Botswana Human Development Report 2005

Harnessing Science and Technology for Human Development

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Foreword

We live in an era in which knowledge is decisive in separating winners from losers. It does not matter whether we look at these polar outcomes – winning and losing – at the level of nations, firms, or individuals: Knowledge is a necessary requirement for winning in today's closely integrated and competitive world. Knowledge expands the achievement possibilities of those who have it. Lack of it diminishes them.

The disparities in development outcomes between prosperous and rich nations, and between rich and poor individuals, are underpinned foremost by differential access to knowledge and information. This is the reason that we, as a nation, are determined to develop a credible national Science and Technology (S&T) capability. This will rank high amongst Botswana's sources of competitive advantage in the future and will be a lasting bequest to posterity. It will also be a strong basis for sustainable human development for generations to come.

Botswana Human Development Report (BHDR), 2005 makes the point that "From the Stone Age to the Information Age, quantum leaps in human material and physical wellbeing were made possible only through breakthrough scientific and technological innovations: in agriculture, biotechnology, biomedical science, communications, industry and transport amongst others". Our experience as a nation bears this out. For instance;

- Our transport and telecommunications infrastructure has reduced the 'time space' between our people considerably, improving access to inputs, markets, services, and information.
- Our health system has delivered to a majority of Batswana, access to life saving medical technologies, and in that process eliminating or bringing under control a range of childhood diseases e.g. whooping cough, diphtheria, polio and small pox, and a range of killer diseases such as tuberculosis and sexually transmitted diseases.

I deliberately chose these examples to emphasise that investment in S&T is about human development. If S&T achievements are not shared equally amongst nations, then technology will become a source of exclusion. It would create the spectre of a technological divide in which those with access achieve unprecedented levels of prosperity whilst the majority who are without it lose competitiveness and are marginalised from the world economy as new technologies render their production systems redundant.

We need to make access to technology in Botswana a critical pillar of our strategies for S&T. Our innovation and diffusion systems should be so balanced as to serve the needs of big business and government as well as those of the great majority who depend on micro and small enterprises for livelihood. For instance, small farmers require affordable seed, fertiliser, and equipment technologies that would raise farm level productivity to give them a decent chance of moving beyond subsistence. Similar needs can be found in food processing and other forms of light manufacturing.

I should not be understood to be making the case for a focus on technologies that would trap Botswana in low value production. Mine is a case for inclusive technological investment, and for access to both new and old technologies for poor people. Our advocacy, our educational, institutional, policy and infrastructure responses to Botswana's technology needs should not engender the exclusion of particular constituencies.

In the 21st century, one class of technologies, Information and Communication Technologies (ICTs) - has been a particularly dominant force in shaping development outcomes. It is the power behind the current productivity revolution and the current phase of globalisation. The internet in particular, has delivered to individuals and organisations, communication capabilities that have produced quantum reductions in transaction costs, extended market reach, and availed unprecedented access to information. Sadly, poor countries and poor people do not have access to these technologies. As a result they suffer enormous competitive disadvantages.

The Government of Botswana (GoB), has made ICTs a priority focus for development. We have made significant investments in the requisite telecommunications infrastructure and have planned more investments to expand bandwidth. Beyond this, two other areas require urgent attention.

First, there is an urgent need to bridge the digital gap between urban and rural areas. The development possibilities that this could unleash from business to the delivery of basic services, are enormous.

Second, there is need to use the power of ICTs to improve efficiency and effectiveness in government. It is a priority of the Ministry of Communications, Science and Technology (MCST) to help government departments to use the ICT capabilities that government has availed to them to improve management efficiency and service delivery. Through effective use of ICTs, we could reduce the amount of paper moving between offices and reduce information storage costs. We could make information storage and retrieval faster and cheaper. We could save our clients the cost and inconvenience of travel to access services that they could access directly from their homes or through government offices in their own villages and towns. There are numerous other possibilities.

We have developed to the extent we have, in part, because Botswana is a decent technological diffuser. However, our capacity for technological diffusion is by no means adequate. Neither should we be content with just being technological diffusers. As a nation, we have fashioned ourselves as winners. That demands urgent and systematic

development of the country's knowledge resources. In the specific case of S&T, the establishment of the MCST is a bold institutional response to this imperative and a measure of the Government's commitment to building a credible national S&T capability.

