

# thetha

the sangonet regional ICT discussion forum project

# Towards an information society in Botswana: ICT4D Country Report

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February 2010



UNIVERSITY OF BOTSWANA



linking civil society through ICTs



EMBASSY OF FINLAND  
PRETORIA



OSISA  
Open Society Initiative  
for Southern Africa

Title: Towards an Information Society in Botswana  
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This report forms part of the Theta - Regional ICT Discussion Forum Project

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The project is funded by the Open Society Initiative for Southern Africa (OSISA) and the Embassy of Finland (South Africa)

**[www.theta.org](http://www.theta.org)**

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## PREFACE

The Thetha - Regional ICT Discussion Forum Project is an initiative of SANGONeT aimed at tracking ICT4D initiatives in SADC member states and facilitating networking and dialogue among civil society organisations, academia, government organisations, corporate sector and development agencies to share information and experiences of the different countries in this regard. The Thetha project is funded by the Embassy of Finland (South Africa) and the Open Society Initiative for Southern Africa (OSISA), and is administered by SANGONeT.

The Botswana Thetha - Regional ICT Discussion Forum is organised through the partnership of the Department of Library and Information Studies (University of Botswana) and SANGONeT. A similar event was co-hosted by BOCONGO and SANGONeT - dubbed the Botswana ICT Discussion Forum - in Gaborone from 5-6 October 2006. The Forum at that time sought to provide a platform for discussing the Maitlamo ICT policy which was at that stage a draft document. The policy was subsequently enacted by Parliament in 2007 and is the foundation upon which ICT4D initiatives are being undertaken in Botswana. The policy, for example, aims at creating an enabling environment for the growth of an ICT industry in Botswana, the provision of universal service and access to information and communication facilities and making Botswana an ICT hub for the region. It is therefore timely to review again what progress has been achieved not only after the enactment of the 'Maitlamo' policy but also with regard to WSIS, AISI, the SADC IT protocol and Vision 2016.

The positive impact and also the challenges brought about by the paradigm shift of integrating ICTs into the lives of the people since DOT FORCE and the World Summit on the Information Society (WSIS) respectively cannot be underestimated in the current global digital dispensation. ICTs have become the basic driving force in all sectors of any nation's economy including but not limited to communication, business, education, health, and government. Consequently, ICTs are at the centre of various development protocols and initiatives at national, regional, continental and international levels. For example, at international level the Millennium Development Goals, WSIS, DOT Force, and the World Economic Forum have explicit actions that defined what countries can implement in order to leverage ICTs to meet the development needs of the people. In Africa, the African Information Society Initiative (AISI) and NEPAD's e-Africa Commission are institutional frameworks that have defined actions for countries on the continent to optimise the use of ICTs for development. Within SADC, the SADC IT protocol defines various actions to be pursued by member states to reach information society status. In Botswana, Vision 2016, the National Development Plans and the National ICT Policy define the government priorities in the application of ICT to spur socio-economic development. Through these protocols, Botswana has made significant progress but still faces challenges in institutional, policy, regulatory and infrastructure development to effectively apply and integrate ICTs in the economic development milieu of the country.

The Botswana Thetha ICT4D Forum aims to:

- Provide a platform for dialogue among civil society organisations, academia, government, and the corporate sector in the SADC region to share experiences and discuss progress being made in member states to integrate ICT in socio-economic development agendas.
- Create awareness about the role of ICT in development among key players in the economy.
- Create ICT networks among stakeholders in development for the purpose of information sharing and exchange.
- Discuss how ICTs are being applied to improve service delivery and alleviate poverty.

The outcomes from the proposed discussion forum would enable the report on ICT4D in Botswana to be finalised with input from key stakeholders in development.

With great thanks



Joyce Mpete

Director, Department of Information Technology

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## ACKNOWLEDGEMENTS

The Department of Library and Information Studies, University of Botswana(UB) is indebted to various individuals and organisations for their contributions towards the finalisation of this report - the Theta - Regional ICT Project: *Towards an Information Society in Botswana*. The Embassy of Finland (South Africa) and OSISA through SANGONeT provided funding for the study of ICT4D for Botswana that culminated in this report and also supported the Botswana Theta ICT4D Forum. The project was coordinated by David Barnard of SANGONeT. Tina James was responsible for editing the report and coordinating the research work. Polly Gaster, of Centro de Informatica da Universidade Eduardo Mondlane, Mozambique gave some advice based on their experiences on a similar study. The following organisations accepted to have interviews with the UB research team: E-government Office (Botswana), Botswana Innovation Hub Project Office, and the IT Department at the Ministry of Youth Sport and Culture. The report relied extensively on data gathered from different documents and websites from the following organisations: Botswana Telecommunication Corporation, Botswana Telecommunication Authority, Botswana Power Corporation, The Government of Botswana Website, Ministry of Communication, Science & Technology, UNDP and ITU.

The University of Botswana provided facilities and time for staff who were involved in the research and compilation of this report who included: Prof Stephen Mutula, Dr. Balu Grand, Dr. Peter Sebina and Mr. Saul Zulu.

Finally, we thank the numerous people who will be participating in the Theta - Regional ICT Project Forum in Gaborone on 10 March 2010. Your inputs will enhance the validity and reliability of the content of this report.

To individuals and organisations who participated in different capacities to put this report into its final form, it is great thanks to you all .

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## ACRONYMS

3G	Third Generation technologies
ACHAP	African Comprehensive AIDS Partnership
ADSL	Asynchronous Digital Subscriber Line
ARV	Anti-retroviral
ASYCUDA	Automated System for Customs Data
ATM	Asynchronous Transfer Mode
AWCC	African West Coast Cable
B2B	Business-to-Business
B2G	Business-to-Government
BAC	Botswana Accountancy College
BBC	British Broadcasting Corporation
BDC	Botswana Development Corporation
BEDIA	Botswana Export Development and Innovation Authority
BHDR	Botswana Human Development Report
BHRIMS	Botswana HIV/AIDS Response Information System
BIAC	Botswana Institute of Administration and Commerce
BIDPA	Botswana Institute of Development and Policy Analysis
BIH	Botswana Innovation Hub
BMS	Blood Management System
BNAST	Botswana National Science and Technology
BOCCIM	Botswana Confederation of Commerce Industry and Manpower
BOPA	Botswana Press Agency
BOTEC	Botswana Technology Centre
BPC	Botswana Power Corporation
BRSTIA	Botswana Research Science and Technology Investment Agency
BTA	Botswana Telecommunication Authority
BTC	Botswana Telecommunication Corporation
BTV	Botswana TV
BWP	Botswana Pula - Botswana's local currency
C2C	Citizen-to-Citizen
C2G	Citizen-to-Government
CAC	Community Access Centres
CD-ROM	Compact Disk Read Only Memory
CEDA	Citizen Entrepreneurial Development Agency
CPMS	Computerised Personnel Management Systems
CRASA	Communication Regulators' Association of Southern Africa
CSO	Central Statistical Organisation
DAR	Department of Agricultural Research
DIT	Department of Information Technology (Botswana)
DOTFORCE	Digital Opportunity Task Force
EASSy	Eastern Africa Sub-marine Cable Systems
ECA	Economic Commission for Africa
FDM	Frequency Division Multiplexing
FM	Frequency Modulation
FP6/FP7	Framework Programme for EU-African Research Cooperation
FTRA	Forum on Telecommunications Regulation in Africa
G2G	Government-to-Government

GCB	Government Computer Bureau
GDN	Government Data Network
GDP	Gross Domestic Product
GoB	Government of Botswana
GPRS	General Radio Packet Services
GWh	Gigawatts per hour
IHS	Institute of Health Sciences
HIV/AIDS	Human Immunodeficiency Virus/ Acquired Immunodeficiency Syndrome
ICT4D	ICTs for Development
ICTs	Information and Communications Technologies
IEC	Information, Education and Communication
IFSC	International Financial Services Centre
IMS	IP Multimedia Subsystem
IP	Internet Protocol
IPMS	Integrated Patient Management System
ISDN	Integrated Services Digital Network
IST	Information Society Technologies
IT	Information Technology
ITL	Internet Learning Trust
ITU	International Telecommunication Union
LAN	Local Area Network
LITS	Livestock Identification and Trace Back System
MAN	Metropolitan Area Network
Mbs	Megabits per second
MCST	Ministry of Communications Science and Technology
MDGS	Millennium Development Goals
MDN	Managed Data Network
MFDP	Ministry of Finance and Development Planning
MLG	Ministry of Local Government
MoE	Ministry of Education
MPSL	Multi-Protocol Label Switching
NBB	National Broadcasting Board
NCST	National Commission for Science and Technology
NDB	National Development Bank
NDP	National Development Plan
NEPAD	New Partnership for Africa's Development
NFTRC	National Food Technology Research Centre
NGO	Non Governmental Organisation
NICT Policy	National ICT Policy
NIIT	National Institute of Information Technology
NSDI	National System Data Infrastructure
Nteletsa	Tswana word meaning 'call me'
OSISA	Open Society Initiative for Southern Africa
P	Variant form of BWP (Botswana Pula)
PDA	Personal Digital Assistant
POPs	Points of Presence
PTO	Public Telecommunications Operators
PUCC	Public Communications Centres
RB2	Radio Botswana 2
RIIC	Rural Industries Innovation Centre

RIPCO	Rural Industries Promotion Company
RTTY	Radio-Teletype System
SADC	Southern African Development Community
SANGONeT	Southern Africa NGO Network
SARUA	Southern African Regional Universities Association
SMEs	Small and Medium Enterprises
SSS	Student Selection System
TCB	Teacher Capacity Building Programme
T-DAG	Telecommunications Development Advisory Group
TMS	Teacher Management System
TMS	Taxpayer Management System
UB	University of Botswana
UHF	Ultra High Frequency
UK	United Kingdom
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UNFPA	United Nations Population Fund
UN	United Nations
UPS	Uninterruptible Power Supply
VANS	Value Added Network Services
VAT	Value Added Tax
VCR	Video Cassette Recorder
VOA	Voice of America
VOIP	Voice Over Internet Protocol
VRL	Vehicle Registration and Licensing
VSAT	Very Small Aperture Terminal
WACS	West African Cable Systems
WAN	Wide Area Network
WiFi	Wireless Fidelity
Wimax	Wireless Maximised
WMS	Warehouse Management System
WSIS	World Summit on the Information Society

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## DEFINITIONS AND DESCRIPTIONS

B2B	Business to business: Analogous to e-commerce, which allows businesses to transact with each other more efficiently
Bandwidth	The maximum amount of information that can be transmitted along a channel
BOTEC	Botswana Technology Centre - a research entity in Botswana that was established in 1979 to promote science and technology through research and development, technology transfer, industrial support, policy development and specialised informational services and systems on technology solutions for industry, business, and education
Broadband	A transmission medium capable of supporting a wide range of frequencies, typically from audio up to video frequencies
BTA	Botswana Telecommunication Authority - a statutory agency that was established in December 1996, with the responsibilities for licensing telecommunications and broadcasting operators, and settling disputes among operators
CEDA	Citizen Entrepreneurial Development Agency - a micro credit finance agency of Botswana aimed at providing support for business ventures to promote the development of citizen entrepreneurship
Consulting and Audit Canada	An agency of the Government of Canada whose main responsibility is public sector management and administration (Consulting and Audit Canada, 2003). The agency developed a framework for Botswana's National ICT policy
DIT	Department of Information Technology (Botswana): A government department that is responsible for setting up, managing and maintaining ICT infrastructure within government. Previously, it was known as the Government Computer Bureau (GCB)
Dial-up Connectivity	Connecting a device to a network via a modem and a public telephone network
Digital Divide	The gap that exists between those who have and those who do not have access to technology (telephones, computers, Internet access) and related services
DOT FORCE	Digital Opportunity Task Force - a public and private sector effort to bridge the global digital divide and to create digital opportunity for the people of the developing world. This initiative was spearheaded by the Clinton/Gore administration of the US as part of the Okinawa Charter on the Global Information Society, which was released at the G-8 Summit, Okinawa Japan in July 2000

e-Africa Commission	The NEPAD ICT Task Team responsible for developing the NEPAD ICT programme and implementing its projects
E-business	Electronic business - the conduct of business on the Internet, such as buying, selling, servicing customers and collaborating with business partners
E-commerce	Electronic commerce, the buying and selling of goods and services on the Internet, especially the World Wide Web
E-government	The use by government agencies of information technologies (such as Wide Area Networks, the Internet, and mobile computing) that have the ability to transform relations with citizens, businesses, and other arms of government
E-learning	The delivery of a learning, training or education programme by electronic means using such technologies as a computer or an electronic device such as a mobile phone to provide training, educational or learning material
Enterprise	An economic entity that is intended to be involved in the production, distribution, and use of income, wealth, and something of value or advantage.
GCB	Government Computer Bureau - the predecessor of the Department of Information Technology in Botswana
GDN	Government Data Network - the government of Botswana network of fibre-optic cabling that serves government ministries and departments
GDP	Gross Domestic Product - the total value of goods and services produced by a nation within that nation
ICT Sector	Refers to computing and related services covering development, production, supply and documentation of customised and non-customised software in addition to data processing and the sale, maintenance and repair of computer equipment (OECD, 2000)
Informal sector	Way of doing things characterised by (a) ease of entry; (b) reliance on indigenous resources; (c) family ownership; (d) small scale operations; (e) labour-intensive and adaptive technology; (e) skills acquired outside of the formal sector; and (g) unregulated and competitive markets.
Information Literacy	A set of abilities enabling individuals to recognise when information is needed and have the capacity to locate, evaluate and use effectively the needed information
Information Society	The new socio-economic and technological paradigm likely to occur as a result of an all-embracing process of change that is currently taking place
IST	Information society technologies: Innovative technologies that drive the emergence of the Information Society, either as a result of incremental demands

on behalf of the customer base, technological breakthroughs, or fusion-type innovation

IT	Information technology: The science of managing and processing information systems. Computers are the central components in these systems
ISDN	Integrated Services Digital Network - an international communication standard for sending voice, video, and data over digital telephone lines or normal telephone wires
JobNet	A network of online services and tools aimed at helping employers and job seekers use the internet for recruitment, career, labour and learning information
Kitsong Centres	Public information access points for the internet, computers, fax, and telephone ('Kitsong' is a Setswana word meaning fountain of knowledge)
Local content	Information that is specific to a community, neighbourhood or area, such as businesses, housing, neighbourhood services and recreation activities
Maitlamo	Botswana brand name for the National ICT policy ('Maitlamo' means commitment)
Masa	The national HIV/AIDS anti-retroviral (ARV) treatment campaign. 'Masa' is a Setswana brand campaign name meaning 'dawn' to signify the hope ARV offers people living with HIV/AIDS
Nteletsa	Tswana word meaning 'call me' to signify government commitment to bring about universal access to telephones, computers and the internet in all areas of Botswana
SADC ICT Protocol	A Southern Africa-wide ICT strategy that defines and focuses on developing a regional ICT policy aimed at ensuring the harmonisation of IT national policies to support regional policies
Teledensity	The number of telephone lines per 100 persons
Thetha	Nguni world meaning: talk, discuss, debate and share ideas
Universal Access	The provision of affordable, reliable, simple to operate, advanced capabilities for new telecommunications and information services, so that they are either available or easily accessible to everyone, with due regard to people with special needs
Universal service	A term that originated from the US government in the 1930s, aimed at providing phone service to all, regardless of distance from the switch or ability to pay. Today, universal service encompasses those aims, plus a subsidy to public schools, libraries and rural health care facilities for telecommunications services

Vision 2016	Botswana Long Term Development Strategy
VOIP	Voice over Internet protocol- a category of hardware and software that enables people to use the Internet as the transmission medium for telephone calls
VSAT	Very Small Aperture Terminal - a satellite communications system that serves home and business users
World Economic Forum	An independent international organisation that provides a collaborative framework for the world's leaders to address global issues by engaging particularly its corporate members in global citizenship
WSIS	World Summit on the Information Society - a United Nations General Assembly initiative aimed at harnessing the potential knowledge and technology for promoting the goals of the UN Millennium Declaration and to find effective and innovative ways to put this potential service of development to all

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# EXECUTIVE SUMMARY

## Background

This initiative forms part of a five-country study in Botswana, Mozambique, Tanzania, Zambia and Zimbabwe to provide opportunities for dialogue among Southern African key players in ICT for Development. The discussions will focus on national challenges and opportunities in ICT4D over the next five to ten years and will aim to develop a comprehensive understanding of national ICT4D issues through in-country research processes, stakeholder consultations, and discussions of these findings on a country level through fora (called *Thetha* Fora).

Each of the five participating countries has undertaken preparatory research, led by a team of local researchers. This report is the result of that effort in Botswana and was undertaken during the latter part of 2009 and early 2010.

The *Thetha* project has been ongoing since 2003, when the Southern African NGO Network (SANGONeT) undertook a series of *Thethas* in South Africa. This was followed by a second phase in 2005-2007 which included five Southern African countries (Angola, Botswana, Lesotho, Namibia and Swaziland). The *Thetha* project now continues with funding from the Open Society Initiative for Southern Africa (OSISA) and the Embassy of Finland (South Africa). The ongoing regional roll-out of the *Thetha* project will provide an important opportunity for a broad range of ICT stakeholders, including government, private sector, academic and Civil Society Organisations representatives, to engage with the ICT challenges and opportunities relevant to the future development of the Southern African region.

