Province.
26. Cherif Hussein, Director of Mozambique Computers International, Beira.
27. Adérito Robeiro, CEO, Connection Time (internet service provider).
28. Michael Schultheis, Professor, The Catholic University, Beira.
29. Father Filipe Couto, Rector, The Catholic University, Beira.
30. Marielle Rowan, IDRC Liaison Officer, IDRC.
31. Fernando Neves, Managing Director, Syscom.
32. Patrício Sande, IT Advisor, the Administrative Court and Chairman of the Scientists Association.