This Report identifies a number of critical entry points for strengthening our national S&T capabilities. The public sector is one, both as a user and a producer 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 our drivers of technological innovation and diffusion. To play this role, 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.

The second entry point is trade and investment. Technology is often embodied in goods and people. Through appropriate trade and investment policies, Botswana can expand its S&T capabilities.

The third is education. Both innovation and technological diffusion are functions of the level and quality of education. Through the Revised National Policy on Education (RNPE), we have shifted emphasis to Maths and Science and have as such given S&T a solid vote.

It has been said in this report that Botswana has the fundamentals for effective technological diffusion. Our literacy levels are high. Our education system is good. Household incomes are, on average, good and we have a good and improving infrastructure base.

To achieve our goal of building a strong national S&T capability, we need a constant and unrestrained flow of ideas. This Report is a useful contribution in this regard. We shall, later in the year, demonstrate high profile advocacy on a particular aspect of ICT when we host the World Information Technology Forum (WITFOR) in September 2005.

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Preface

When the first BHDR was published in 1997, it made perfect sense to focus on "Challenges for Sustainable Development", because the time had come to establish a detailed Human Development Index (HDI), for Botswana. It also made perfect sense that the 2000 Report should focus on the challenge of moving "Towards an AIDS Free Generation", because the threat from the HIV/AIDS epidemic increasingly had emerged as the major challenge to human development in Botswana.

Does it then make equally perfect sense to choose "Harnessing Science and Technology for Human Development" as the theme for the 2005 Botswana Human Development Report? Yes, I very much believe so! The choice of this theme was inspired by both the recognition of what humanity has achieved so far in areas of agriculture, manufacturing, communication, medicine, etc with the aid of S&T, and by the recognition of the development possibilities that technology offers to developing countries.

Because the next phase of Botswana's development will depend to a great extent on the country's ability to leverage S&T for economic and human development, it is important to investigate the links between S&T and human development closely. In the context of globalization, the ability to harness S&T has become a key factor for both economic and human development. Globalization constantly reminds us that contrary to past thinking, it is not enough for developing countries to focus on good governance, market reforms, etc. To bridge the gap between the rich and poor countries, S&T has to become a core part of the national development strategy.

So by adopting the theme of "Harnessing Science and Technology for Human Development", we hoped to bring into focus how technology can accelerate the pace of human development in Botswana, and how human development in turn can promote the creation and implementation of technological breakthroughs in Botswana. The Report therefore explores Botswana's experiences with S&T for human development, as well as the possibilities that exist for the country to leverage technology to further advance human development.

The Report identifies Botswana as part of a large group of countries that are neither technological inventors nor diffusers. Despite this, Botswana has the potential to effectively leverage S&T for human development and facilitate technological progress. Botswana has much of the infrastructure as well as the economic and fiscal position with which to develop the S&T capabilities and capacity required to benefit from the gains of technological progress.

The BHDR 2005 articulates the fact that Botswana can become an information state. The starting point for this would be for Botswana to create and then sustain the development dynamic necessary to transform the state. For this to happen, four elements are highlighted as critical, namely: education and training; ICT infrastructure; entrepreneurship; and trade and investment.

In addressing the need to harness S&T in Botswana, the BHDR 2005 identifies five broad areas to be addressed in particular if Botswana is to become an Information Society: the fight against HIV/AIDS; economic diversification and private sector development; development of research and innovations systems; development of an ICT framework; and the enhancement of human freedoms.

Many would probably consider the top priority among these five areas to be HIV and AIDS. The current high HIV and AIDS prevalence rate has reversed some of the human development gains achieved in the three decades since independence in 1966. One of the most critical roles of S&T in this area is developing the local expertise with which to cope with the epidemic.

From the perspective of United Nations Development Programme (UNDP), the BHDR 2005 is therefore a timely endeavor. It will also feed into the World Information Technology Forum (WITFOR), to be hosted in Gaborone from 31st August to 2nd September 2005. The objective of this biennial global event is to work towards bridging the digital divide between developed and developing nations and empowerment of the common man with the help of ICTs. The BHDR 2005 makes a first attempt to articulate how Botswana can begin to bridge the digital divide and empower Batswana with and in the use of ICTs.