## The ICT Context in Botswana

This report documents the progress that has been made to date by the Government of Botswana and the private sector in the domains of Information and Communications Technology (ICT) policy; ICT, telecommunications and power infrastructure; the telecommunications regulatory and legal framework; and capacity building; in an attempt to make Botswana an information society. In particular, the report deconstructs the relationship between ICT and development; Botswana's geographic, demographic and socio-economic indicators; ICT policy, legislative and regulatory framework; liberalisation of the telecommunications sector; telecommunications and broadcasting services; social responsibility in the telecommunications industry; investment in ICT infrastructure development; and ICT and power infrastructure. The report provides an overview of ongoing ICT for Development (ICT4D) projects and programmes, and the main actors who play a role in this arena. The document reflects on the challenges facing Botswana in its ICT4D endeavours, and makes recommendations for further action.

In an information society environment, there is widespread exploitation of numerous and varied information sources. It is a society where people know and appreciate what information they need, where and how to obtain information, and finally, how to use it. An information society caters for all people by providing them with information in many formats, and exposing them to the different technologies used for collecting, manipulating and disseminating the information.

An information society is also one where there is increasing use of computers; convergence of computing and telecommunications; e-governance; e-commerce; online education; universal access to telephony, the use of technology for community development; and use of information technology in the management of public utilities.<sup>1</sup>

The World Summit on the Information Society (WSIS) held in Geneva in 2003 was explicit and clearly defined the trajectory for countries to reach the status of being an information society. This would include:

- Connecting villages with ICTs and establishing access points;
- Connecting universities, colleges, secondary schools and primary schools with ICTs;
- Connecting scientific and research centres with ICTs;
- Connecting public libraries, cultural centres, museums, post offices and archives with ICTs;
- Connecting health centres and hospitals with ICTs;
- Connecting all local and central government departments; and
- Adapting all primary and secondary school curricula to meet challenges of the information society, enabling national capability in ICT research and development and capacity building.

This report therefore assesses these parameters in the context of how Botswana is attempting to achieve them.

The document was compiled by a four-person team at the Department of Library and Information Studies, University of Botswana, based on findings from numerous relevant studies commissioned by the national telecommunication regulator, the Botswana Telecommunication Authority (BTA) and the backbone provider, the Botswana Telecommunication Corporation (BTC). In addition, the review made use of the following sources:

- The 2008 annual reports of the BTC, BTA, Botswana Power Corporation (BPC) and the Botswana Human Development Report; and
- The Botswana National Development Plans, National Budgets, National ICT policy, e-government strategy, Vision 2016 (the Botswana long-term vision for development), Botswana Human Development Report for 2005, Botswana government website, and the ITU website, among others, have also been used in compiling this Report.
- The use of these various sources was complemented by interviews with key players in ICT4D in government.

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<sup>1</sup> Martin, 2005.

Bill Gates observes that 99% of the benefits of having a computer come when you have provided reasonable health and literacy to a person sitting down to use it.<sup>2</sup> For this reason, broader demographic statistics are presented to contextualise the ICT4D environment in Botswana.

## **The Report**

*Chapter 1* provides a brief discussion on the relationship between ICT and development, and particularly how ICTs are a key catalyst in the development and attainment of the Millennium Development Goals.

*Chapter 2* presents Botswana's geographic and demographic data, and key economic indicators. Botswana is a semi-arid landlocked nation and one of the most sparsely populated countries in the world, with more than half the population estimated to live in the towns and cities and the other half in rural areas. The vast part of the country falls within the Kalahari Desert which extends across the borders into South Africa, Namibia, Zambia and Zimbabwe. Botswana's economy exhibits strong fundamentals in terms of fiscal solvency, monetary stability, a healthy external balance of payments, robust growth, and a good sovereign credit rating. Mining accounts for more than a third of Gross Domestic Product (GDP). Socio-economic indicators show that Botswana has experienced a high incidence of HIV/AIDS (nearly 40% of the sexually active population by 2005-2006), but the introduction of anti-retroviral (ARV) therapy in hospitals has significantly stabilised the situation and reduced mortality rates. The GDP during the first quarter of 2009 was estimated at BWP 18,225.6 million<sup>3</sup> and Botswana remains the largest exporter of diamonds in the world as well as a large beef exporter to the European Union.

The majority of the population in Botswana consists of youth below the age of 30 (65%), while those below 15 years of age are estimated at 36%. Urbanisation is on the increase, with more than 54.1% of the population estimated to be living in urban areas.<sup>4</sup> Access to primary education is nearly universal and educational attainment, as measured in primary school completion rates and transition to higher education, is markedly high. An estimated 95.3% (about 350,000) of primary school age children (7-13 year age group) are enrolled in formal education. The transition rate from Standard 7 to Form 1 is approximated at 96.0%. Within the tertiary education sector, enrolment is expected to rise steadily to 70,000 by 2020.

*Chapter 3* provides an overview of the policy and regulatory environment which includes the National ICT policy; liberalisation of the telecommunications sector; telecommunication and broadcasting services; and consumer protection and social responsibility in the telecommunication sector. Botswana has made significant progress in liberalising its telecommunication services, resulting in integrated network platforms and the deployment of efficient advanced fixed and mobile communications for voice and data, including VoIP, Wi-Fi and Wimax. The Government of Botswana envisages that the National ICT policy will facilitate

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<sup>2</sup> The Economist Newspaper and The Economist Group (2005)

<sup>3</sup> As of 3 March 2010, the exchange rate is about 1US\$ = 6.983 BWP

<sup>4</sup> Republic of Botswana, 2006

the development of various e-services (e-government, e-health), greater transparency and human resource development.

*Chapter 4* documents the status quo of ICT infrastructure investment and development, including the power supply infrastructure. The focus on infrastructure is about enhancing network quality, effectiveness, universal access to electricity and ICTs, technical and physical infrastructure development, infrastructure standards, ICT systems security and privacy standards, and emerging technologies.

Botswana's Government-On-Line project is being undertaken by government as a major service delivery reform programme, and aims to improve service quality in education, business, communities, health, government and general civil service.

*Chapter 5* documents several ICT4D projects being implemented by the Government:

- Nteletsa, a project for bringing telecommunication services to rural communities;
- The establishment of Public Communications Centres (PUCCs) in villages;
- The implementation of Kitsong Centres (information access centres) across the country;
- The establishment of the Thuto Net programme aimed at linking all secondary schools to the internet; and
- The implementation of rural electrification projects.

*Chapter 6* examines the main actors in the telecommunications sector (including the fixed and mobile phone service providers). This is followed by a separate chapter which looks at capacity building through education and training institutions and service providers in the sector.

Botswana faces many challenges which impact on its ability to implement ICT4D: a shortage of electricity; the global financial crisis; unreliable, expensive and slower telecommunications networks with frequent internet downtimes and slow internet access speeds; high taxation on ICT products; lack of adequate technical support; and congestion in mobile phone connectivity (especially at the end of the month), resulting in frequent dropped connections on mobile phones.

The report concludes by proffering recommendations for various stakeholders including government, academia, civil society, and the corporate sector to deepen integration of ICT4D in the socio-economic activities of the people. The recommendations include:

- a) Reviewing how various strategies are meeting their intended purpose i.e. universal access policy and e-government.
- b) Reducing the high cost of telecommunications which is holding back growth in internet penetration.
- c) Investigating the possible cross-subsidisation by BTC of mobile, internet and fixed markets, which may amount to an abuse of market power.

- d) Ensuring infrastructure development is accompanied by the development of relevant local content.
- e) Reviewing policies to ensure that all stakeholders including civil society, government, the corporate sector and academia have a role to play in propelling Botswana towards becoming an information society.
- f) Prioritising digital inclusion through enhancing universal access and universal service.
- g) Putting in place a national information policy which ensures that various forms of public ICT access points do not duplicate efforts and are placed geographically to facilitate equitable access to citizens.
- h) Creating a legislative and policy framework that provides an environment for community media, especially community radio. This should include attention to issues such as the freedom of access to information and multilingual content.
- i) Promoting research and development through adequate funding of up to a minimum of 1% of GDP. This should be accompanied by investment in science, technology and innovation hubs.
- j) Building capacity in the areas of science and technology as this is crucial for the sustainability of ICT and e-government infrastructure.

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# 1. INTRODUCTION

*This chapter introduces the relationship between ICT and development. The concept of development is defined followed by evidence that shows its inextricable relationship with ICT. The chapter in particular shows that governments **worldwide are preoccupied with promoting digital inclusion because of the belief that there is a direct correlation between** low digital gaps and economic development based on findings of United Nations Conference on Trade and Development (UNCTAD), the World Summit on the Information Society (WSIS), the World Economic Forum (WEF), the World Trade Organisation (WTO) and the North American Free Trade Agreement (NAFTA). The relationships between high ICT penetration and economic growth in the developed world as well as the impact of mobile phones in Africa are used to exemplify this relationship. It is concluded that greater use of technology in business, schools and home could raise standards of living and help people prosper.*

## 1.1 Preamble: ICTs for Development

Governments the world over are more than ever before preoccupied with promoting digital inclusion because of the belief that there is a direct correlation between low digital gaps and economic development.<sup>5</sup> UNCTAD<sup>6</sup> notes that a person in a high-income country is over 22 times more likely to be an internet user than someone in a low-income country. Similarly, secure internet servers, a rough indicator of electronic commerce, are over 100 times more common in high-income than in low-income countries. In high-income countries, mobile phones are 29 times more prevalent and mainline penetration is 21 times that of low-income countries. Relative to income, the cost of Internet access in a low-income country is 150 times the cost of a comparable service in a high-income country. UNCTAD concludes that, greater use of technology in business, schools and home could raise standards of living and help people prosper.

BBC News<sup>7</sup> in an article on 'mobiles narrow digital divisions' notes that mobile phone and net access are helping narrow the gulf between the rich and poor nations. The efficiencies these technologies bring have boosted development in poorer countries. The report estimates that mobile phone users in developing nations now make up 58% of handset subscribers worldwide. In Africa where the increase in terms of the number of mobile phone subscribers and penetration has been greatest, this technology can improve the economic life of the population as a whole. The report notes that in rural communities in Uganda and the small vendors in South Africa, Senegal and Kenya, mobile phones were helping traders get better prices, ensure less went to waste and sell goods faster.

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<sup>5</sup> World Economic Forum, 2003

<sup>6</sup> UNCTAD, 2006

<sup>7</sup> BBC, 2008

During the 1990s, governments the world over had begun efforts to bridge the digital divide in order to realise digital dividends for their citizens in the social, economic and political spheres. These included improved service delivery, prudent management of public resources, and overall good governance. Similarly, **since the year 2000, governments the world over have been preoccupied with putting in place strategies on how to meet the Millennium Development Goals (MDGs) by the year 2015.** Universal access to digital technologies is seen as an important catalyst in this endeavour.

WSIS in 2003 noted that the digital revolution fired by the engines of ICTs had fundamentally brought new ways of creating knowledge, educating people and disseminating information, conducting economic and business practices, running government, engaging politically, providing speedy delivery of humanitarian aid and healthcare, and improving the living standards for millions of people around the world among others. Bridging the digital divide therefore creates opportunities for the previously marginalised. Such opportunities include among others access to education, equal employment opportunities, and medical care.

The United States government integrated ICT in its policy documents to achieve largely economic development and increased productivity. The US advanced this idea by advocating a Global Information Infrastructure (GII) through the World Trade Organization and the North American Free Trade Agreement (NAFTA). Similarly, at the 1994 ITU international conference in Buenos Aires, Albert Gore noted that the NII and GII would lead to sustainable economic progress and improved health care, among other benefits. Moreover, the GII would lead to global free market and global decentralised democracies, more freedom of individuals, and more choices.<sup>8</sup>

Countries that have low digital gaps are also performing best in terms of economic development. For example, Switzerland, Finland, Sweden, Denmark, Singapore, the United States, Japan, Germany, the Netherlands and the United Kingdom are the world's top ten performing economies according to *The Global Competitiveness Report 2006-2007*.<sup>9</sup> These countries are also leaders in e-governance systems and score highly on the digital opportunity index, e-readiness rankings, information society indices and e-government indices.

The term 'development' in this report is used to refer to the process of improving the quality of life of all people by raising their standards of living, creating conditions conducive to the growth of people's self esteem, and increasing people's freedom of choice.<sup>10</sup> Similarly, Zaidi<sup>11</sup> defines economic development as growth in GDP accompanied by relevant social and institutional changes by which that growth can be sustained. These changes include reduction in absolute poverty, a better quality of life, high literacy levels, improved productivity of labour, sophisticated techniques of production, development of physical and commercial infrastructure, higher savings, increase in employment opportunities, a positive attitude towards life and work, and a stable political system. Efforts aimed at digital inclusion must therefore first and foremost uplift

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<sup>8</sup> Miranda, 2006

<sup>9</sup> World Economic Forum, 2006

<sup>10</sup> SADC, 2008

<sup>11</sup> Zaidi, 2005

the socio-economic status of the people. **One of the key catalysts in the attainment of development is the inclusive access to and effective use of ICTs. ICT4D is used to refer to the application of ICT to facilitate development.**

This country report on ICT4D in Botswana is part of a five-country study involving Botswana, Mozambique, Tanzania, Zambia and Zimbabwe. The areas and issues presented in the report focus on:

- Botswana's geographic, demographic and socio-economic indicators;
- The ICT and telecommunications policy and regulatory framework, including liberalisation of the telecommunications sector;
- The ICT, Telecommunications and Power infrastructure and investment in their development;
- Telecommunication and broadcasting services;
- Social responsibility in the telecommunications industry;
- ICT4D projects and programmes;
- Main actors in the ICT/telecommunications industry
- Capacity building, including education service providers

The report concludes with an overview of the challenges facing Botswana in ICT4D endeavours, and presents a list of recommendations to take Botswana forward towards becoming an information society.

The report aims at developing a comprehensive understanding of national ICT4D issues for Botswana and is expected to enhance collaboration, sharing and dissemination of knowledge on ICT4D in Botswana and beyond. This report, it is hoped, will help stimulate and contribute to a discussion about the best strategies for ensuring that ICTs are integrated into national development plans.

This report was written by a joint team of four at the Department of Library and Information Studies, University of Botswana. The report is based largely on desk research complemented by interviews with key stakeholders in the public sector. Methodologically, this report was informed by findings of studies on ICTs in the public and private sectors commissioned by the, Botswana Telecommunication Authority (BTA) on the one hand, and the Botswana Telecommunication Corporation (BTC) on the other. The annual reports of the BTA, BTC, and the Botswana Power Corporation (BPC) have also been used, as have the Botswana Human Development Report, National Development Plans, the National Budget for 2009 and individual research publications. The findings from the desk research were validated and updated by interviews and the outcomes from the *Thetha* discussion forum (to be held in March 2010) involving experts from academia, civil society organisations, government, and the corporate sector.

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## 2. GEOGRAPHIC AND SOCIO-ECONOMIC CONTEXT

*This chapter provides an overview of Botswana's demographic data and economic indicators such as GDP, mainstay of the economy, employment statistics, and education enrolments. Specifically, the chapter discusses the youth and employment, the impact of HIV/AIDs, urbanisation, access to education, poverty levels and how mobile communications are improving the lives of rural communities through entrepreneurship from mobile communications trade spinoffs. The chapter also discusses the Botswana economy and government's efforts towards diversification.*

### 2.1 Geographic Context

Botswana is a semi-arid and landlocked country, considered to be one of the most sparsely populated countries in the world. It covers a land surface area of 582 000 km<sup>2</sup>, with a population of about 1.8 million.<sup>12</sup> The vast part of the country falls within the Kalahari Desert which extends across the borders into neighbouring countries South Africa, Namibia and Zimbabwe. The Republic of Botswana also borders Zambia to the north. The Republic of Botswana is a democracy with a growing economy and a stable political environment.

### 2.2 Demographic Context

The majority of the population in Botswana consists of youth below the age of 30 (65%), while those below 15 years of age are estimated at 36% of the population. Overall, Botswana has been experiencing a slowdown in population growth because of the devastating effects of HIV/AIDS. The Botswana population has increasingly been urbanised with more than 54.1% of the population estimated to be living in urban areas. This trend is attributed to the belief that urban centres have the potential to provide more job opportunities than rural areas.<sup>13</sup>

2005 figures indicate poverty levels of 30.1%<sup>14</sup> which is high for a country now considered a middle income nation. There are few data points to track changes in poverty over time but anecdotal evidence shows that there is little progress towards improving income distribution among the country's populace. However, the mobile communications phenomenon seems to be improving the lives of rural communities<sup>15</sup> by enhancing entrepreneurship, especially from small-scale spinoffs of the mobile communications trade.