Preparation of this Report has not been an easy task. We are happy to have reached the end of the process, albeit two years later than intended. Consequently, allow me to conclude by recognizing the contributions of those who made this Report possible. The BHDR 2005 is a collaborative effort between the GoB and UNDP and has had technical and editorial contributions from various development partners, from the UB to the Civil Society. I also recognize the efforts of independent consultants, the Reference Group which served as a sounding board and provided guidance on production of the Report, and the BHDR team in the UNDP Botswana office. This Report would not have been possible without these efforts.

BJØRN FØRDE
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Reference Group

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1 Sawako Inae, Debbie Tlhomelang, Sennye Obuseng and Constance Formson

Abbreviations

ACHAP	African Comprehensive AIDS Partnership
ADSL	Asymmetric Digital Subscriber Line
AGOA	Africa Growth and Opportunity Act
AIDS	Acquired Immune Deficiency Syndrome
AISEC	An International Student Exchange Programme at University of Botswana
ARAP	Accelerated Rain-fed Arable Development Programme
ARVs	Anti-Retrovirals
ASU	AIDS and Sexually Transmitted Disease Unit
ASYCUDA	Automated system for customs Data Application
BBCA	Botswana Business Coalition on AIDS
BCA	Botswana College of Agriculture
BECA	British Educational Communications and Technology Agency
BHDR	Botswana Human Development Report
BIDPA	Botswana Institute of Development Policy Analysis
BNAST	Botswana National Association of Scientists and Technologists
BOCCIM	Botswana confederation of commerce, Industry and manpower
BONASO	Botswana Network of AIDS Service Organisations
BONEPWA	Botswana Network of People living with AIDS
BONELA	Botswana Network on Ethics Law and HIV/AIDS
BOSHASTED	Botswana Symposium for Harnessing of S&T for Economic Development
BTA	Botswana Telecommunication Authority
BTC	Botswana Telecommunication Corporation
BTV	Botswana Television
BOTEC	Botswana Technology Centre
BPC	Botswana Power Corporation
BRSTIA	Botswana Research Science and Technology Investment Agency
BVI	Botswana vaccine Institute
CA	Continuous Assessment
CBO	Community Based Organisation
CDC	Centre for Disease Control
CEDA	Citizen Entrepreneurial Development Agency
CHBC	Community Home- Based Care
CSO	Central Statistics Office
DFID	Department for International Development
DNA	Deoxyribonucleic Acid
DSTV	Digital Satellite Television
ECA	Economic Communication for Africa
EDI	Electronic Data Interchange
EFA	Education for All
EFT	Electronic Funds Transfer
ELISA	Enzyme Linked Immunosorbent Assay
FAP	Financial Assistance Policy
FDI	Foreign Direct Investment
FHS	Family Health Survey
GAP	Global aids Programme
GEM	Global Entrepreneurship Monitor
GDN	Government Data Network
GDP	Gross Domestic Product
GoB	Government of Botswana
HDI	Human Development Index
HDR	Human Development Report
HIV	Human Immuno Deficiency Virus
HPI	Human Poverty Index
ICRIST	International Crops Research Institute for the Semi-Arid Tropics
ICT	Information Communication Technology
ICTs	Information and Communication Technologies
IDRC	International Development Research Centre
IDSN	Integrated Services Digital Network
IEC	Information, Education and Communication Programmes
IFIM	Incentive Funding Investment Model
IFSC	International Financial services Centre
IKS	Indigenous Knowledge Systems
IMF	International Monetary Fund
IPR	Intellectual Property Rights
IPT	Isoniazid TB Preventive Therapy
ITG	Intermediate Technology for Development Group
ITU	International Telecommunication Union
JAB	Junior Achievement Botswana
LAN	Local Area Network
LDC	Least Developing Countries
LITS	Livestock Identification and Trace Back System
MCE	Molopolole College of Education
MCST	Ministry of Communication, Science and Technology
MDGs	Millennium Development Goals
MFDP	Ministry of Finance and Development Planning
MOA	Ministry of Agriculture
MOE	Ministry of Education
MTP	Medium Term Plan
NAC	National AIDS Council
NACA	National AIDS Coordinating Agency
NACP	National AIDS Control Programme
NAMPAADD	National Master Plan for Arable Agriculture and Dairy Development
NAP	National Action Plan
NCE	National Council on Education
NDP	National Development Plan
NCSIR	National Centre for Science and Industrial Research
NDP	National Development Plan
NCST	National Commission for Science and technology
NEPAD	New Partnership for Africa's development

NGO	Non-Governmental Organisation
NRPEP	National Rural Photovoltaic electrification Program
NSPR	National Strategy for Poverty Reduction
ODA	Official Development Assistance
OECD	Organisation for Economic Cooperation and Development
PCR	Polymerised Chain Reaction
PIPR	Patent and Intellectual Property Regime
PLWA	People Living with AIDS
PMTCT	Prevention of Mother to Child Transmission
POPs	Points of Presence
R&D	Research and Development
RIIC	Rural Industries Innovation Centre
RNPE	Revised National Policy on Education
SADC	Southern African Development Community
SARS	Severe Acute Respiratory Syndrome
SEANAC	Southern and eastern Africa Network for Analytical Chemists
SIFE	Student in Free enterprise
SMME	Small Medium and Micro Enterprises
S&T	Science and Technology
STD	Sexually Transmitted Disease
STP	Short Term Plan
TCB	Teacher Capacity Building Programme
TRIPS	Trade Related aspects of Intellectual Property
TyBEP	Ten-year Basic Education Programme
UB	University of Botswana
UN	United Nations
UNAIDS	United Nations Joint Programme on AIDS
UNCED	United Nations Conference on Environment and Development
UNDP	United Nations Development Programme
UNESCO	United Nations Education and Scientific Cultural Organisation
UNFPA	United Nations Population Fund
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
USAIDS	United Nations Joint Programme on AIDs
VCT	Voluntary Counseling and Testing
VSAT	Very Small Aperture Terminal
WHO	World Health Organisation
WIPO	World Intellectual Property Organisation
WITFOR	World Information Technology Forum
WTO	World Trade Organisation

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By harnessing S&T, countries are assured of economic growth and can fight poverty, disease and environmental destruction. Thus the building of a national S&T capability is a critical indicator of the future well-being of a country's citizens and how well the country can compete in the global market place. The ultimate end of S&T is the improvement in the multiplicity of goods that enhance human wellbeing. The pursuit of the universal concept of human development focuses on addressing three imperatives:

- Provision for basic human needs
- Development of basic human capabilities
- Provision of space to enable people to apply their innate and acquired assets to acquire higher welfare status.

This Report makes the case that human development is intrinsically linked to freedom from poverty and disease, but acknowledges the widening gap between 'the haves' and 'the have nots' both within and across nations, which is exacerbated by lack of equity in terms of the access to and sharing of resources.

It acknowledges global evidence that the pillars of development crumble in most developing (and poor) nations due to failure of governance institutions to provide security, empowerment, opportunity and incentives. It however cites the contradictions that exist between human freedoms as expressing the ultimate in human development, thus assuming a form of human right on the one hand, and necessity which sometimes forces the abrogation of these rights in response to emergencies. Thus the pursuit of human development from say increased production of goods and services through the application of S&T might have to be curtailed if it runs counter to environmental protection; enjoyment of freedoms might give way to compulsory testing for HIV/AIDS or quarantining of airline passengers to arrest the spread of Severe Acute Respiratory Syndrome (SARS) and many other emergency situations, whether rights are suborned to need.

Botswana thirty-eight years of progress and the tragedy of HIV/AIDS

By zeroing in on the tragedy that is HIV/AIDS, the Report captures in graphic terms the reversal in human development that the scourge has inflicted on Botswana and by extension other countries that are burdened by a high prevalence rate. Botswana had by the end of the 1990s achieved what could only be described as an extraordinary record of development success, surpassing in some specific areas such as per capita expenditure on education even countries in the developed north. This record has brought the country to a stage where it could achieve even higher developmental goals, but all this investment is under strain from HIV/AIDS which has drained not only the human resources (deaths and productive days lost while out on sick leave), but more critically the financial and human resources devoted to it. This has meant that other aresas of development receive little in terms of support. The provision of infrastructure, including ICT and services, has to play second fiddle to the concerted response to this challenge.

Botswana's development record characterised by rapid and sustained growth for more than three decades, is attributed mainly to mineral wealth, a disciplined approach to macroeconomic management, democracy and good governance, international goodwill and policy activism towards priority development, is in danger unless a solution can be found to the HIV/AIDS problem. This is however not the only problem. There is still need to strengthen the economy by diversifying it away from minerals and mining.