Access to primary education in Botswana is nearly universal and educational attainment, as measured in primary school completion rates and transition to higher education, is markedly high. It is estimated that 95.3% (about 350,000) of primary school age children (7-13 year age group) are enrolled in formal education.<sup>16</sup> The transition rate from Standard 7 to Form 1 is

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<sup>12</sup> Republic of Botswana, 2007

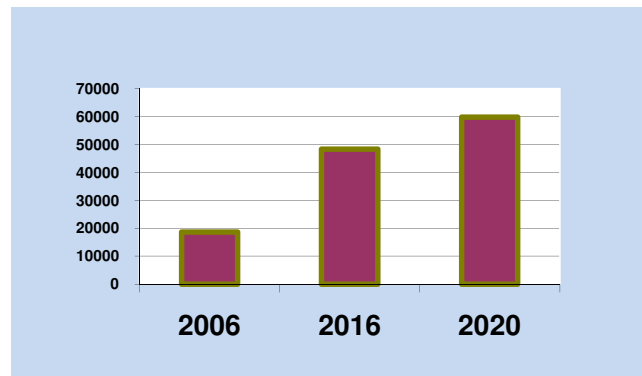
<sup>13</sup> CSO, 2005

<sup>14</sup> UNDP, 2005

<sup>15</sup> Institute of Economic Affairs, 2007

<sup>16</sup> Mutula and Mutula, 2008

approximately 96.0%. With regard to tertiary education, there has been a consistent increase in the numbers of learners at the tertiary level. For example the University of Botswana, the only public university in the country, has 15 725 students.<sup>17</sup> During NDP 9,<sup>18</sup> notable achievements included access to tertiary education with student enrolment rising from just over 20 000 in 2003/2004 to 31 129 in 2007/2008.<sup>19</sup> Estimates<sup>20</sup> indicate that enrollments within the tertiary education sector will rise steadily to 60 000 by 2020 as shown in **Figure 1** below:



Source: Neil, 2007

**Figure 1: Tertiary Education Council Projected Student Enrolment in Botswana**

## 2.3 Socio-Economic Context

Botswana is regarded as one of Africa’s wealthiest nations with a thriving economy largely based on diamond mining and tourism.<sup>21</sup> Botswana attained independence in 1966 when it was classified among the poorest nations of the world in terms of Gross Domestic Product (GDP). With the discovery of diamonds, the economy of Botswana has grown steadily to the level where it is classified as a middle income nation.<sup>22</sup> The GDP during the first quarter of 2009 was estimated at BWP 18,225.6 million.<sup>23</sup> Botswana is the largest exporter of diamonds in the world as well as a large exporter of beef to the European Union.<sup>24</sup>

At the time of independence, the semi-literate and the natural resource base was very poor. Institutional and physical infrastructure was at best very rudimentary. Besides, an administrative capital did not exist and there were only seven kilometres of tarred road in the whole country. No other communications infrastructure or services of note were available. The state lacked development capability and the entire development and more than half of the recurrent budget

<sup>17</sup> ibid

<sup>18</sup> NDP 9 refers to the National Development Plan (2003 – 2009)

<sup>19</sup> Ministry of Finance and Development Planning, 2009

<sup>20</sup> Neil (2007),

<sup>21</sup> Paul Budde Communication Pty Ltd, 2009

<sup>22</sup> UNDP, 2006

<sup>23</sup> One US\$ = about 6.983 as at 3 March 2010

<sup>24</sup> Mutshewa, 2009

was funded through grants in aid, primarily from the United Kingdom.<sup>25</sup> Institutions of state depended on expatriate personnel because of a very weak base of nationals trained to a level sufficient to run the public sector bureaucracy. Under the circumstances, Botswana's development prospects were considered exceptionally gloomy.

Today, Botswana's economy is one of the strongest and best managed in the developing world. The economy exhibits strong fundamentals - fiscal solvency, monetary stability, a healthy external balance, robust growth and a good sovereign credit rating. The economy is dependent essentially on mineral extraction. Mining accounts for more than a third of GDP, about 80% of export receipts and about 50% of government revenue.<sup>26</sup> Large diamond deposits were discovered by 1985/86, which changed the structure of the economy profoundly. Mining, which was virtually non-existent in 1966, became the dominant economic activity, accounting for 50.7% of Botswana's GDP. Agriculture's GDP share had by then slumped to 5.8%. It further declined to 3% of GDP in 2002. Driven by mining, Botswana's real GDP growth rate averaged 9.2% per annum by 1996, the highest sustained growth rate in the world and matched only by China's performance in the 1990s. The growth was however defective, especially in relation to employment creation and poverty reduction. Despite its large GDP share, mining accounts for less than 5% of total formal sector employment and its direct linkages with other sectors of the economy are weak.<sup>27</sup> The Government of Botswana has abolished all exchange controls and has instituted low personal and corporate tax rates. Together with a stable macroeconomic environment and a commitment to transparency, Botswana has actively encouraged and received a significant amount of foreign investment. Although the majority of this investment has occurred in the mining sector, Botswana has actively sought to create an enabling investment climate in alternative sectors.<sup>28</sup>

Besides, the government is keen to bolster its economy by diversifying from its reliance on diamond mining to a service economy, with more focus on developing the local ICT industry to support Small and Medium Enterprises (SMEs) that have the potential to contribute significantly to the economic development of the nation. SMEs are claimed to be essential for the survival and growth of nations' economies.<sup>29</sup> Through the use of relevant ICTs, SMEs would be able to capture global markets, sell to international customers and compete favourably with large corporations. The NDP 10 (2009 – 2015) focuses on implementing the Vision 2016 strategy by investing in ICT to reach a knowledge economy in Botswana so as to accelerate economic growth, reduce poverty, diversify the economic base, and create more and sustainable employment opportunities.<sup>30</sup>

The Government is also keen on diversification of the economy in order to reduce the risk of being dependent on a few major export commodities, and to reduce the very high dependence

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<sup>25</sup> UNDP, 2005

<sup>26</sup> *ibid*

<sup>27</sup> *ibid*

<sup>28</sup> *ibid*

<sup>29</sup> Ramsay *et al*, 2003

<sup>30</sup> Ministry of Finance and Development Planning, 2009

on imports. Through diversification of the economy, the government expects to increase job opportunities because the mining sector employs relatively few people.<sup>31</sup> Diversification has been accelerated by the global economic crisis, which has forced Botswana to seek funding to bridge the gap in the 2008 national budget.<sup>32</sup> Through diversification of the economy, it is possible to explore other growing markets and not be limited to Botswana alone. Evidence of economic diversification is reflected in the decreasing dependence on imports.<sup>33</sup> The ratio of imports of goods and services to GDP has fallen very substantially showing that the private sector in Botswana has been competitive. Moreover, there has been some success in export diversification. Based on a recent survey of non-mining firms in Botswana, results showed that, in comparison with neighboring countries, a smaller percentage of firms export their production, and that all firms sell unusually large amounts of their output to the Government.<sup>34</sup> This can be attributed to the enormously rapid growth of the economy, driven to a considerable extent by government spending its large diamond revenues. The World Bank concludes that in these circumstances, the domestic market has provided very profitable opportunities, and within that market the biggest opportunities have been in selling to the Government.

With regard to employment, 71% of the population is in the working age category (12 years and over). During 2005/6, the working age population included 663 000 people who were actively seeking employment.<sup>35</sup> Using the projected population of those 12 years and over for 2006, this is equivalent to a labour force participation rate of 54%. Of these active job seekers, 82.7% found employment, including self-employment for family gain and 17.35% remained unemployed.<sup>36</sup>

The budget Speech for Botswana in 2009 stated that the country has made considerable progress in economic and social development over the years. This includes:

- Reduction in the number of people living in absolute poverty;
- Increased access to education, health facilities and portable drinking water;
- Provision of basic shelter;
- Growth in jobs created;
- Considerable diversification of the economy; and
- Sustained economic growth as well as improved investment climate.<sup>37</sup>

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<sup>31</sup> Republic of Botswana, 2007

<sup>32</sup> BOCCIM, 2009

<sup>33</sup> World Bank, 2007

<sup>34</sup> *ibid*

<sup>35</sup> Republic of Botswana, 2006

<sup>36</sup> CSO, 2006

<sup>37</sup> Ministry of Finance and Development Planning, 2009

Moreover, for the eighth successive year, the country's credit ratings by both Moody's Investors Service and Standard and Poor's have been retained at grade 'A' despite the global credit crisis and economic downturn which has resulted in ratings for several other countries being downgraded. . The main sector that is instrumental in sustaining Botswana economy is the mining sector, complemented by agriculture, tourism, transport and communications; construction; banks, insurance and business services sector. During NDP 9 (2003-2009 development plan), the government established six Hubs to accelerate economic diversification and growth. These hubs include diamond mining, innovation, education, health, tourism and transport.<sup>38</sup> Because of the global financial crisis in 2008, there was a sharp decline in commodity prices for the minerals including diamonds, copper, nickel, and to a lesser extent, gold. The decline in mineral revenues adversely affected the government budget balances necessitating government to draw from its reserves and also to borrow.

In 2007 the number of informal businesses was estimated at 40 421, of which 27 315 or 67.6% were owned by females and 13 106 by males. The number of informal businesses increased by 72% from the 28 726 businesses estimated by the 1999 Informal Sector Survey. The majority of informal businesses were in the Wholesale and Retail Trade sector (40.5%), followed by Real Estate (20.3%). About 12.2% of businesses were in the Manufacturing sector while businesses in the Hotels and Restaurants category accounted for 8.8%. The financial sector recorded significant growth during NDP 9 including an increase in the range of institutions, infrastructure and services, as well as the establishment of a National Clearance and Settlement System.<sup>39</sup> The Botswana International Financial Services Centre (IFSC) continues to promote Botswana as a regional and international financial services centre in order to contribute to sustainable economic diversification, employment creation, skills development and revenue generation.

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<sup>38</sup> *ibid*

<sup>39</sup> Ministry of Finance and Development Planning, 2009

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## 3. POLICY, LEGAL AND REGULATORY FRAMEWORK

*Chapter 3 covers the National ICT policy, liberalisation of the telecommunications sector, telecommunication and broadcasting services, consumer protection and social responsibility in the telecommunications sector. The chapter provides a detailed discussion of policy and legislative frameworks to enhance the adoption of ICT4D, Botswana's expenditure on R&D, the telecommunications infrastructure and the use of ICTs. The scope and coverage of Botswana's ICT policy, aimed at innovating and diversifying into a knowledge based economy is explained as is the impact of liberalisation of value-added services and private networks in improving the quality of lives of the citizens. The chapter also elucidates on the expansion of broadcasting services especially the electronic media. Finally, the regulatory environment with regard to consumer protection and social responsibility is discussed.*

### 3.1 Botswana National ICT Policy

Botswana has in place several policy and legislative frameworks to enhance the adoption of ICT4D. The Science and Technology (S&T) Policy for Botswana envisages S&T as critical to the growth of productivity, national competitiveness and the diversification of the economy. The Policy commits Botswana to developing an S&T capability through, among other interventions, increased spending on scientific research. Whereas most developed and emerging economies spend in the order of 2-3% of GDP on S&T related research, Botswana's research expenditure is estimated to be less than 1% of GDP. The Policy gives priority to strengthening telecommunications infrastructure and the use of ICTs, and attracting women to professions and careers in the field of S&T. The Policy further provides for the coordination of scientific research within the country and with the rest of the world. It proposes the establishment of three institutions to coordinate and promote scientific and technological research. These institutions include:

- The National Commission for Science and Technology (NCST) as the policy advisory body;
- The Botswana Research Science and Technology Investment Agency (BRSTIA) responsible for the output-based resource allocations for research and development; and
- The Botswana National Association of Scientists and Technologists (BNAST) which is supposed to play the role of an umbrella advocacy agency for professional researchers.<sup>40</sup>

In May 2007, the government published the National ICT policy (NICT Policy) as a framework that sets guidelines on the development and utilisation of ICTs in national development.<sup>41</sup> The overall objective of the NICT Policy is to complement and build upon Botswana's Vision 2016 strategy by cultivating an enabling environment for the growth of the country's ICT industry, providing

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<sup>40</sup> UNDP, 2005

<sup>41</sup> Botswana, Ministry of Communications, Science and Technology, 2007

universal service and nationwide access to information and communication facilities, and positioning Botswana as a global competitor in the ICT sector. The NICT Policy envisages wide-ranging objectives including providing an efficient and cost-effective ICT infrastructure, establishing universal access to local and relevant information, instituting an ICT legal framework, and enhancing government services and health care through the use of ICTs. This will prepare the nation to participate, learn and innovate in an information- and knowledge-based society and an economy that is diversified and attractive to foreign investment.<sup>42</sup> The NICT Policy is considered a roadmap for the effective utilisation of ICT as a vehicle for social, economic, cultural and political development.

The NICT Policy covers agriculture, civil society, economy, education, government, health, law, and infrastructure among other sectors. Within the overall economy, ICT is envisaged to create growth in employment and as a diversification strategy from mineral extraction. To achieve this goal, focus is being placed on international financial services; business process outsourcing; improvements in technical infrastructure; service quality and reliability to attract foreign direct investment to the services industry; developing a network of agricultural extension agents to provide farmers with an inventory of agricultural information; academic/private sector partnerships, such as Student Connections, to assist in the adoption of ICTs; and small business entrepreneurship. Within civil society, the NICT Policy aims to achieve community access and service delivery, public awareness, capacity building, and content development.

The NICT Policy's concern on education is to develop local skills with a particular emphasis on the development of ICT skills in children and young adults. Therefore an efficient, accessible, affordable and reliable infrastructure that connects all schools and learning centres is envisaged by the NICT Policy. School connectivity will be enabled through a central education network with infrastructure that supports broadband delivery. Besides, computers will be introduced at a higher ratio in the classroom to facilitate the infusion of ICT throughout the curriculum. Training, development and support of education professionals will be implemented in order to ensure the effective integration of ICTs within the educational curriculum. Training and job creation will be provided for those outside of the formal educational system through public and private initiatives such as JobNet - a network of online services and tools aimed at helping employers and job seekers use the internet for recruitment, career, labour and learning information.<sup>43</sup>

With regard to governance, the NICT Policy will facilitate the development of e-government, e-services, e-information and a transparent public service. In the health sector, the NICT Policy envisages an e-Health system that will use ICTs in order to increase quality, effectiveness, safety and swiftness of health services. It is envisaged that all health facilities will be interconnected. Online health information will be universally accessible by the end of 2009. Remote health services across the nation will be provided by the end of 2010. To achieve these goals, focus will be placed on developing national leadership and sponsorship for the e-Health project, reviewing legislation and policy regarding storing and managing health information in an electronic form, and identifying the necessary technical infrastructure and standards. Secondly, emphasis will be

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<sup>42</sup> *ibid*

<sup>43</sup> *ibid*

placed on professional development for health care workers, providing the necessary tools and resources, and managing the transition to e-Health services. Finally, efforts will be made to expand the use of radio and television healthcare messages to an online Health Portal. A telehealth initiative that provides patients with access to nurses via the telephone is envisaged in the NICT Policy. In addition, the National Health Surveillance Network initiative will be enhanced to facilitate the improvement of the health care system by providing the government with feedback on health issues and the strategies to address them.

With regard to the legal framework, the NICT Policy envisages legislation relating to regulation, privacy, security, and cyber crime. Finally, as far as infrastructure development is concerned, the NICT Policy is concerned with technical and physical infrastructure development, network quality, infrastructure standards, ICT systems security and privacy standards, emerging technologies, human resource development, and ICT infrastructure management. The NICT Policy has a component on connecting communities whose goal is to provide residents of rural, remote and urban areas affordable access to ICTs, especially computers and the internet.<sup>44</sup>

The NICT Policy is explicit about Botswana becoming a globally competitive, knowledge and information society where lasting improvements in social, economic and cultural development is achieved through effective use of ICT. The NICT Policy builds upon Vision 2016 (Botswana's long term development strategy).<sup>45</sup> Through the NICT Policy, the government has created an enabling environment for mainstreaming ICTs into the development agenda of the country. The NICT Policy is buttressed by the National Research Science and Technology Plan which identifies two key ICT development focus areas, namely:

- a. Appropriate access technology, which focuses on research aimed at improving communications; and
- b. Software engineering.

Botswana has almost completed the liberalisation of the telecommunications sector, resulting in the pervasive and ubiquitous use of mobile phones in the general population in Botswana, and surpassing fixed-line telephony by eight times (See **Table 1** in Section 3.3 below).

The NICT Policy creates opportunities for all sectors of the economy (government, communities, business, health, education) to apply ICTs to solve national problems and share such experiences with other countries. The Permanent Secretary of the Ministry of Communication, Science and Technology<sup>46</sup> reported that the NICT Policy has been a catalyst in the ICT infrastructure development taking place in the country.

Besides the NICT Policy, Botswana has put in place a Universal Access and Service Policy aimed at facilitating the provision of communications throughout Botswana. The emphasis of this policy

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<sup>44</sup> Ministry of Communication Science and Technology, 2007

<sup>45</sup> Republic of Botswana, 2007

<sup>46</sup> In a speech delivered at the University of Botswana on 14 October 2009, during a conference on *Information Management in the Digital Era*

will be on improving telecommunications services and connectivity to underserved areas. This is to be achieved by broadening its service base from the formal sector (corporate services) to extending services to households in both urban and rural areas. The Botswana Telecommunication Corporation (BTC), the only (quasi-government) telecommunications operator in Botswana, also has a policy of providing at least one payphone in every village of the country with more than a population of 500.<sup>47</sup> The Universal Access and Service Policy advocates for the establishment of a Universal Service Fund that would assist service providers by subsidising the installation and provision of communication service areas, which would otherwise not be commercially viable.<sup>48</sup>

### **3.2 Liberalisation of the Telecommunications Sector**

In 2006, the Government of Botswana further liberalised the telecommunication sector. The immediate impact of liberalisation was the establishment of integrated network platforms, deploying the most efficient advanced technologies by the Botswana Telecommunication Authority (BTA) that carry all forms of communication, including fixed and mobile voice and data originating from many different providers. This service and technology neutral approach made it possible for the sole fixed telephone operator BTC (now also a mobile service provider), and mobile phone providers Mascom Wireless and Orange Botswana to be granted (on application), service-neutral licenses. These licenses authorise them to provide all forms of telecommunications services, to a defined level of functionality, over fixed or mobile, wire line or wireless, network links, using any available technology, and to provide international telecommunications, including the operation of international gateways. Through the new licensing regime, the operators are required to maintain their existing network coverage and are also authorised to extend their coverage as they wish, subject to obtaining the necessary planning approvals and allocation of radio spectrum where necessary. Rules for infrastructure sharing and mobile roaming remain unchanged. The new licensing regime means that value-added network services (VANS) licenses, the existing licenses for the provision of internet services and data services, are also being replaced by service-neutral and technology-neutral licenses, covering all forms of value-added telecommunications service provision, including VoIP or internet telephony at national and international levels.<sup>49</sup>

With the new licensing structure, only the existing mobile and fixed line operators have been allowed to apply for the Public Telecommunications Operators (PTO) licenses. This market segment is under consideration for further liberalisation.

The market for value-added services and private networks is fully liberalised and any locally registered company is eligible to apply for a license in these two categories. Following further liberalisation of the telecommunications market no company is compelled to use the BTC infrastructure, or the BTC international gateway to route calls. Companies are allowed to provide

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<sup>47</sup> Mbarika, Raymond, and Byrd, 2002

<sup>48</sup> Odirile, 2007

<sup>49</sup> BTA, 2008

their own transmission links and backbone infrastructure, or continue to hire from the BTC. In addition, VoIP has been made legal.

The impact of the further liberalisation of telecommunications sector in Botswana has enabled new technologies such as Wi-Fi, Wimax and ADSL to be implemented in the country. In addition, BTA has put in place the following sectoral policies:

- A Telephone Numbering Policy which addresses the management of telephone numbers in a liberalised market. Issues covered include, among others, carrier selection, short codes, and VoIP numbers.
- A Spectrum Management Strategy to ensure a comprehensive spectrum management policy/strategy. It entailed, amongst others, reviewing the National Frequency Plan to align it to international plans and design allocation policies for various radio services envisaged in the liberalisation roadmap, and to develop a licensing and pricing policy.
- Telecommunications Technical Specifications and Type Approval Procedures for both Radio (wireless) and Telecommunications Terminal (wired) products.

BTA was considered a model regulator, especially among developing countries, in 2001 by the Sector Reform Unit of the ITU Telecommunication Development Bureau. BTA enjoys complete freedom in licensing operators and in financing its operational budget. BTA has been instrumental in the creation and working of the Communication Regulators' Association of Southern Africa (CRASA). CRASA has developed model legislation and regulatory guidelines for the Southern African region.<sup>50</sup>

Despite the strides made in Botswana's telecommunication sector, the BTC still retains the monopoly on the provision of fixed line telephony.

### **3.3 Telecommunication and Broadcasting Services in Botswana**

BTA has been active since 2007 in the licensing of three new private FM radio broadcasters by the National Broadcasting Board namely:

- Gabz Fm (private national);
- Yarona FM (private national); and
- Duma FM (private national).

In addition, a satellite subscription based broadcasting service provider – the Munhumutape African Broadcasting Corporation (MABC) (private national) was licensed to operate. BTA is facilitating possible licensing of Telkom Media, a South African based company which applied to broadcast into Botswana. In addition to licensed telecommunication services in Botswana, there are other unlicensed telecommunication services such as MultiChoice Africa (foreign private television network), Botswana TV (government TV service with national coverage), Voice of

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<sup>50</sup> BTA, 2008

America, VOA (foreign government radio with national coverage), Radio Botswana (RB2) (Botswana Government Radio service with national coverage) and Government TV (foreign private TV with national coverage).<sup>51</sup>

The telecommunication industry has grown significantly since the liberalisation of the sector began in 1996, and subsequently since 2006 when more services were liberalised including private data networks, international gateways and VOIP. The Table below summarises figures showing growth in the telecommunication services between 2007 and 2008.<sup>52</sup> (adapted from BTA, 2008)

**Table 1: Growth in Botswana’s Telecommunication Services, 2007 – 2008**

	March 2007	March 2008	% Increase	% Subscriber Base
Post paid subscribers	-	-97,922	-	69%
Prepaid subscribers	-4176	4,219	-	29%
Pay phone (Public phones)	-	-3,193	-	2% (2846) of fixed line base
Mobile phones	1,151,761	1,485,791	29%	-
Fixed lines	136,946	142,282	4%	-

Mobile penetration is now estimated to be approaching 100%, which is more than twice the continent's average. Mascom Wireless, Orange Botswana and BeMobile (a subsidiary of fixed-line incumbent BTC) – have entered the underdeveloped broadband sector with different strategies including 3G mobile, WiMAX and bundling with fixed-line (ADSL) services. These providers are competing with a large number of Internet Service Providers (ISPs), some of which are rolling out their own wireless access infrastructure.<sup>53</sup> Despite the impressive growth of telecommunication services, especially the mobile phone industry, Botswana has one of the lowest internet penetration rates in the world at just above 4%.<sup>54</sup>

With further liberalisation of Botswana’s telecommunication sector during 2006/7 a new licensing regime was introduced by BTA. A service neutral license, the Public Telecommunications

<sup>51</sup> BTA, 2007

<sup>52</sup> Adapted from BTA, 2008

<sup>53</sup> Paul Budde Communication Pty Ltd, 2009

<sup>54</sup> Orange Botswana, 2009

Operators (PTO), was introduced and subsequently awarded to BTC in March 2007 and to Orange Botswana and Mascom Wireless in April and June 2008 respectively. Under the new licensing framework, the Data and Internet Service Provider's license were merged to form a Value Added Network Services (VANS) license. VANS licenses were awarded to 24 VANS providers from 13 June 2007 to 31 March 2008. Of the twenty four licensees, thirteen (13) were converting from the former ISP/Data licenses whilst 11 were new applicants.

The other immediate impact of further liberalisation was the establishment of new international voice gateways by PTOs such as Mascom Wireless Botswana and Orange Botswana. The old regime of separate fixed and mobile licenses only enabled mobile operators to route all their international traffic through the BTC gateway. The new regime of the PTO license has since moved away from that condition and allows all operators to establish their own gateways. The new VANS license, unlike in the old regime, allows VANS providers to offer multiple services including VoIP. Already several VoIP providers are currently offering international calling services.<sup>55</sup>

During 2008, BTC launched its mobile service under the brand name 'BeMobile'. The service is now available in most parts of the country. Before the introduction of BeMobile services, BTC core business was in voice and data services through a broad spectrum of modern network platforms. It now boasts of access lines connected by all digital and soft switches, IP back bone, fibre-optic and SDH radio links. BTC remains the only fixed line operator in Botswana providing both national and international voice telephony, toll free services, public payphones, internet wholesale access, data services including leased circuits, private wires, very small aperture terminals (VSATs), managed networks and switched data services, and customer equipment).<sup>56</sup> BTC supplies the backbone of network to facilitate cellular access lines distributed communications. BTC has completed upgrading its national Management Data Network (MDN) and ADSL. During 2006/07 BTC successfully launched broadband services in most parts of Botswana that support education, healthcare, libraries and other public sector needs. In 2006/07 a network using fibre-optic cables initially reserved for key business areas was rolled out. This was a move to create a high capacity multi-Gigabit network to support existing services and launch new services such as Ethernet. This initiative becomes the first commercial Multi-Protocol Label Switching (MPSL) deployment in Botswana. Broadband services are available in the form of ADSL and various wireless technologies, including a city-wide WiMAX network in the capital Gaborone, launched in mid-2008. The government is in the process of privatising the national telecommunication agency BTC through a new service-neutral license.<sup>57</sup>

Following the further liberalisation of the telecommunication sector in 2006, the following developments have taken place:<sup>58</sup>

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<sup>55</sup> BTA, 2008

<sup>56</sup> BTC, 2008

<sup>57</sup> Research and Markets, 2008

<sup>58</sup> *ibid*

- Mobile operators provide transmission links to build their own backbone infrastructure to carry their traffic;
- Mobile operators now exploit service-neutral license provision to provide all telecommunications services including voice and data, irrespective of whether service is transmitted wireless or on wire;
- Introduction of service neutral licenses at rural and district levels;
- Liberalisation of the international voice gateway to allow other players to provide international switching and transmission of voice services which previously was a monopoly of BTA;
- Establishment of the Universal Service Fund whose proceeds would be used to subsidise rural telecommunications;
- Future privatisation of the BTC has been sanctioned by government; and
- All mobile and ISP operators have been issued with service neutral licenses that allow them to provide VANS and VoIP. Effectively ISPs would provide service at the national and international levels.

BTC currently provides VSAT services that allow it to extend voice and data coverage beyond the cable network infrastructure. BTC's VSAT services can be provided beyond the borders of Botswana and currently have a footprint to cover most parts of sub-Saharan Africa. The system supports voice, video and data including internet access. The mobile network currently uses 2.5G technology and has coverage in most parts of eastern Botswana offering customer services such as voice, text messaging and basic data services. In addition, through General Packet Radio Services (GPRS), wireless access to data networks such as the internet can be enabled. It is expected that, with the implementation of 3G networks in the not-too-distant future, BTC will be able to offer data speeds from 384Kbps up to 14.4Mbps.<sup>59</sup>

BTC provides wholesale internet services through five dial-up Points of Presence (PoPs) and the central BotsGate internet gateway in Gaborone. The national backbone network comprises a high capacity fibre SDH ring infrastructure around the country. The Trans-Kalahari ring network connecting major towns such as Gaborone, Jwaneng, Ghanzi, Maun, Orapa and Francistown has built-in rerouting capabilities to restore traffic hence making the network more resilient. BTC also manages other smaller regional fibre rings connecting towns with spur links towards the borders with neighbouring countries for international connectivity. During 2007/8 BTC expanded its satellite and terrestrial capacity, connecting to the rest of the world and reached a key milestone of 200Mbps. BTC has achieved 90% international connectivity via high quality

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<sup>59</sup> BTC, 2008

redundant fibre links. Growth in broadband, managed services is expected to further enhance the capacity.

### **3.4 Consumer Protection and Social Responsibility in the Telecommunications Sector**

To protect consumers of the telecommunication services in Botswana, operators are required by BTA to submit monthly network performance reports detailing the status and performance of their networks in terms of the set parameters of Quality of Service as determined by the BTA from time to time. To protect consumers, BTA also carries out investigations on the illegal use of communications equipment in order to determine the extent of illegal operations in the telecommunications market, educate illegal operators on the licensing procedures, and advise them to apply for licenses. BTA regularly conducts outreach activities to educate community leaders, students and the general public on a range of subjects regarding its mandate. These include the challenges and successes facing the BTA:

- Obtaining feedback on consumer related issues and/or complaints;
- Licensing of operators;
- Spectrum management;
- Setting tariff principles;
- Setting industry standards; and
- Monitoring service providers for compliance with license conditions.

To enhance consumer protection, BTA monitors broadcasting services of the licensed broadcasters to assess possible breach of license conditions. BTA occasionally undertakes site visits to the stations' facilities to monitor the day to day operations of the licensees and to offer assistance where necessary with regard to license terms and conditions. BTA further ensures that its services are benchmarked against best practices by working closely with ITU and ensuring participation of its staff in key regional and international conferences.

BTA undertakes social responsibility obligations within the community in Botswana by, for example, donating ICT equipment to various beneficiaries. During 2008, 28 beneficiaries received donations totaling P463 899.00. Eight schools received a combined total of nine computers, five printers and three photocopiers. Other beneficiaries included charitable organisations and the Customary Court of Appeal. BTA constructed a three roomed house for a destitute woman in Pitsane village in the Southern District costing P50 000 00.<sup>60</sup>

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<sup>60</sup> BTA, 2008

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## 4. ICT AND POWER INFRASTRUCTURE IN BOTSWANA

*Chapter 4 covers investment in ICT and power supply infrastructure. The chapter reveals that government has invested significant resources for the expansion of ICT and power infrastructure in the country to support development initiatives, but several challenges continue to hamper steady progress. The Government is implementing a rural electrification programme as well as expanding telecommunication services to underserved areas. There are five radio and three television stations and a growing number of private networks such as the Government Data Network (GDN), police private networks, internet service networks and mobile phone networks. The Government is also participating in continent-wide ICT infrastructure developments such as the EASSy and SEACOM submarine cable systems.*

### 4.1 ICT Infrastructure Investments in Botswana

The Government of Botswana is making impressive efforts to expand ICT infrastructure in the country to support development initiatives. The rural electrification programme is being extended to remote villages. Five radio and three television stations are available and a growing number of private networks are in place such as the Government Data Network (GDN), a police private network, Botswana TV network and mobile communications networks. Public internet access and internet cafes in urban areas are available and managed by several ISPs. Business access can be achieved through packet switched, managed services, ISDN and private line services. The rapidly growing mobile user base is estimated at more than 1.5 million.<sup>61</sup>

The Botswana government is the major driver in the development of IT and communication systems in the country.<sup>62</sup> The recognition of the importance of ICTs in national development is demonstrated by the government's growing expenditure on ICTs since National Development Plan 7 (NDP7). For example, the pattern of growth in expenditure on IT was 0.2% of the NDP 7's capital expenditure; 1.9% of NDP8's development budget; and 3.7% of NDP 9 projected expenditure.<sup>63</sup> In terms of real Pula value, investment in Government IT rose from Pula 19 million (about US\$ 2.72 million) in NDP7, (1992 to 1997) to Pula 487 million (US\$ 69.75 million) in NDP8 (1997 to 2003). It rose to Pula 602 million (US\$ 86.21) during NDP9 (2003 to 2009) as shown in Table 1.<sup>64</sup>

The Government of Botswana has invested substantially in Microsoft technology. More than 90% of Intel servers run a Microsoft operating system.<sup>65</sup>

There are salient developments of ICT infrastructure within the public sector such as data communication networks across ministries, departments, parastatal organisations and public

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<sup>61</sup> BTA, 2008

<sup>62</sup> Fombad, 2005

<sup>63</sup> Government Computer Bureau, 2003

<sup>64</sup> Department of Information Technology, Botswana, 2004

<sup>65</sup> Ministry of Science Communication & Technology, 2007

utilities.<sup>66</sup> The private sector has also shown signs of involvement in the ICT sector as providers and users of ICT goods and services.

**Table 2: ICT Investments by the Government of Botswana (NDP 9/10)**

Project Name	Project Value (BWP)
Nteletsa I	126 000 000
Nteletsa II	350 000 000
Fibre Optic Network	500 000 000
Installation of telecommunications networks	86 000 000
TOTAL	1 062 000 000

Sources: Mmegi, 2008 & 2009; Botswana Guardian, 2009

A number of factors are giving impetus to Botswana's drive towards investments in ICT infrastructure:<sup>67</sup>

- Globalisation, economic restructuring and reforms which have threatened the key industries that generate wealth, thus making information and ICTs important ingredients for competitiveness and survival;
- BTC's Act of 1996 which opened a competitive environment, allowing new market entrants to compete for the provision of infrastructure, network and value added services;
- Government's deregulation and restructuring of computer operations, enabling individual ministries and departments to forge their own partnerships and contracts with the private sector;
- The restructuring of the education sector which has increased opportunities for technical, managerial and computer-related courses. This should substantially raise computer literacy levels among the working population; and
- The need to use modern technology as articulated in Vision 2016.

#### *Rural Telecommunications Development*

Investment in ICT infrastructure has continued with the BTC announcing in October 2009 that it had signed a contract with the Government of Botswana to extend telecommunications services to 94 villages in five rural districts covering the Central, North West, Chobe, Ghanzi, and Kgalagadi Districts of the country.<sup>68</sup> The Project, known as Nteletsa II,<sup>69</sup> is part of Botswana's Rural Telecommunications Development Programme which seeks to extend telecommunications services to all rural areas of the country. The P350 million (US\$ 50.12 million) Project will involve

<sup>66</sup> Fombad, 2005

<sup>67</sup> Sebusang, Makepe and Botlhole, 2007

<sup>68</sup> Botswana Guardian, October 2009

<sup>69</sup> *Nteletsa* is a siTswana word meaning 'call me'

government subsidies for the provision and installation of telecommunications infrastructure and services as well as the operations and maintenance over a ten-year period. Nteletsa II will entail BTC providing mobile services capable of delivering internet, voice and data.<sup>70</sup> The government subsidy is intended to ensure wider national telecommunications coverage as well as effecting non-discriminatory tariffs.<sup>71</sup> One of the key objectives of the project is to provide a shared telecentre in each village, with telephone lines and internet access operated by the BTC in partnership with local communities as means of empowerment. The telecentres will provide other basic services such as charging mobile phones, desktop services, photocopying, scanning and printing.

Under the Rural Telecommunications Development Programme, Botswana has been divided into four areas covering all the unserved 197 gazetted villages in the country. The Government has thus far signed contracts with a private telecommunications service provider, Mascom (a mobile phone provider) and the BTC, to implement projects in Areas 2 and 4.

**Area Demarcations for Unserved Villages in Botswana**  
**Area 1** - 59 villages in Chobe, Ghanzi, Kgalagadi, North West districts.  
**Area 2** - 62 villages in Southern, Kweneng and North East.  
**Area 3** - 35 villages in Central and Northwest districts.  
**Area 4** - villages in Kgatleng and Central districts

BTC has completed the implementation of infrastructure in Area 2. Mascom was awarded a tender for Area 4 in 2008 which is still ongoing. The Mascom project worth P86 million (US\$ 12.32 million) entailed supplying, installing, operating and maintaining telecommunications networks in 41 villages as part of Nteletsa II.<sup>72</sup> The project design also provided for the establishment of Public Communications Centres (PUCCs) in villages. These centres are to be operated by the communities in partnership with Mascom. The objective of the PUCCs is to provide community access to phones, computers and the internet through public ICT access points. New employment opportunities will be created through these centres.