Other human development challenges such the persisting inequality, unemployment, poverty and excessive dependence on the state, as well as a slow pace of citizen economic empowerment need to be tackled head on if the impressive gains of the last thirty-eight years must continue and be consolidated. The central theme of this Report is that technology has an important leveraging role to play in facilitating human development through ushering in an information rich and diversified economy. This Report recognises that the problems of health, globalisation and the threat of digital exclusion (both globally and nationally) and environmental sustainability need to be addressed. S&T backed by the appropriate policy and implementation strategy is best placed to play such a catalytic role.

Human Development and Science & Technology: a two way street

Human development and S&T exhibit a complex relationship that clearly demonstrates that the advancement of one depends very much on the other. It has been argued that there exists a paradox between enhanced human development through S&T and the fact that S&T could equally be the antithesis of development such as when it makes possible the development of weapons of mass destruction. One must however look to the harnessing of S&T over time as a key factor behind progress made in human development, that initself will drive future progress.

On a global scale, Botswana belongs to a large group of developing countries that are neither involved in S&T innovation nor its diffusion at any significant level. The capacity to innovate and diffuse technology is a product of the quality of physical and institutional infrastructure; the state of education and educational attainment by the citizenry; the size and maturity of markets; as well as the level of integration into the world economy through trade and investment.

Looking at Botswana's strong fiscal position, the Report argues that it meets the basic requirements for developing a strong S&T capability and capacity. It has research institutions that are well resourced to carry out significant research, but outputs have to date not been reflective of this potential. The Report postulates that part of this lack of output might be due

to lack of focus in both funding and recruitment and retention of skilled personnel. As part of the policy response to this, the Government in implementing the Science and Technology Policy of 1998, is shifting away from the current input funding model to an outcomes based, Incentive Funding Investment Model (IFIM). With this new focus, government funding for research would be based on identified outcomes by the research provider. This should add to the intellectual property developed in the country. These are however, future prospects: a positive outcome will require a creative mix of policy research skills and an institutional framework that facilitates value addition in S&T research and development.

Creating a development dynamic

In order to achieve an information society and economy, the Report indicates that Botswana must first create and sustain a development dynamic necessary to transform itself from its current state. Four elements are singled out as critical to this dynamic, namely, education and training (skills), ICT infrastructure, entrepreneurship and trade and investment. A critical aspect of achieving an information society will be the development of an educational policy framework that affords all school going children access to ICTs and becomes the platform for the development of an enterprise culture in the youth. Thus the Report urges the streamlining of e-learning into the school curriculum in addition to the current provision of ICT infrastructure that the GoB has embarked upon. Beyond this, it must form part of the quest for life-long learning by all citizens.

One of the critical visions of the Government is an economically diversified country that no longer depends extensively on mining for trade. Thus in creating a development dynamic, the Report also focuses on trade and investment in ICT as one possible avenue through which this diversification could take place. To be sustainable, citizens must have and develop an entrepreneurial culture, through both education and the support of the state in encouraging those who take advantage of opportunities. An underlying factor in all these, is investment in the necessary infrastructure to facilitate trade and access to information and markets. On this front, Botswana is performing much better than many developing countries. Various pipeline telecommunications projects will improve the overall capacity and quality of the current infrastructure.

Towards an information society for Botswana

The starting point is the premise that ICTs are vital for enhancing human development as facilitators of economic growth productivity improvements. Access to ICTs is thus seen as the precursor to having an information economy, which is a new global electronic structure, where the production of information goods and services dominates wealth and job creation. Thus the clear digital divide between the North and South manifests the lost opportunities for growth for the latter relative to the developed world.

In Botswana's case, a lack of an information society would not be for lack of ambition. The country's national vision, Vision 2016, envisions 'an educated and informed nation that has mainstreamed computers and the internet and that has entered fully into the information age'. It starts its quest for this new exalted status from a position of strength boasting an expanding world class telecommunications infrastructure and an enviable open and fair telecommunications regulation regime. There are however, a number of problems that the GoB has to address. These relate to increasing and maintaining skills being decimated by HIVAIDS; enhancing deployment and access to ICTs by rural people and the Small Medium and Micro Enterprises (SMME) sector; diffusing support technologies such as electrical energy to make use of ICTs possible.

Measured up against competitor nations of the same demographics and size, such as Namibia, it appears the country is failing to fully utilise its capacity, rendering the impressive telecommunications infrastructure and one of the highest internet bandwidth per capita in Africa, relatively under utilised. Thus another challenge for the country is to exploit its capacity which means the average citizen must be economically empowered to partake in the information age perhaps in much the same way most have taken to the cellular phone revolution. Thus citizen economic empowerment must accompany the creation of a new Botswana information society and economy.