Nteletsa I, the predecessor of the Nteletsa II rural project, covered the Southern, Kweneng and North East districts, providing basic telephony to 177 villages. Nteletsa I, worth P126 Million (US\$18.04 million), was launched in 2002 and implemented by the BTC.<sup>73</sup>

#### *Fibre-optic Networks and Linkages to Submarine Cable Systems*

The Government of Botswana, has invested P500 million (US\$71.6 million) to install fibre-optic cables that will link the country to the undersea West African Cable Systems (WACS) via London. This will be in conjunction with Namibia and regional telecommunications companies (Zain, MTN, Neotel and Vodacom). Once completed, this investment will afford Botswana a more secure, reliable and cheaper bandwidth. The Government, in partnership with other sub-regional

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<sup>70</sup> Echo, 2009

<sup>71</sup> Botswana Guardian, 2009

<sup>72</sup> Mmegi, 2008

<sup>73</sup> BOPA, 2005

countries, is also investing in the US\$210 million Eastern Africa Sub-marine Cable System (EASSy).<sup>74</sup> EASSy, which is 90% owned by African countries, is laying an undersea fibre-optic cable along Africa's eastern seaboard. Once completed by 2010, the project is expected to substantially improve bandwidth not only in Botswana, but in the region.

The Southern African Regional Universities Association (SARUA)<sup>75</sup> states that the EASSy project aims to install the 'missing leg' of the submarine fibre-optic cable system up the east coast of Africa by means of a 9 900 km undersea cable that will run from South Africa to Port Sudan. The project design entails eight landing stations along the way, including Maputo (Mozambique), Toliary (Madagascar), Dar-es-Salaam (Tanzania), Zanzibar (Tanzania), Mombasa (Kenya), Mogadishu (Somalia), Djibouti (Djibouti) and Massawa (Eritrea). EASSy will connect to the global network through other undersea cables such as SAT-3, SAFE, SEA-ME-WE 3 and SEA-ME-WE 4. The completion of this leg will mean that high capacity fibre-optic telecommunications cable will encircle practically the entire continent of Africa.

For international connectivity, Botswana has two fibre links of at least 622 Mbps (STM4) to South Africa and radio links to Namibia (PDH), Zambia (SDH of about 622 Mbps) and Zimbabwe (SDH of about 33).

Botswana (together with Namibia) is also aiming to connect to SAT3 via Angola<sup>34</sup> once the national fibre network is fully developed.

Botswana is also to be connected to a privately funded undersea cable provider, SEACOM, based in Kenya. SEACOM has investors from Kenya, Botswana, South Africa and from outside the continent.<sup>76</sup> Botswana's ICT liberalisation reform programme and investment in ICT infrastructure over the past two decades has paid dividends. The Wireless Federation (2009) estimates that, with the launch in 2008 of Botswana's third mobile service provider, BeMobile, Botswana was poised to surpass South Africa and Nigeria as the country with the highest per capita teledensity in Africa in the fourth quarter of 2009.

#### *Government Data Network (GDN)*

The Department of Information Technology (DIT) is the statutory agency responsible for maintaining and managing the nationwide Government Data Network (GDN).

The GDN is a secure network of routing devices and gateway infrastructure that delivers connectivity to all government departments, and provides centralised internet access via high-speed satellite links. It also provides access to centrally hosted applications such as the national identity registration, vehicle registration and so forth. The primary backbone of the GDN uses high-speed data links of 34 Mbps, ATM links and E1 Leased Lines. High-speed Fractional E1 Frame Relay Links serve as secondary links that are used only for backup purposes. The backbone links are primarily supplied by the BTC. Currently, DIT is exploring the possibility of using other carriers to enhance the resiliency of the backbone. The Government has also invested in the police

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<sup>74</sup> Mmegi, 2009

<sup>75</sup> SARUA, 2009

<sup>76</sup> Mmegi, 2009

microwave network that is distributed across the country in all the major urban and town centres.

#### *Government ICT Infrastructure Strategies*

The Government's strategy for building an effective and efficient ICT infrastructure was driven by national, regional and global considerations. Nationally, the country's infrastructure development strategy is encapsulated in the long term national development vision, Vision 2016.<sup>77</sup> The national vision stipulates that by the year 2016 Botswana would have:

- Entered the information age on an equal footing with other nations;
- Sought and acquired the best available information technology;
- Become a regional leader in the production and dissemination of information; and
- Developed its capacity particularly in electronic media, radio and television.

In addition, all schools in Botswana would have access to computer and computer-based communications such as the internet. Moreover, the people of Botswana would be able to use and apply the potential of computer equipment in many aspects of their everyday life.

Botswana's Vision 2016 strategy and NDP 10 have prioritised ICTs as the means to propel the country to become an information society predicated on knowledge economy.

Botswana's NDP9 on the other hand, encapsulated the creation of an enabling environment for the growth of the ICT industry in the country. This was to be achieved through the provision of universal service and access to information and communications facilities in the country, and establishing Botswana as sub-Saharan Africa's hub for ICT so as to make the service sector in the country globally competitive.<sup>78</sup>

#### *Regional and Pan-African ICT Agreements*

Regionally, Botswana's ICT infrastructure development is guided by the SADC IT Protocol of which the government of Botswana is a signatory. The Protocol identified improving and broadening equitable access to information and communications technology; reducing costs related to IT; developing infrastructure; encouraging the growth of software and hardware facilities; and improving human resource capacity.<sup>79</sup>

Botswana is also a signatory to the Economic Commission for Africa's (ECA) principle of '*Building Africa's Information Highway*' and the utilisation of ICTs to accelerate the socio-economic development of Africa and its people. Botswana has made good progress regarding the ECA Action Framework<sup>80</sup> which calls for the:

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<sup>77</sup> Presidential Task Group, 1997:6

<sup>78</sup> DIT, 2004

<sup>79</sup> SADC, 1999: 14

<sup>80</sup> Amoako, 1996

- Implementation of a national information and communication infrastructure;
- Building of institutional frameworks;
- Developing human resources; and
- Building information and technological resources.

Botswana's infrastructural development is guided by the New Partnership for Africa's Development (NEPAD) initiative which identifies the development of the ICT sector in member countries as one of its priority areas.<sup>81</sup>

Globally, Botswana is a signatory to the Digital Opportunity Task Force (DOT FORCE) on infrastructure development and bridging of the digital divide. The DOT FORCE identifies priority actions in such areas as: (Digital Opportunity Task Force, 2002):

- Fostering policy, regulatory and network readiness;
- Improving connectivity, increasing access and lowering costs;
- Building human capacity; and
- Encouraging participation in the global e-commerce.

Botswana also subscribes to the World Summit on Information Society (WSIS) whose principles include but are not limited to, the building of information infrastructure through telecommunications and investment in technology; achieving universal and equitable access to information technology, and making information a common good.<sup>82</sup>

#### *Existing National ICT Infrastructure*

Botswana has fostered a sound regulatory framework that has seen the rapid growth of the telecommunications sector especially mobile communications, internet service provision and private data networks. Connectivity has however been slow with only about 6% internet penetration in the country, though government is making good progress to ensure universal access to telephones and computers. Human capacity building in ICT remains a challenge as most highly qualified professionals are in demand worldwide. The growth of e-commerce is insignificant because of limited e-readiness of the economic sectors.

With regard to building an institutional framework, Botswana has in place the Ministry of Communication Science and Technology that was specifically created to address ICT development as a priority for the government. BTA has put in place various regulatory policies to manage liberalisation of the telecommunications sector to enhance, among others, universal access and service, consumer protection, and conflict resolution among service providers. BTC is responsible for the planning and development of telecommunications infrastructure in the country.

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<sup>81</sup> Harbi, 2003

<sup>82</sup> WSIS, 2003

Botswana has performed well with regard to national information infrastructure. For example, mobile communication penetration is almost 100%, and the GDN covers the whole country. There are several data networks supported by BTC, ISPs and several mobile operators.

ICT infrastructure is generally good with three mobile service providers and more than 20 ISPs. There are several fibre-optic networks owned by Botswana TV, GDN, Botswana Power Corporation and Botswana Railways. Within government there is state-of-the-art ICT infrastructure that includes the following:

- A Campus Local Area Network (LAN): This is a high speed connectivity that links all government offices situated within the government enclave;
- A Wireless Metropolitan Area Network (MAN) that connects government departments located in Greater Gaborone, the capital;
- A Wide Area Network (WAN) that connects all government departments across the country where there is availability of power, telephones and LAN in place; and
- A telephone and internet connectivity network that links government offices that have access to the electricity power grid.

The Government has also established a National Spatial Data Infrastructure for Botswana. This was developed within the National Geographic Information System project (NSDI) which allows the sharing of geospatial data throughout all levels of government, the private sector and academia. This reduces duplication of effort, improves the quality of data and reduces costs related to geographic information, to make geographic data more accessible and to increase the benefits of using the available data.

## **4.2 Power Supply Infrastructure in Botswana**

The energy sector in Botswana has experienced increased electricity demand up to a maximum of 530 MW. During 2008, electricity was in short supply due to a reduction of 60 MW supply from South Africa. The Morupule Power Station in Botswana contributes 120MW and the balance is imported mainly from South Africa and Mozambique. However, there are still shortages of power resulting in load shedding. This situation should improve on completion of the Morupule “B” Power Station Expansion Project in 2012.<sup>83</sup> In addition, a substantial private sector energy project, which would use some of the extensive reserves of the Mmamabula coal field to generate power for both export to the South African market and for domestic supply, has been reconfigured. The development now envisions a 1 200 megawatt power station; a nearby open cast coal mine, and coal washing facilities to provide clean-burning coal. This would assist in meeting the regional power requirement, provide greater energy security to Botswana, and further help diversify the Botswana economy.

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<sup>83</sup> Ministry of Finance and Development Planning, 2009

The shortage of electricity in Botswana has been exacerbated by vandalism of the power network, fraud and theft of electricity equipment. A total of 244 incidents were reported in 2008 where 168 were for vandalism, 22 for meter fraud and 22 for illegal connections. Nevertheless, the Corporation is engaged in a major generation expansion project in response to this reduction in the region's surplus generating capacity.<sup>84</sup> During 2008, BPC concluded a new five year Power Purchase Agreement with Eskom for the period 2008–2012, albeit with a stepped down supply. Because of the diminishing surplus generating capacity, the price of electricity has continued to increase significantly. Due to the huge capital investment required in developing new generation sources, the BPC is committed to operating in partnership with Independent power producers.

By the end of October 2008, 52.4% of households were connected to the national grid and by mid-November 2008, a total of 270 villages had been electrified. To bridge the gap between the demand and supply of electricity, Government has initiated various activities to implement an energy-saving strategy. These include energy-saving campaigns and the use of more energy-efficient lamps. For medium- to long-term power supply solutions, the Government intends to invest in alternative energy sources such photovoltaic power generation, bio-diesel production and the installation of solar home systems for lighting in rural villages.

Despite the energy shortages in Botswana, the government has had limited success in introducing alternative energy sources such as biomass and solar energy. The development of technological capabilities for harnessing solar energy has been ongoing for more than two decades in Botswana but the results have to date fallen short of establishing acceptable levels of efficiency and reliability, let alone, commercial viability. Botswana uses solar energy where it might not be economically viable to provide electricity through the national grid. For example, it has been used for borehole water reticulation in remote areas, providing energy to the remote installations of the railway and the BTC, as well as for lighting in remote areas. District councils use solar power to provide electricity to clinics and schools for refrigeration and lighting purposes.

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<sup>84</sup> BPC, 2008

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## 5. ICT4D PROJECTS AND PROGRAMMES

*Chapter 5 covers e-government and e-governance services in Botswana, ICT initiatives and projects, and ICT4D poverty alleviation programmes. A distinction between e-government and e-governance is provided and the applications of e-government outlined. Various indices are used to show how Botswana compares globally and in the region in e-government development. Botswana's e-government maturity level is assessed showing that the country is still at the emerging stage. The chapter further describes the various ICT4D projects that are being implemented in Botswana within the community such as the Nteletsa and rural electrification projects, government online and e-health initiatives.*

### 5.1 E-Government and E-Governance in Botswana

E-government refers to the application of ICTs within public administration to optimise its internal and external functions, thereby providing government, the citizen and business with a set of tools that can potentially transform the way in which interactions take place, services are delivered, knowledge is utilised, policy is developed and implemented, and citizens participate in public administration reform.<sup>85</sup> E-government is perceived as a panacea to the deficiencies of traditional forms of government where citizens physically go to government offices to apply for passports, birth certificates or death certificates, or file tax returns, with the consequent delays that arise out of long queues, lost files or the absence of relevant officials. E-governance, on the other hand, is an advanced level of e-government where citizen-government engagement takes place electronically.<sup>86</sup>

Various indices are used for measuring a nation's e-government capability and maturity. The Digital Opportunity Index (DOI) can be used to measure and evaluate the opportunity, infrastructure and use of ICTs by government and its people. The DOI monitors recent technologies such as broadband and mobile Internet access, the falling price of broadband, and increasing broadband speeds.<sup>87</sup> Most African countries, including Botswana, do not score favourably in terms of e-government opportunities, as shown in **Table 3**.

The 2006 e-government ranking shows that Botswana dropped from its position in 2005 by five points (**Table 4 below**). The 2008 UN e-government survey shows that the Southern African region showed little improvement from the previous 2005 survey. South Africa (0.5115) continued to lead in the region followed by Lesotho (0.3805).

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<sup>85</sup> United Nations Department of Economic and Social Affairs, 2006

<sup>86</sup> United Nations, 2008

<sup>87</sup> World Information Society Report, 2006

**Table 3: DOI for SADC Member States (Number of countries ranked globally = 180)**

Country	Opportunity 2004/5	Infrastructure 2004/5	Utilisation 2004/5	DOI 2004/5	World ranking 2004/5
Angola	0.60	0.002	0.00	0.21	135
Botswana	0.92	0.12	0.01	0.35	102
DRC	0.46	0.05	0.00	0.16	150
Lesotho	0.65	0.03	0.00	0.23	133
Madagascar	0.38	0.01	0.00	0.13	162
Mauritius	0.98	0.41	0.06	0.48	50
Mozambique	0.26	0.02	0.01	0.09	169
Namibia	0.85	0.10	0.01	0.32	109
Seychelles	0.97	0.32	0.10	0.46	54
South Africa	0.90	0.18	0.05	0.38	91
Swaziland	0.80	0.80	0.01	0.30	116
Tanzania	0.35	0.02	0.00	0.12	165
Zambia	0.39	0.01	0.00	0.13	160
Zimbabwe	0.42	0.05	0.03	0.17	149

Source: World Information Society Report, 2006

Botswana experienced a major drop of 29 places, declining from being ranked 90<sup>th</sup> in 2005 to 119<sup>th</sup> in 2008. This drop was attributed to a lower score in the web measure index. Botswana did not improve its sites since the time of the 2005 survey.<sup>88</sup> At a glance, the Botswana government web portal reveals a lower level of e-government maturity on the most common model of e-government maturity with five stages, as presented below.<sup>89</sup> Botswana seems to linger around the emerging and enhanced stages.

The *emerging* stage is characterised by a government's online presence that is mainly comprised of a web page and/or an official website; and links to ministries or departments of education, health, social welfare, labour and finance. Much of the information is static and there is little interaction with citizens.

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<sup>88</sup> United Nations, 2008

<sup>89</sup> Department of Innovation, Industry and Regional Development, 2007

**Table 4: E-government Ranking of SADC States in 2006**

Number of Countries =194

Country	2005 % ranking	2006 % ranking	Relative growth
Angola		22.7	26.7 +4
Botswana		27.0	22.0 -5
DRC		28.0	24.0 -4
Lesotho		14.7	16.7 +2
Madagascar		28.0	20.0 -8
Malawi		21.3	20.7 -0.6
Mauritius		20.9	23.7 +2.8
Mozambique		24.0	24.0 0
Namibia		21.0	21.4 +0.4
Seychelles		19.7	25.5 +5.8
South Africa		24.5	29.2 +4.8
Swaziland		29.0	34.0 +5
Tanzania		15.2	17.5 +2.3
Zambia		No figures	23.5 N/A
Zimbabwe		No figures	26.0 N/A

*Source: Created from Darell M. West, the Centre for Public Policy, USA, 2006*

The *enhanced* stage on the other hand is where governments provide more information on public policy and governance. They have created links to archived information that is easily accessible to citizens, such as documents, forms, reports, laws, regulations, and newsletters. The low status of Botswana's e-government status can be discerned on the central government website – [www.gov.bw](http://www.gov.bw) which provides a standard introduction to Botswana and access to most government ministries and departments. There is no centralised web portal of integrated services in a unified environment. Different government ministries have their own websites that provide general information about the ministry such as mandate, information about the minister, departments, tourist information, vacancies, tender documents, speeches, organs of state, parastatals, international financial services centre, among others. The Ministry of Communication Science and Technology (2007) reports that very few ministries in Botswana have web sites tailored to the needs of clients and virtually none offer any form of online transaction. Government departments' web sites have a large amount of outdated information and share a common problem in that information is difficult to find. Two ministries have incorporated extravagant, and perhaps unnecessary, flashy introductions into their homepages – which would

prove very difficult to download for citizens who do not have the latest PCs and access to high bandwidth connectivity. That Botswana is yet to move to higher levels of e-government is quite clear.

At the *interactive* stage, governments deliver online services such as downloadable forms for tax payments and applications for license renewals, but Botswana does not yet provide these services. In addition, the beginning of an interactive portal or website with services to enhance the convenience for citizens needs to be evident, yet this is not the case for Botswana.

The *transactional* stage is characterised by governments beginning to transform themselves by introducing two-way interactions between 'citizen and government'. It includes options for paying taxes, applying for identity cards, birth certificates, passports and license renewals, as well as other similar G2C (government-to-citizen) interactions. It allows citizens to access these services online 24/7. Transactions are conducted online.