An Agenda for the Future

In charting the way forward and thus challenging the GoB to perform better for its citizens, the Report cites five broad areas that must be addressed and where ICTs could play an anchoring role. These are the fight against HIV/AIDS and the Health crisis; economic diversification and private sector development; development of a research and innovations system for Botswana; development of an ICT framework and finally enhancment of human freedoms.

Under HIV/AIDS:

- The Report advocates finding new ways of continuing the awareness campaign and a consideration of moving beyond routine testing to actually acknowledging the medical emergency it is and taking the route of compulsory testing.
- It equally advocates for developing a local core of expertise in Research and Development (R&D), e.g epidemiologists, medical statisticians and generally the capacity to respond to future epidemics.

As part of economic diversification, the Report calls for providing ICT infrastructure and programs in all schools; building an entrepreneurial culture and empowering the SMMEs (and particularly women) through technology support.

In terms of the research, development and innovations system the Report calls for the building on a centre of excellence in HIV/AIDS research; developing research capacity at tertiary institutions by insisting that 60% or more public servants are trained within the country and providing the funding to allow for the capacity building at these institutions.

The ICT framework focuses on: allowing people access, and thus having policy focus on allowing for security of electronic transactions; calling for legislation that recognises electronic signatures; building the capacity to make the country a Southern African Development Community (SADC) ICT hub as well as providing all schools with the necessary electrical connections and ICT hardware and software to become participants in development.

As a way of enhancing human freedoms, it calls for provision beyond the basic needs of food, shelter and health by advocating for access to information through a freedom of information act. The Report goes further to advocate for public service reform and decentralisation of government, both of which must involve empowerment of service providers by decentralisation of decision making powers and most critically, the provision of tools for enhanced service delivery.

Chapter 1

Science, Technology and Human Development: Some Basic Conceptual and Definitional Issues

Human Development: A Universal Pursuit

Harnessing S&T for human development is the very essence of investment in building a national S&T capability; it is about expanding the frontiers for human achievement and human development. As a process, it is as old as mankind. From the Stone Age to the Information Age, quantum leaps in human material and physical wellbeing were made possible only through breakthrough scientific and technological innovations: in agriculture, biotechnology, biomedical science, communications, industry and transport amongst others.

Human development is a universal pursuit. Whether rich or poor, human beings, as individuals, as communities, as nations and indeed as a race, are engaged in a constant search for means and opportunities for the betterment of their conditions of life. It is an exceedingly vital process and technology has too often proved to be the decisive factor in separating winners from losers. Thus, no nation, including technological laggards, has ever lost sight of the centrality of progress in S&T to the human development process. Building a solid national science and technological capability, one that permeates government, industry and civil society, is thus a strategic development objective for any nation. Botswana, through the Science and Technology Policy enacted by parliament in 1998, and the establishment of the MCST has made bold, its commitment to developing a strong national S&T capability.

Freedom to choose to send children to school

Relative progress in S&T is every nation's hope for relative productivity growth, global competitiveness, beneficial integration into the world economy, and above all, improved welfare outcomes for the citizenry. Through S&T, the range of choices open to human beings – for consumption, employment and investment – grow.

The ultimate end of human development is improvement in the multiplicity of 'goods' that enhance human wellbeing. Human development requires that three broad areas of need and capability be satisfied:

First: Adequate provisioning for basic human needs - food, shelter, clothing, health and other necessary services – through both public and private effort.

Second: Development of basic human capabilities. These are, in Sen's conception, the substantive freedoms a person needs to lead "… the kind of life he or she enjoys". They include health, education, knowledge and skills.

Third: Space for people to apply their innate and acquired assets, individually and communally, to achieve higher welfare outcomes. The defining features of such space include an environment of stability (political, social and economic), of democracy, a human rights culture, and freedom for all to operate as political and economic agents.

Human development is a means towards an even higher ideal, human freedom (see Box 1.1). An especially important freedom in the human development process is that of choice. At certain levels of deprivation, people cannot exercise basic choices that are essential for a dignified human existence, choices that every human being should have as a matter of right. For instance, they do not have the choice to seek medical help when sick; to have clean water; to eat decent food; or to send a child to school. Poverty robs people of such basic choices. It is perhaps out of the realisation that the Government of Botswana has put in place a number of policies and programmes to reduce poverty (see Box 1.2) over the years.

Box 1.1 Human Development and Human Freedom

Human rights and human development share a common vision and common purpose – to secure the freedom, wellbeing and dignity of all people everywhere[1]

These freedoms include:

- Freedom from want: The dominant objective of human development is to satisfy basic needs, food, shelter, clothing, health and other necessary services as provided for under Article 25 of the Universal Declaration of Human Rights which proclaims everyone's right to "… a standard of living adequate for the health and well-being of himself and his family …".

- Freedom to develop and realize one's potential: Human development seeks to develop human capabilities and to create quality opportunities so that human beings may achieve the life outcomes they desire.
- Freedom of choice: Human development is about expanding human choices, including the choice of work and consumption choices.
- Freedom to participate in decision-making: Human development requires participation in the politico-socio-economic process as input makers as well as beneficiaries of the development process.
- Freedom of opinion and expression: As an empowering process, human development nurtures and in turn, thrives on the free exercise of mental capabilities by citizens.
- Freedom from discrimination: In every society where a section of society is excluded to any degree from political and economic processes, human development suffers for human beings are also a development resource. Exclusion robs the nation of essential human resource inputs and generates conflicts that can only obstruct development.
- Freedom from injustice: An important objective of human development is human security, which includes protection of individuals and groups from violations of basic human rights e.g. protection from inhuman and degrading treatment and protection of one's property by law.

These freedoms, and many others, which are enunciated in the Universal Declaration of Human Rights, are the ultimate objectives of human development.

Human beings do not go hungry for days, scavenge for food in rubbish dumps, live in shacks and disease infested environments, drink dirty water, keep their children out of school, or watch them die of curable diseases out of choice. They do so out of lack of better options, often through no fault of their own but rather through the failure of governance institutions to provide four public goods that are essential to human development and human freedom. These are:

Human security: In conditions of conflict, human beings are displaced, their assets destroyed and their very physical being threatened in ways that make it impossible for them to provide for their own needs.

Empowerment: This is an essential function of the state. It entails facilitating the development, within individuals and communities, of capabilities that help them to function as agents for the improvement of their own wellbeing. It includes measures to ensure universal access to quality health and education services; improving access to resources such as land, financial services and productivity enhancing technologies; creating new economic opportunities, for instance, through access to new markets and economic growth; and nurturing a culture of participatory, transparent and accountable governance.

1 United Nations Development Programme. 2000. Human Development Report 2000. Human Rights and Human Development, NY

2 According to the human rights approach to development, it is neither permissible nor desirable to disregard or abrogate any human rights - legal, political, social or economic, in order to effect human development.

Creating and/or capacitating institutions competently facilitating people's interaction amongst themselves and with external parties, is an important element of the empowerment process. Institutions of state must provide law and order; define and protect property and intellectual rights; create political space for individuals and organisations to express themselves; and manage the macro-economy, regulatory functions, skills development and knowledge creation in a manner that gives visible impetus to human agency.

Empowerment is not just about the state providing resources and opportunities. It is also about the citizens taking responsibilty for self-improvement. As shown in Text Box 1.2, empowerment is a process that needs facilitation through government policy activism by means of propoerly sequenced short and long term development strategies. It is an intergral part of sustainable poverty reduction.

Opportunity: Creating opportunities for people to earn decent livelihoods is another critical government function. Opportunity requires policies that support, amongst others, an efficient balance between allocative and distributive objectives, pro-poor growth, improved access to productive resources (including land and credit) for poor people, access to markets, export growth and new knowledge and technologies.

Incentives: Institutions of state have a responsibility to promote incentives for desirable private behaviour such as incentives for saving, risk taking, investment, and social responsibility by citizens, including corporate citizens. An especially critical incentive in the information age is that for firms to invest in the creation, transfer, diffusion and adoption of new technologies.

Human Development in Concept and Practice: Some Basic Contradictions

Human freedom is the ultimate expression of human development. In politics and social dynamics, it finds expression in universal acceptance of two basic principles: that human dignity is inherently sacrosanct; and that human beings are born free and equal in dignity and rights. At the economic level, it finds expression in adequate provisioning for human needs through public and private means. Therefore, in its totality, human freedom guarantees the dignity and worth of the human person á la Universal Declaration of Human Rights.