Finally, the *connected* (integrated or seamless) stage is characterised by governments transforming themselves into a connected entity that responds to the needs of its citizens by developing an integrated back office infrastructure.<sup>90</sup> There is little evidence of e-government transversality either horizontally or hierarchically in Botswana going by different platforms that are implemented in different government ministries and departments. In addition, very few ministries have web sites tailored to the needs of clients and virtually none offers any form of interactive on-line transaction.<sup>91</sup>

The importance for Botswana to leverage its ICT policy to enhance e-government for enhanced service delivery cannot be overstated. The world over, a number of countries are making good progress in providing citizens with e-government centred services and Botswana would do well to learn from these experiences. For example, the Singaporean government portal provides information services on culture, recreation, sports, defence and security, education, employment, family, community development, health and environment. Other features of the portal that are user-centric include such links as 'give us your feedback on national issues and policies', 'give us your suggestions on cutting waste in government', 'give us your suggestions on cutting red tape in government' and 'get assistance to use government services online'.<sup>92</sup> Similarly in Canada the government has done well in e-government services. The government portal provides public participation that allows individuals to share their opinions on specified subjects, or to participate in various activities. Additionally, there is provision for online services that can be used to search for a job, estimate one's retirement income, convert currencies, compare financial service charges, research one's family history, and more. A 'frequently asked questions' feature provides a quick means of interacting with government.<sup>93</sup> Other services that are interactively available include: applying for pension, accessing employment, applying for a passport, insurance services, legal assistance, and assistance on starting business.

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<sup>90</sup> United Nations, 2008

<sup>91</sup> Mutula, 2008

<sup>92</sup> Government of Singapore, 2004

<sup>93</sup> Government of Canada, 2006

The United Kingdom, Singapore, and the State of California in the US also provide good examples of government websites that are citizen-centric, with a comprehensive list of services, seamless access and links to related sites.<sup>94</sup> Moreover, government web portals that espouse service rather than department-focused delivery mechanisms are the ideal. Such delivery systems or portals would contain services tailored for family, the youth, the elderly, and students. For example, family service would have such information as marriage certificates, taxes, utility services, municipality services, and land registration. The Youth service, on the other hand, would have information about employment services, career advice, vehicle registration, and applications for a passport. The Old age component would contain information about pensions, insurance, health care and death certificates. Finally, the Student service would have information of interest to students including school admission, scholarships, professional examinations and education opportunities.

## 5.2 ICT4D Initiatives and Projects in Botswana

There are various ICT4D initiatives underway in Botswana some of which are spinoffs emerging from the liberalisation of the telecommunications sector while others are government driven. For example, farmers previously isolated by the long trips they had to make to reach markets, services and supplies, on foot or donkey-drawn carts, are now able to keep in touch with friends and relatives, schedule appointments and deliveries, request help for medical emergencies and access news through the use of mobile phones. With access to information about markets in villages and larger cities, farmers are able to increase productivity and expand their businesses.<sup>95</sup> For example the Bikas are cited by UNDP as one example of beneficiaries of mobile phones. They own a vegetable farm in the village of Gakuto, a short distance outside of Gaborone. Prior to mobiles, the Bikas had no access to a telephone and developed their business by supplying small buyers who came to the farm to purchase vegetables. Since then the business has expanded to include five full-time employees, and bigger customers. Mobile phones are their main form of communication. They can receive orders through their mobile and also keep in touch with customers about deliveries and other needs. The farm now supplies the grocery retailers Spar, Fruit & Veggie stores, along with street vendors and other small buyers.<sup>96</sup>

Mobile banking has brought the safety and security of banks to places located far from the halls and walls of the traditional commercial bank, providing previously unbanked populations with the conveniences of modern-day banking. The service allows anyone who has a mobile phone to access banking facilities such as balance enquiries, statement requests, transfer of funds, payments to third parties and opportunity to purchase pre-paid airtime. With instant notification of activities in one's bank account people are better equipped to monitor changes in their accounts. The ability to use mobile technology for banking requirements in Botswana has removed the need to carry large sums of cash that could carry the risk of theft. Given the high

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<sup>94</sup> TATA Consulting Services, 2006

<sup>95</sup> UNDP, 2005

<sup>96</sup> Institute of Economic Affairs, 2007

mobile penetration in Botswana, people residing in rural areas far from the city centres where commercial banks are located may with time save time and money by avoiding long trips into town when mobile service providers establish cash dispensing kiosks as is the case in Kenya.<sup>97</sup> But for this to happen, government must license mobile service providers to offer such services in Botswana.

### **5.2.1 Kitsong Centres**

Community Access Centres have been established under the Rural Telecommunications Expansion Programme of the BTC. Under this programme, BTC is providing essential infrastructure services in rural areas. This is part of government's obligation to integrate people into the economic and social development of the nation. The services include internet lines and telephones. The CACs serve as a gateway to the internet and access to other services in rural areas. The Kitsong Centres are located in the following areas:

- Letlhakeng in the western part of the country to provide services to areas in the proximity of the Central Kgalagadi Game Reserve and areas on the fringes of the rural Kweneng region;
- The Kitsong centre at Hukuntsi will serve the areas within the Kgalagadi areas; and
- The Kitsong centre at Gumare in the north will serve areas around the Okavango and the entire northern part of the country.

At present 35 centres across the country are functional and an additional 25 are being set up. All the Kitsong Centres will provide access to a range of online information including: local and community information, business information services, government information and services such as school registration, birth certificates, livestock tracking and passport applications.

### **5.2.2 I-Partnership**

The Ministry of Communication, Science and Technology has launched a project known as the i-Partnership. This is a computer ownership project for government employees and unemployed youth using a government scheme. Employees are encouraged to buy computers at reduced cost to enable them to take work home or work from home. Several applications for the scheme have been processed. There is also a website which is operational for applicants to use to access the service.<sup>98</sup>

### **5.2.3 Government-On-Line**

The Government of Botswana is undertaking major service delivery reform programmes aimed at improving service quality. To date a government web portal with information and e-services is being developed. The portal is being designed to be customer focused, making the organisational structure of government more transparent to citizens and business. The portal extends the reach

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<sup>97</sup> Institute of Economic Affairs 2007

<sup>98</sup> *ibid*

of government and provides everyone with access to information and services, from virtually any location and at any time.<sup>99</sup> In addition, all government services that are appropriate for online delivery will be available over the Internet. Already driver's licenses are accessible at all government Road Transport Offices and Depots across the country.

The Ministry of Agriculture has developed a Livestock Identification and Trace-back System to maintain a record of all the cattle in the country, and to track the exposure level of each animal to contagious diseases. The system uses data from other government departments such as the National Citizen Identification System for identifying cattle owners.<sup>100</sup> To enhance service delivery further, the Government of Botswana initiated several computerisation projects in the public sector, as reflected in **Table 5** below.

**Table 5: Computerisation of Government Operations**

Ministry	Project	Project description
<b>Attorney General Chambers</b>	Computerised Case Management	Case registration system that tracks case files.
	Computerisation of Lobatse High Court	Track court records to check the status of the case.
<b>DPSM</b>	Computerised Personnel Management System	Runs across government to update the status of government employees, from appointments to retirements.
<b>Education</b>	Computerisation of Students Records and Grant Loan Scheme	Registration of government sponsored students at Students Placement and Welfare Department.
	Computerisation of Teaching Service Management	Computerisation of personnel management for teachers.
<b>Finance</b>	Government Accounting and Budget System	Runs across government, for budgeting, accounting and supplies.
<b>Health</b>	Integrated Patient Management System	Centralised database for patient data management to link all hospitals in the country. Patient registration, laboratory and wards management.
<b>MLHA</b>	National Archives and Records Management Systems	Registration, classification, request, retrieval, tracking, destruction and transfer of e-records and manual records. Will ensure that records are not altered in order to preserve their integrity.
	Computerisation of Civil and	Registration of births, deaths and national identity cards.

<sup>99</sup> Ministry of Communication Science and Technology, 2007.

<sup>100</sup> Institute of Economic Affairs, 2007

Ministry	Project	Project description
Local Government	National Registration	
	Computerisation of Labour and Social Security	Issue work permits and scanning factory plans.
	Computerisation of Human Resource Management	Update status of local government employees from appointment through to retirement.
	Computerization of Social Benefit and Reconciliation System	Registration of the needy, orphans and old-age pensioners in the country.

## 5.2.4 International Connectivity

Under this framework, several projects aimed at positioning Botswana as a regional ICT hub are being undertaken. Through the Pan African e-Network project, 53 African countries will be connected as one network through satellite and fibre-optic links for providing electronic and knowledge connectivity to the African nations. The network will primarily provide effective communication and connectivity among nations in the loop. It will also provide tele-education, and telemedicine. The project will inter-connect 11 Universities, 53 Learning Centers, 11 Super Specialty Hospitals and 53 Remote Hospitals in the membership of the e-Network project. Botswana has identified three Very Small Aperture Terminals (VSAT) Sites comprising a Tele-Education Centre (learning Centre) at the University of Botswana, a Telemedicine Centre (Patient-end-terminal) at the only referral hospital in the North part of the country (Nyangabgwe Referral Hospital). There are also two diversified fibre-links to South Africa and radio links to Namibia, Zimbabwe and Zambia. Further afield there are direct satellite links to the United Kingdom (BTC Cable and Wireless), United States (AT&T, Sprint) and Canada (Tele-globe). There is also direct connectivity to London through the SAT3 undersea cable.<sup>101</sup>

## 5.2.5 Botswana Innovation Hub (BIH)

The Botswana Innovation Hub is responsible for stimulating start-ups and providing an enabling environment for investors. Technology-driven and knowledge-intensive industries, researchers, higher education institutions and the ICT industry are provided with a forum through the BIH to interact together to foster innovation and new business. The success of these projects depends on good infrastructure. The innovation hub has proposed sectors through which businesses, research and training could be explored. These areas include ICTs, Biotechnology, Energy and Mineral Technology.<sup>102</sup>

<sup>101</sup> Institute of Economic Affairs, 2007

<sup>102</sup> Technopolis Plc, 2008

## 5.2.6 Rural Electrification

The Botswana Government's NDP9 (2003-2009) targeted the electrification of 105 villages between 2003/04 and 2008/09. This electrification plan is being addressed by implementing two major electrification projects. During 2008, 30% of the villages were completed, with the balance being scheduled for the period to September 2010. In the second project, Government funded the electrification of 30 villages to an amount of P115 million (US\$ 16.47 million). In addition to the electrification of the villages, Government is also financing network extensions on existing infrastructure in 20 already electrified villages to an amount of P75 million (US\$ 10.74 million). Moreover, the Corporation invested P7.3 million (US\$ 2.47 million) in urban areas and P10 million (US\$ 1.43 million) in rural areas towards the installation of new distribution network capacity and the reinforcement of existing networks. Provision of electricity to rural areas is part of the Government's initiative to promote rural development to alleviate poverty and improve the quality of life in those communities. The BPC is involved in providing cost effective electricity through Photovoltaic (PV) systems to rural populations unable to connect to the electricity grid. The project's products and services include solar electric systems, rechargeable lanterns, recharging stations for lanterns and batteries, efficient cooking appliances, mini grids, solar water heaters, as well as the installation and maintenance of photovoltaic facilities for Government institutions and large enterprises in rural areas.<sup>103</sup>

## 5.2.7 E-Health Initiatives

Several e-health activities are taking place in Botswana:<sup>104</sup>

- Installation of Local Area Networks (LANs) and Wide Area Network (WANs) in 22 facilities;
- An Integrated Patient Management System (IPMS) at four sites that are strategically identified including the Princess Marina referral hospital in Gaborone, Nyangabwe Hospital (Francistown), Maun and Serowel;
- A Warehouse Management System (WMS) at Central Medical Stores to manage the procurement and distribution of drug supplies;
- A MASA system in some hospitals and clinics to manage HIV/AIDS patient information where an IPMS has not been implemented;
- A Blood management System (BMS) in the two cities of Gaborone and Francis Town to manage the inventory and distribution of blood;
- A Website for the Ministry Headquarters to inform the public on the objectives and performance of the ministry;
- The Health Professionals Registration System which will maintain a database of all health practitioners and professionals in the country;

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<sup>103</sup> BPC, 2008

<sup>104</sup> IST for Africa, 2007

- Telemedicine using radiology between distant hospitals with the main hospital in the city, which will facilitate online services to low level facilities;
- A District Health Information System to provide aggregated health information from health districts; and
- A Library Management System for the Institute of Health Science (IHS) and provision of Internet services to students.

Apart from the above ICT4D projects, the Government of Botswana has implemented, or is in the process of implementing several ICT projects:<sup>105</sup> For example, among the projects completed include a payroll system, vehicle registration system, and Automated Systems for Customs Data (ASYCUDA). Other projects being implemented include a voter register, national identity registration system, trade systems, tax payer management systems, and teacher management system among others.

During NDP9 (2003-2009) the Government planned the following IT projects, some of which have already been implemented:<sup>106</sup>

- Installation of an asset management database;
- Development of a document management system;
- Installation of a forecasting system for human resource planning;
- Networking of the Audit Information System;
- Upgrading of the Central Selling Organisation computer system;
- Development of a website for all Ministry of Finance and Development Planning (MFDP) departments;
- Government Accounting and Budgeting System;
- Geographic Information System Centre;
- Personnel Management System; and
- Improvements to the GDN.

### **5.3 ICT4D Poverty Alleviation Programmes in Botswana**

The Government has put in place several programmes aimed at poverty alleviation that include among others:

- The Global Libraries Project, which is a Bill and Melinda Gates Foundation sponsored initiative aimed at computerising and networking public libraries in Botswana and building

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<sup>105</sup> Bose, et al., 2002, Government Computer Bureau, 2002

<sup>106</sup> Ministry of Finance and Development Planning, 2009

the capacity of library employees to serve in e-enabled environments across the country. The project, once completed, will provide the public with affordable or free access to computers and the internet.

- The Nteletsa II project, a government rural initiative, is setting up ICT infrastructure in the villages in Botswana in order to bridge the technology gap between rural and urban areas. The project is expected to improve internet access and also access to mobile communication to facilitate economic activities within the communities.<sup>107</sup> Government sees rural telecommunications as a basic need for every citizen of Botswana, because it will act as a catalyst for socio-economic development. By the end of the Nteletsa II project, every village in Botswana is expected to have a telecentre where the public can access the internet and other telecommunication services. Nteletsa I, the predecessor of Nteletsa II, was aimed at extending telecommunication services only to a limited number of villages with rural telecommunications connectivity. Nteletsa II therefore builds on Nteletsa I and expands the geographic coverage of rural telecommunications connectivity by government, through the Ministry of Communication Science and Technology.
- In agriculture, the Government of Botswana has introduced the bolus system as a compliance measure to European Union regulations for accepting Botswana beef exports to its member countries. This follows several incidences of foot and mouth disease in Botswana. The bolus system is a technology that allows for cattle tracking from the farm to the slaughterhouse. The purpose of the bolus system (where a chip is inserted into the animal and monitored through a centralised computer system) is to improve identification of the respective animals, reduce illegal trade and livestock theft. A study was carried out to determine the impact of the bolus system on the cattle rearing sector in Botswana. The findings showed that the bolus information system had significantly improved cattle traceability and enhanced farm management for small scale farmers.<sup>108</sup>
- The Government of Botswana is also involved in integrating data and voice systems, enhancing personal communication systems and improving accessibility to internet services through lowered access costs as well as the introduction of broadband services. Participation in continental infrastructure development such as EASSy that would facilitate high-speed global connectivity through fibre optics.<sup>109</sup>
- The Government has also in place an ICT-based initiative known as the Teacher Capacity Building Programme (TCB) which was developed in partnership with the African Comprehensive AIDS Partnership (ACHAP), UNDP, United Nations Population Fund (UNFPA), and the Ministries of Education Science and Technology. The interactive distance education programme is delivered through Botswana Television (BTV).

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<sup>107</sup> Radijieng, 2009

<sup>108</sup> Kalusopa, 2009

<sup>109</sup> MFDP, 2009

The objective of the TCB program is to contribute towards the prevention and mitigation of the impact of HIV/AIDS by enhancing the response capacity and resilience of the education and communication sectors. It was hoped that through the TCB, the stigma associated with the disease would be addressed through discussions about HIV prevention, and living with and caring for adults and children infected or affected by HIV/AIDS. The first TCB broadcast took place countrywide through a weekly programme called 'Talk Back'. 400 schools participated in the programme in 20<sup>th</sup> March 2003. Teacher Capacity Building is being used to equip teachers with the skills to deliver HIV/AIDS Information, Education and Communication (IEC) services effectively to communities.<sup>110</sup>

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<sup>110</sup> UNDP, 2005

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## 6. MAIN ACTORS IN THE ICT INDUSTRY, EDUCATION AND TRAINING

*Chapter 6 introduces the main actors in the ICT sector including government, Botswana Telecommunication authority (BTA), Botswana Telecommunication Corporation, Botswana Power Corporation, Wireless communication service providers, private data networks service providers, education institutions and Botswana Council of Non Governmental Organisations (BOCONGO).*

There are various actors in ICT4D in Botswana including government, private sector, academia, civil society, and development agencies. Each of these is discussed in more detail below.

### 6.1 The ICT Industry

Botswana has a relatively young IT industry with about 200 registered IT companies. The scope of these companies covers:

- Training;
- Database development;
- In-house software development;
- Networking;
- Hardware maintenance;
- Website development;
- Commerce service provision;
- Multimedia; and the
- Distribution of computers and their accessories.

Given the government's intension to make Botswana the best location to do business in the Southern African region, it can be expected that the number of IT companies in Botswana will increase significantly.<sup>111</sup>

### 6.2 Government

The Ministry of Communication, Science and Technology was formed six years ago to facilitate policy initiatives in the telecommunication and computing industry. Currently the Botswana Government is developing an Innovation Hub that would facilitate the country's transformation into a knowledge economy. When fully operational during NDP10 (2009-2016), the Hub will provide a platform where technology-driven and knowledge-intensive industry, researchers, higher education institutions and the public sector would work together to foster innovation and new businesses.

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<sup>111</sup> BEDIA, 2007

The Nteletsa II Programme of BTC (already discussed above) is aimed at facilitating rural telecommunications development. The project started with 103 villages out of a total of 197 villages in the programme. The roll-out of the services to these villages will be completed by December 2010.

Government has also started the implementation of the e-Government project that will integrate all the current and future information technology systems to achieve a collaborative approach to service delivery. The e-government project is divided into two phases:

- e-Information which will provide a one-entry gateway for communication with Government stakeholders; and
- e-Services which will provide an electronic platform for enhanced and automated service delivery.

The two phases will be delivered through a Government web portal. The Government Portal and the e-services will commence in 2009/2010, and the whole project is estimated to be completed by the end of NDP10.

The Government continues to play a large role in ICT4D in Botswana. Government IT needs are met by the Department of Information Technology (DIT) which is mandated to promote ICT use and contribute to the national economy by improving government services to all citizens throughout the country, including those in remote locations. In general DIT implements government policy with regard to ICTs, and has responsibilities that include, among others:

- Advising government on future computer needs and strategy;
- Developing guidelines for the selection of equipment and software;
- Providing technical support to Ministries and departments; and
- Purchasing needed systems as well as setting standards for the security of computer systems.

DIT has seconded an IT manager to each of the 17 government ministries to oversee their IT needs. DIT also coordinates IT services in government. DIT staff are therefore deployed to Ministries to meet their computerisation needs. They offer advice when Ministries computerise their business functions.

### **6.3 Botswana Power Corporation (BPC)**

The Botswana Power Corporation (BPC), a parastatal utility, was formed in 1970 by an Act of Parliament. BPC has the responsibility to provide power throughout the country. Within the twenty-three years of its existence, BPC has developed from a small, oil-fired power station in Gaborone (which was commissioned in 1970 and dismantled in 1989) to better and more efficient thermal power stations in Selebi-Phikwe and Morupule. The Morupule Power Station, which is technologically more advanced and adjacent to the coalmine, provides approximately 80% of the country's power requirements. Reserve power is also provided by the international

grid connections with the Republic of South Africa to Gaborone and with Zambia/Zimbabwe to Francistown. The National Grid has dedicated extensions to the diamond mines at Orapa, the Soda Ash Project at Sua Pan from Francistown, and the Jwaneng diamond mine. In order to meet the power needs of the nation and to promote rural development, BPC, in collaboration with government, introduced various assistance schemes to facilitate the electrification process throughout the country. These assistance schemes support the extensive village electrification programme run by the Corporation, which electrifies at least seven new villages per year.<sup>112</sup> BPC also owns and operates a private telecommunications system.

## 6.4 Botswana Telecommunications Corporation

Botswana Telecommunications Corporation (BTC) is a state-owned enterprise incorporated under the BTC Act of 1980 (revised in 1996). BTC is the monopoly operator for landline provision, a wholesale backbone provider, a competitive data network provider as well as an ISP provider. It provides public telecommunications services in Botswana. BTC has a telecommunications infrastructure that is one of the most modern in Africa. Its network, composed of all-digital exchanges at the main centres, comprises 7 300 kilometres of microwave radio and fibre-optic links between 12 main processors, each serving a specific area of the country. The switching unit has a capacity of about 160 000 lines. BTC provides the transmission network for fixed (PSTN) voice in a monopoly situation. Data and Internet services are also provided on a competitive basis. BTC wholesales bandwidth to other services providers and private networks.

## 6.5 Wireless Communication Service Providers

There are now three mobile phone service providers in Botswana namely Orange Botswana, Mascom Wireless and BeMobile (a subsidiary of BTC).

**Orange Botswana:** Orange Botswana was launched in Botswana in March 2003, following the acquisition of a 51% stake in Vista Cellular, a mobile phone operator established in 1998. Orange Botswana (2009) has built a commercial network at the 2.5 GHz frequency band which enables it to provide advanced data services to businesses and homes in Gaborone and Francistown, Botswana's two largest cities, with a combined population of over 330 000. The first network was launched in June 2008 in Gaborone, Botswana's capital and one of the fastest-growing cities in Africa. Following this successful deployment Orange Botswana increased its coverage in Gaborone and in November 2008 launched a second network in Francistown - an important centre for industry and commerce. Future extensions of the networks are planned in other areas throughout the country. Using Alvarion's 4Motion solution, Orange Botswana offers its Livebox service to most of Gaborone's population and includes advanced internet access at speeds of up to 1 MB.

Orange Botswana had over 658 000 customers as of September 30 2008. It offers nationwide coverage consisting of radio coverage as well as GPRS/EDGE coverage. Radio coverage consists of

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<sup>112</sup> BTC, 2008

a GSM/cellular phone network. Radio coverage is 95% of Botswana. GPRS/EDGE coverage represents regions where data (Internet access) services are available or active. GPRS coverage is active in 95 % of Botswana. EDGE coverage is active in all cities and major towns of Botswana.<sup>113</sup>

**Mascom Wireless:** Mascom Wireless was licensed to operate in Botswana in February 1998 alongside Vista (now Orange Botswana). Five weeks after acquiring the license to offer mobile communication services, Mascom Wireless launched its network, and has remained the market leader in mobile phone communications in the country. Like Orange Botswana, Mascom has in place a GPRS/EDGE network coverage that spans 90% of the population and has also 3G/HSDPA covering the city of Gaborone. Mascom coverage extends to almost the entire population. Mascom Wireless plans to make the GPRS/EDGE application accessible to users beyond its network footprint and outside Botswana via network roaming. Internet access is available to contract and pre-paid Mascom subscribers via laptops, desktop PCs, USB modems or GPRS/EDGE compatible phones.

**Be Mobile,** a subsidiary of BTC, also provides mobile phone services.

## 6.6 Private Network Service Providers

DIT is the statutory agency for managing and supporting the GDN, the private network for Government. The Botswana Police Services (BPS) has a private network for police use (using GDN, private microwave and HF radio facilities). Other data private network providers are Barnnets Furnishers, Standard Chartered Bank, Harness Manufacturing Botswana African Banking Corporation, Debswana, UNDP and Barclays Bank. In the gateway services are the following ISP providers: AfriSwitch, AME Enterprises, Fourth Dimensions, Integrated Digital Networks, Pan African Communications Networks, SITA Botswana, Transtel, UUNET Zenclair, Competitive licensed international data, 4Site Holdings, Afritel (formerly AME Enterprises), All The Rage Solutions, Botsnet, Fourth Dimensions, Foneworx – VTS Fusion, Kasane Computers, Logical Botswana, Mega Internet, Pan African Communications Networks (PACONET), Romela Internet Communications, Virtual Business Networks USKO, UUNET (Interswana).

## 6.7 Botswana Telecommunication Authority (BTA)

The Botswana Telecommunication Authority (BTA) is a statutory agency that was established in December 1996 with responsibilities for licensing telecommunications and broadcasting operators, settling disputes among operators, approving tariffs, promoting and monitoring free and fair competition, allocating and managing the radio spectrum and protecting consumers. BTA's mission statement aims at promoting the:

- Provision and availability of efficient and affordable communication services throughout Botswana;
- Interests of consumers in having a choice of quality and variety of services at good value for money; and

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<sup>113</sup> Orange Botswana, 2009

- Effective competition through fair regulation that is conducive to business investment in telecommunications.

BTA accomplishes its mandate through six departments namely:

- Engineering Services;
- Marketing Development and analysis;
- Broadcasting Regulation;
- Communication and Consumer Affairs;
- Finance and Administration; and
- Legal Services.

Each of the six departments is headed by a manager.<sup>114</sup>

## 6.8 Thuto Net and Education Service Providers

The Thuto Net is an expansive project that incorporates the Schools Connectivity Initiative, to link all secondary schools to the internet. At present 104 secondary schools throughout the country have internet access and the programme is rolling out to other secondary schools. All secondary schools in Botswana have computer laboratories comprising about 15-20 computers. This initiative is aimed at reducing literacy gaps between students in urban schools and rural schools. To fast track the program, the department responsible for laying out the infrastructure is working together with the Department of Education to train teachers on using ICT as a classroom tool. A similar initiative will be rolled out to primary schools through a programme of refurbishing computers used in government departments with appropriate programmes for primary schools. This initiative will provide opportunities for the private sector to ensure support and maintenance of the equipment.<sup>115</sup>

Botswana has several government and private training institutions that produce IT graduates with certificates, diploma and degree qualifications. Notable among these institutions are: University of Botswana, Botswana Institute of Administration and Commerce (BIAC), Botswana Accountancy College, Limkokwing University of Technology, NIIT, Baisago University, and IBM University. Besides, Botswana's research and development infrastructure includes several government-funded institutes that undertake research and development work to meet the specific needs of Botswana. These include the Botswana Technology Centre (BOTEC), the Rural Industries Promotion Company (RIPCO) and its subsidiary, the Rural Industries Innovation Centre (RIIC), the National Food Technology Research Centre (NFTRC), the Department of Agricultural Research (DAR), Botswana Institute for Development Policy Analysis (BIDPA) as well as other government research departments. Veld Products Research and Development and Thusano Lefatsheng are non-governmental research organisations that undertake research in non-timber

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<sup>114</sup> BTA, 2002

<sup>115</sup> *ibid*

forest products and medicinal plants respectively. The applied research institutions' mandate and focus is on developing and adapting technologies for the local market.<sup>116</sup>

ICT training for computer teachers in schools is currently being provided through various institutions such as the Mochudi Media Centre, an urban centre located 45 kilometres north-east of Gaborone. The centre provides training, advice, guidance and support to educational professionals including ICT training for the schools and Department of Teacher Training and Development. Additional teacher support for professional development is provided through a network of 12 education centres. These centres are located throughout the country to provide in-service activities. Other training programmes available for educators include the Internet Learning Trust (ITL) which builds on the government project by providing initial training and support for teachers in a couple of junior secondary schools identified by the Ministry of Education as suitable pilot models. The project has piloted the use of the Internet for communication and enrichment of the curriculum in pilot schools

## 6.9 Non-Governmental Organisations

The Botswana Council of Non-Governmental Organisations (BOCONGO) is the umbrella body for non-governmental organisations in Botswana. It is responsible for creating a sound environment for the civil society organisations sector to participate in national development. This role is achieved through several sectoral networks that include among others: disability; women, gender and development; microfinance credit and empowerment; environment and agriculture, population, health and HIV/AIDS, and media among others.<sup>117</sup> The expansive network of BOCONGO could be fully leveraged to facilitate integration of ICT in the operations of these organisations. Civil society organisations in Botswana have lagged behind in adopting ICTs compared to similar organisations such as SANGONeT which has prioritised technology services and ICT advocacy. Various reasons may be advanced for the limited use of ICT in civil society organisations such as limited human capacity, lack of access to resources, lack of awareness about the potential of ICTs, and the inability to cope with rapid changes in technology landscape. Civil society organisations in Botswana must overcome these constraints in part by engaging with similar organisations and technical support and philanthropic agencies to build capacity, mobilise resources, exchange and share experiences as happens in corporate, government, and academic sectors in the southern African region. They could also explore appropriate technologies that are cost-effective such as open source software for information management, including local content.

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<sup>116</sup> UNDP, 2005

<sup>117</sup> The African Capacity Building Foundation; SANGONeT, 2006

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## 7. HUMAN RESOURCES AND CAPACITY BUILDING

*Chapter 7 covers issues of capacity building through education and training, and information on education and training service providers. The chapter highlights the challenges facing Botswana with regard to ICT skills shortages in key sectors of the economy, and particularly in Small and Medium Enterprises (SMEs). Shortages are identified in areas of specialised skills such as MCSE, Oracle, CISCO, SAP and IP engineering. The chapter proffers approaches to capacity building to address these shortcomings including tailoring of the immigration policy to attract skilled high-tech workers from abroad; implementing appropriate training programmes and educating people on procedures and mechanisms to use the technologies better; and incentives to attract, train and retain the best technical and managerial talent.*

### 7.1 Education and Training in ICTs

Botswana is faced with ICT skills shortages in key sectors of the economy, with specific needs in management experience and entrepreneurship.<sup>118</sup> The WSIS Civil Society Working Group<sup>119</sup> observes that it is important to ensure the adequate development of human capacity in order to fully exploit the benefits of ICTs. Small and Medium Enterprises (SMEs) in Botswana have found that their employment needs for ICT skills were not being adequately met.<sup>120</sup> For example, some respondents had this to say about skills shortages:

- *Often we seek expatriate skills;*
- *There is a lack of managerial and technical expertise;*
- *There is a limited number of IT professionals in the country, for example, there is a small community of web designers and network managers;*
- *Specialised skills such as MCSE, Oracle specialists; content managers and telecommunication engineers were in short supply;*
- *Whereas there are many degree holders, they lacked ICT experience;*
- *We have shortage of CISCO skills which we have to outsource;*
- *At middle level management, most staff do not have hands on experience;*
- *Skills for such applications as SAP and IP engineering are often outsourced; and*
- *Support service is poor especially as it relates to telephone services.*

These responses suggest that there is a strong demand for technical personnel to meet the needs for service and support, as well as for network deployment, management and maintenance. The latter would be responsible for building and maintaining the intelligent networks upon which the information economy depends. Similarly, the demand for network engineers could suggest the increasing importance of telecommunications in the ICT sector. These findings demonstrate the

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<sup>118</sup> Southwood, 2004

<sup>119</sup> WSIS working Group, 2004

<sup>120</sup> Mutula, 2006

need for the Government of Botswana to put in place mechanisms to enhance the transfer of expertise in order to obviate the situation where the country will remain dependent on foreign experts who come, make money, and go.

An important approach to capacity building is the tailoring of the immigration policy to welcome skilled high-tech workers from abroad. Furthermore, implementing appropriate training programmes and educating people on procedures and mechanisms to use the technologies better would have a significant impact on the adoption and use of ICTs in Botswana. With Botswana being ranked 61<sup>st</sup> globally among 102 countries by the World Economic Forum in its 2003 report as far as investment in staff training was concerned, there is need to address this. DIT acknowledges the need to put in place effective procurement of human, technical and financial resources if the country is to meet its technology needs.

The development of human capital necessitates incentives to attract, train and retain the best technical and managerial talent. Enhancing education with the effective application of ICT, both as a classroom tool and as a subject in its own right, needs to become one of the priorities of the Government of Botswana. A sustainable ICT programme that contributes significantly to a country's development would only be achieved if there is a suitably trained workforce and an educational system that continually supplies skilled, innovative and entrepreneurial professionals. If these types of challenges are not addressed, Botswana could lose its economic advantages in the connected world because of the migration of IT specialists, a small IT workforce or the low ratio of ICT graduates.

As far as the national investment in education is concerned, business enterprises should have a role to play in contributing to citizens' knowledge and skills. Companies that invested more heavily to attract, train and retain employees could help raise the overall level of workforce productivity. In many instances, they also provided people with the skills they needed to participate fully in the information economy. The importance of the export potential of SMEs cannot be over-emphasised. In Malaysia, the country's export-based economy has been dominated by ICT related growth with good foreign investment from Japan and the United States. The ability to manufacture high-tech products for export is one of the indicators of an economy's sophistication in ICT.<sup>121</sup>

Botswana has the potential to produce adequate skilled manpower to drive ICT4D in the country. Botswana in general has a well resourced educational system, which attracts one of the highest spending in the world as a percentage of GDP. This level of investment in education includes expenditure for over 8 500 Batswana studying abroad at any given time, of which about 2 860 study overseas and the rest in South Africa. The outputs of this investment should be well educated young people with a broad range of skills pertinent to having a world-class work force. Countries that have made investments in infusing technology into learning culture have achieved higher success rates in leveraging education for development. Such success depends on sound education policies that require continuous evaluation and updating to incorporate current

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<sup>121</sup> Maitlamo, 2004:41

science and practice. For Botswana to benefit from ICT4D there must be aggressive investment in educational infrastructure to develop the requisite skills for the internet economy.<sup>122</sup>

By the end of 2005, 4 441 ICT graduates ranging from certificate to postgraduate levels had been trained in Botswana. About 4 301 were from local institutions and about 140 were trained outside the country.<sup>123</sup> The rate of producing ICT personnel from institutions of learning has since accelerated following Government’s decision, in 2006, to extend sponsorship of students in private institutions of colleges and other tertiary level institutions. These universities are using ICT to increase the success rates of students; and provide the opportunity for the University to enhance flexible learning anytime, anywhere and at a learner’s own pace.

The University of Botswana uses a video conferencing system to link the main campus in Gaborone to Maun and Francistown using ISDN. It has also made it possible for virtually all students to have access to the internet, as well as for all departments and faculties in the University. Every staff member has a Pentium computer, printer or access to a printer, internet and e-mail. The University of Botswana library uses ICTs to communicate with its customers, and provides services such as online access to full text databases, online renewals, and online public access catalogue via the internet, e-mail and CD-ROM.<sup>124</sup>

The increasing use of ICT in tertiary education, especially at the University of Botswana, is reflected in **Table 6** which depicts the findings of a study<sup>125</sup> to determine ICT penetration among students at the University. The findings suggest that most students access the internet from different points in the community such as home, cybercafés, university, and using a neighbour’s computer. The study suggests that access to ICTs is reasonably available in Botswana homes, especially in urban areas.

**Table 6: Place of Accessing the Internet by Students at the University of Botswana**

Place of access	No = 306	Percentage
Home	19	6.2
School/On Campus	216	70.6
Friends’ House	26	8.5
Cybercafé	45	45.7

A study<sup>126</sup> on mobile phone usage in higher education in Botswana revealed that mobile device ownership was 92.3% at the University of Botswana. Mobiles are used to communicate with lecturers, especially outside of the classroom. There was a general agreement among students about the potential use of mobiles for learning and their desire to explore mobile learning possibilities for academic advancement.

<sup>122</sup> UNDP, 2005

<sup>123</sup> Fiver Four Traders, 2006

<sup>124</sup> Lumande, 2006

<sup>125</sup> Adeyinka 2007

<sup>126</sup> Shemi 2007

With regard to the contribution of the internet to academic performance, the results shown in **Table 7** suggest that students appreciate that internet enhanced their academic performance.

**Table 7: Internet Access and Academic Performance**

Response	Sample size =13	Performance
Yes	11	84.6%
No	2	15.4%
Total	13	100%

A related study<sup>127</sup> showed that the majority of academics at the University of Botswana were using e-resources. In particular, the study found that e-journals were used by 69% of the respondents for printing or downloading articles, as well as reading articles online; professors (44.4%) publish in e-journals more than lecturers (26.3%).

A study from the perspective of distance education at the University of Botswana reflects patterns of technology usage (**Table 8**).<sup>128</sup>

**Table 8: Patterns of Access to Technology from 1999 to 2006**

No	Responses	1999 N=96 %	2001 N=188 %	2006 N=429 %
1	I have a CD player.	-	-	60.8
2	I have a cassette player	86.5	86.2	77.2
3	I have an MP3 player.	-	-	11.5
4	I have an iPod	-	-	2.1
5	I have a cell phone	-	79.8	87.0
6	I have a computer	1.1	13.5	17.3
7	I have a land line telephone	65.6	55.9	43.1
8	I am connected to the internet	3.1	-	3.7
9	I have a printer	-	-	9.3
10	I have fax	3.3	3.1	2.1
11	I can type my work on the computer	-	-	13.8
12	I have a television set	71.9	60.1	78.80
13	I have a video cassette player (VCR)	39.9	39.6	66.0
14	I have a DVD player	-	-	62.2
15	My house is connected to electricity	-	-	79.5%

Botswana must embark on an ambitious training and re-tooling exercise in terms of both human resources in Science and Technology and training institutions. A concerted effort should be placed on training researchers up to doctoral level with emphasis placed on home-based training. This means the local university and other training institutions such as the institutes of health sciences should be encouraged to introduce postgraduate training programmes in collaboration

<sup>127</sup> Moahi and Jain, 2007

<sup>128</sup> Kabonoki, 2007

with external institutions. The local training of scientists will not only contribute to the closing of the skills gap, but will have the added benefit of creating capacity in the training institutions themselves, thus ensuring sustainability in production of the requisite human resource base into the future; and from programmes deliberately tailored to address the country's specific needs. If Botswana is desirous of reaping benefits from intellectual property, then it may want to consider building an impressive research and development capacity. Moreover, the government must go beyond just doctoral training, but place its leading researchers in leading global centres of excellence as both guest researchers and postdoctoral fellows on structured exchange programmes, so as to develop specific research strengths not yet available locally.<sup>129</sup> Increased ICT skills in higher education can help develop appropriate technologies that would be more affordable, accessible and useable by all people. For example, the use of open source software would be used to create local content that is more available and cheaper; develop communication systems whose signals would reach remote areas of the country where conventional mobile communication signals may not reach; develop seedlings that may take the shortest possible time to mature to mitigate hunger; develop technologies that would use solar energy to power cell phones so that even areas which have no power would be connected 24/7 to enhance communication.

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<sup>129</sup> Institute of Economic Affairs, 2007

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## 8. CHALLENGES OF ICT4 D IN BOTSWANA

*Chapter 8 covers challenges facing Botswana in its ICT4D. Although the Government of Botswana has made good progress in policy, legal and infrastructure development, there are some weaknesses that need to be overcome. For example, the growth of e-commerce is slow because citizens have not yet trusted the electronic environment due to issues of transactional security, privacy, and data integrity which are yet to be addressed. The other challenges relate to the limited availability of specialised ICT skills.*

### 8.1 Challenges Facing Botswana in ICT4D

Public policy and legislation could help or hinder the development of a mature networked economy. A favourable climate created by an appropriate legislative and regulatory regime is needed to encourage communities, organisations and individuals to invest in and use ICTs. Important areas, such as internet availability, the use of ICT in schools, and the growth of e-commerce, are all influenced by public policy and the legal framework. Moreover, citizens must be able to trust the electronic environment because issues of transactional security, privacy, and data integrity have been addressed. The potential for fraud and cross-border transmission of objectionable content, as well as new criminal behaviour, must be addressed and enforcement arrangements established.

The policy challenge for the Government of Botswana is to create an enabling and nurturing environment that is aimed at promoting and accelerating the diffusion of e-commerce technologies and strategies amongst business enterprises. This would include the physical e-commerce infrastructure needed for an enterprise to implement an e-commerce strategy; a policy and regulatory environment that addresses issues which most hinder enterprises from engaging in e-commerce, and institutional and human resources which address the national skills base and the development of capabilities that necessitate enterprises to engage in e-commerce strategies.

Botswana further faces a number of challenges in key sectors of the economy which must be addressed to enhance ICT4D.<sup>130</sup> **Tables 9 and 10** compare the status of Botswana in relation to current global rankings on key enhancers and attributes:

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<sup>130</sup> Neil, 2007

**Table 9: Botswana’s Status in Terms of Key Enhancers vs Global Rankings**

Key Enhancers	Current Global Rankings
Tertiary Education	89 (128)
Health & General education	115 (128)
Technological readiness	81 (128)
Business sophistication	98 (128)
Innovation	92 (128)

Source: Neil, 2007

**Table 10: Botswana’s Key Attributes vs Global Rankings**

Key Attributes	Current Global Rankings
Macro economy	41 (128)
Institutional regime	38 (128)
Infrastructure	67 (128)
Market efficiency	61(128)

Source: Neil, 2007

### *Tertiary Institutions*

Tertiary institutions must:

- Promote access and participation;
- Produce graduates ready for the world of work;
- Nurture a scholarship that stimulates innovation not just research;
- Nurture a learning culture that promotes problem solving, team work and produces students who are ‘work ready’;
- Embrace a curriculum that educates about the world and focuses on societal problems; and
- Generate new and workable approaches with regard to infrastructure, processes, capabilities and cultures.<sup>131</sup>

Adekanmbi (2007) provides the following amelioration strategies for the challenges of using of technology at tertiary education levels:

- Investing in rural communications;
- Making available more spending on national networks;

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<sup>131</sup> Neil, 2007

- Engaging in more regional collaboration;
- Universities offering more programmes in IT development;
- Enhancing training in the use of new technologies through reward systems that give promotional points, or some form of remuneration to staff; and
- Collaboration that ensures that adequate learning resources are available in other educational institutions, in agencies, and at the workplace.

### *ICT Access*

With regard to access to ICTs, despite the existence of universal access and service policies, most of the Botswana people have yet to benefit from ICT4D. Access to the internet and computers (at 4%) remains quite low. Those who have access to ICTs are hampered by limited relevant local content.<sup>132</sup>

### *Local Content and Language*

The country does not have community radio stations that would enhance the development and dissemination of local content.

There is need for a national ICT framework that caters adequately for use by all categories of citizens. Issues around assistive technologies have not effectively been addressed by national ICT policies or e-government strategy. The government web portal that would serve as a link with the people is largely populated by government-to-government information and has limited content for the people.

The Botswana people are more adept at communicating in local languages than in English. This requires that issues of translation of web content into the language of the people be addressed.

Botswana therefore does not yet have the necessary preparedness to leverage ICT for socio-economic development. Preparedness for ICT use should be reflected in the level of universal access, relevant local content, universal service, human resources, affordable connectivity, access to adequate electricity supply, and the extent of the digital divide.

### *The ICT Industry*

An e-readiness survey undertaken in 2006<sup>133</sup> reported extensively on the challenges facing the ICT industry in Botswana. This culminated in the national ICT policy of 2007. There is a low incidence of specialised applications on which e-commerce is likely to depend, such as financial services, data warehousing and security. Business process outsourcing activities such as remote data entry, programming, help desk functions and financial services are also relatively low. The Botswana ICT industry is dominated by foreign companies with limited local content in this area.

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<sup>132</sup> Maitlamo, 2004

<sup>133</sup> Mutula, 2006 – Consulting and Audit Canada

For example, there is minimal locally assembled hardware or developed software. Hardware and software needs are met largely through imports, typically from South Africa, Europe and the United States.

The lack of locally generated content implies that the ICT sector in Botswana relies on foreign products and lacks the capacity to innovate and export in order to generate employment and foreign exchange needed to plough back into socio-economic development projects.

The following challenges faced by businesses in the ICT sector hamper the development of an enabling environment for ICT integration into development:<sup>134</sup>

- *We experience bandwidth bottlenecks;*
- *Our businesses are limited by the high cost of bandwidth;*
- *We are wary of trading on the Internet without guarantee of security of our information;*
- *Botswana has very limited legislation dealing explicitly with the protection of personal privacy or personal data; and*
- *The legislation is weak on access to government information.*

One respondent noted that:

*Without a second network operator, the ICT industry is often hindered by the limited bandwidth and bound to the incumbent operator and this restricts growth of our business.*

Those businesses that are able to effectively employ ICTs find more sophisticated and efficient ways of managing their external relationships and communications. Most enterprises are constrained in acquiring new technology for various reasons such as lack of affordability, inadequate accessibility, and lack of awareness.<sup>135</sup> Botswana is yet to mainstream ICT in its economy.

The respondents in the SME study<sup>136</sup> had the following statements to make regarding their e-readiness status:

- *For us to say we are e-ready, we need to have most of our clients both current and potential connected to the Internet. However, most of the people in the country have no telephone connectivity and even if they have access to the internet it is limited due to high costs and lack of awareness;*
- *In Botswana, network quality problems are common and this hampers our competitiveness in some way;*
- *There no demand locally for e-commerce; and*
- *Though computer systems and software that can handle electronic signatures exist, at the present time, Botswana has no legislation dealing with electronic signatures.*

The quality of network access provided by the telecommunications operator for business transactions remains wanting. Responses from business enterprises were:

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<sup>134</sup> *ibid*

<sup>135</sup> Maitlamo, 2004

<sup>136</sup> Mutula, 2006

- *The telecommunication operator does not respond to faults expeditiously;*
- *Numerous network problems occur due to poor maintenance and support services. This probably explains why cellular usage has grown so rapidly over the last three years to outstrip fixed lines; and*
- *Our company has been waiting for frame relay service to be installed by BTC for the last 3-4 months.*

Respondents wanted greater network access and expected the government to provide efficient network services so that they could take advantage of the ICT opportunities that are available locally and internationally. The findings further suggested that Botswana is yet to achieve widespread telephone access for its population. If Botswana's SMEs are to leverage ICTs to gain entry into international markets, then it is imperative for the government to expedite the complete liberalisation of the telecommunications sector, especially fixed-line telephony.

The business enterprise respondents complained about the following ICT issues:

- *The costs of hardware and software remain largely unaffordable and this probably explains why only 4% of households in Botswana have computers. If one assumes that the 4% owners are our clients with whom we have to transact business over the Internet, then we are far from being ready to partake in the global electronic age;*
- *The hardware is expensive to us and even more expensive to individual people who ideally should be our customers to transact business with us electronically; and*
- *Government charges 10% VAT on computer hardware making them expensive for the consumer.*

The survey results suggested that ICTs in Botswana are highly priced compared to those of neighbouring countries such as South Africa. This could be attributed to a lack of a local IT manufacturing capacity and the taxation on computers and telecommunications products and services. The findings suggest that infrastructure development and legislative reforms are part of the measures needed to facilitate the e-readiness of SMEs. The findings also suggest that an enabling policy framework is therefore needed to link ICT infrastructure development and SMEs in Botswana in order to enhance their competitiveness in both local and international markets.

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# 9. RECOMMENDATIONS AND A PLAN OF ACTION FOR BOTSWANA

## 9.1 Conclusion and Recommendations

Based on the research carried out for this report, there are a number of areas where the Government and other key players can take action to move forward the ICT4D agenda. Despite progress in a number of areas, there is a need for accelerated implementation if Botswana is to achieve the goals it has set itself for Vision 2016. Without concerted efforts to address the Digital Divide and to ensure that ICTs are mainstreamed into the broader economic and social fabric of the country, it is likely that Botswana will be left behind in what is increasingly a global market, where knowledge-based economies are the key to successful growth and development.

The following recommendations are proffered for various stakeholders including government, corporate sector, civil society organisations and academia to ensure that ICT is successfully and inextricably infused into the development agenda for the people of Botswana:

- a) Review the extent to which various strategies are meeting their intended purpose i.e. universal access policy and e-government on a three-year rolling framework. Align ICT policies (including the universal access policy) and strategies (such as the e-government strategy) with the country's development agenda as espoused in Vision 2016.
- b) Reduce the excessively high cost of telecommunications which is holding back growth in internet penetration. Areas to address include the wholesale pricing of ADSL access, international data and leased lines by BTC.<sup>137</sup> Additional areas of concern include: connecting the unconnected; infrastructure sharing; spectrum allocation in the era of convergence, and digital switch-over to mention but a few which will require concerted efforts to resolve.<sup>138</sup>
- c) Investigate the possible cross-subsidisation by BTC between mobile, internet and fixed markets, which may potentially represent an abuse of market power by BTC in an attempt to dominate different markets.
- d) Ensure that infrastructure development is accompanied by the development of relevant local content in areas such as education, housing, social security, employment and entrepreneurship to ensure that the people of Botswana have access to opportunities that would improve their lives and reduce poverty.
- e) Review policies to ensure that civil society has a role to play in propelling Botswana to an information society status. Civil society has immense influence at the grass roots level and has the ability to mobilise action and resources to meet the development needs of the people.

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<sup>137</sup> Analysys Mason, 2008

<sup>138</sup> BTA, 2008

- f) Prioritise on digital inclusion by enhancing universal access, universal service, digital literacy, connectivity, affordability of internet access, bridging the digital divide, and enhancing broadband access.
- g) Provide a national information policy for better planning and coordination to ensure that the various forms of public ICT access points do not duplicate efforts and that such access points are placed geographically so that the optimal level of ICT access is made available for citizens. The access points would, among others, consist of public libraries, Kitsong centres and internet cafés.
- h) Create a legislative and policy framework that provides an environment for community media, especially community radio. This should include attention to issues such as the freedom of access to information and multilingual content.
- i) Promote R&D through adequate funding of up to a minimum of 1% of GDP. This should be accompanied by investment in science, technology and innovation hubs.
- j) Build capacity in the areas of science and technology as this is crucial for the sustainability of ICT and e-government infrastructure.
- k) Enable Botswana's nationally funded research institutions to play a more prominent role as producers of knowledge resources. Publicly funded institutions that do research and development work, e.g. the Botswana Technology Centre, the National Food Technology Research Centre, the Rural Industries Promotions Company, the Botswana College of Agriculture (BCA) and the University of Botswana (UB) should be drivers of technological innovation and diffusion. To do so they need more funding, better networking with mature institutions in other countries, closer contact with other government institutions and industry, and more focused research and development programmes.
- l) Establish special centres of excellence in ICT to grow skills needed in an information society environment. Most of the barriers to effective deployment of ICT for development in Botswana relate to lack of skills to resolve technical problems whenever they occur.
- m) Fast track the implementation of the e-government strategy by enabling G2G, B2G, C2G, C2C and B2B forms of e-government interactions. The e-government system should ensure transversality in G2G interactions.
- n) As a newly emerging economy, the Botswana government should invest in a knowledge based society and innovative economy that supports small business enterprises in their diversification strategies.
- o) Address the digital divide in education in order to improve information literacy among learners. Research is needed to identify leading practice of professional development activities involving the use of ICT by teachers and schools. Capacity building among teachers in ICTs should be carried out, taking into account the varying levels of computer experience among teachers. Ensure that schools integrate ICT into their operations, both as a subject and as a classroom and educational tool.

The successful use of ICT in education depends largely on a supportive policy environment and framework at national level in order to provide the necessary resources. This should mandate the use of ICT to improve learning in every subject at every school level as well as the availability of technical support for teachers in the use of ICT.

Critical elements that should be considered when considering integration of ICT in education include the:

- Provision of an educational network for universal access to ICT – the Government should step up efforts to ensure that all schools have adequate, affordable and reliable ICT infrastructure to facilitate access by all learners;
  - Integration of ICTs into the curriculum and administrative processes to improve the quality of education; and the
  - Introduction of technical training programmes in the community that can prepare a productive and innovative ICT workforce outside of the formal education system.
- p) Encourage schools to open up their computer rooms to local communities and charge for courses in technology skills, for printing out documents or hosting e-mail accounts. This would assist in making ICTs more sustainable in the school environment.
- j. Reduce ICT access costs for schools. The Government should provide financial assistance or pass legislation that can guarantee reduced prices for net access for schools. Similarly, partnerships could help to bridge the digital divide in Botswana's schools.
- k. Enable access to power supply, especially in rural areas, to facilitate the integration and use of ICT in education across the country.

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