As a concept and as an ideal, human development enjoys universal support, not least because of its affinity to human rights, freedom and justice. Yet, in practice it is fraught with contradictions, and rather paradoxically, also because of its affinity to human rights and justice. Whereas the Universal Declaration of Human Rights proclaims all rights inalienable, universal and ipso facto equal[2], too often, these principles prove nonviable in practice.

In both policy and development practice, rights are hierarchical. civil, legal and political rights enjoy higher levels of acknowledgement, definition and enforcement compared to social and economic rights. The latter two present practical problems for development management. For example, the right to development is inconsistent with a fundamental economic reality, scarcity. How are resource poor countries to be held to account for not guaranteeing their people the right to development when they lack the fiscal capacity to provide essential goods and services?

The judicial system, which is the dominant mode for challenging violations of legal, political and civil rights, is considerably more dependable and predictable as compared to the political process, which

Box 1.2: Short-term Poverty and Hunger Reduction Policies, Strategies and Programmes[3]

The Instrument	*Objectives*
2003, National Strategy for Poverty Reduction (NSPR)	To link and harmonise anti poverty initiatives, provide opportunities for people to have sustainable livelihoods through expansion of employment opportunities and improved access to social investment, and to monitor progress against poverty.
2002, Revised National Policy for Rural Development	To reduce rural poverty, promote sustainable livelihoods, stimulate rural employment and income generation, diversify the rural economy, reduce dependency on government, maintain and improve rural capital, increase agricultural productivity and promote participation in development.
1984 Industrial Development Policy IDP(revised 1998)	To diversify the economy, foster the growth of the private sector, assist small-scale rural entrepreneurs, support growth and employment creation in towns and villages; and achieve higher levels of productivity.
1982-2002, Financial Assistance Policy	To create employment opportunities and encourage investment in a range of economic activities.
2002, Citizen Entrepreneurial Development Agency (CEDA)	To promote citizen entrepreneurship, support economic diversification and create employment opportunities.
1980 Destitute Policy (Revised 200)	To provide income support to people defined as destitute according to criteria used by the GoB.
Policies, Strategies and Programmes to Reduce Hunger	
Labour-Based Drought Relief Programme	To provide work and income in rural areas for people whose livelihoods are temporarily disrupted by drought.
1996, National Policy on Disaster Management	To provide a comprehensive framework for disaster management; reduce the potential loss due to disasters; ensure timely assistance to victims and achieve rapid and durable recovery.
The Revised National Food Strategy	To provide a framework for attaining national and household food and nutrition security through (a) the attainment of household income security; (b) physical and economic access of households to adequate supplies of safe and nutritionally adequate food; and (c) availability of food through import and production.
The Strategic Grain Reserve	To store enough grain to meet the national requirement of cereals for at least three months.
The Botswana Agricultural Board	To offer a favourable price regime and extended marketing services to isolated parts of the country through deports and cooperatives.

is the dominant mode for claiming social and economic rights. The judicial system does not, however, have the tools to enforce economic and social rights. These are seldom codified in statutes.

The principles of universality and inalienability are also not always tenable in practice. For instance, in emergencies such as war or health crises such as SARS, Human Immuno Deficiency Virus/ Acquired Immune Deficiency Syndrome (HIV/AIDS) or Anthrax, civil rights may be temporarily abrogated to secure an outcome such as compulsory testing as an essential component of a strategy for managing the emergency. An 'optimal strategy' for managing HIV/AIDS may thus entail subordinating the individual right to choice in respect of submitting to an HIV test to the public health interest. In such instances, the principles of universality and inalienability are breached, albeit out of a necessity created by an emergency.

An emerging debate in countries that now bear the brunt of the HIV/AIDS epidemic, within the health profession and amongst policymakers, is whether the early focus on protecting the individual's right to test or not to test, may not have been decisive in delaying behavioural change and the containment of the problem. There are concerns that the early focus on individual rights may have been ill-advised. Consequently, pressure is now being exerted from within and outside the health profession for compulsory, or at the very least, routine HIV testing as an important component of a strategy for achieving universal testing. Botswana has, in fact, opted for routine testing.

In countries that practice capital punishment, the commission or non-commission of a capital offence qualifies the right to life. In those that do not, the right to life is an inalienable birthright, never to be tempered with. South Africa and much of Europe are examples in this regard. Not so in Botswana, some states in the United States of America and many other countries around the world. Thus, the right to life fails to meet the standards of inalienability and universality even within the borders of one federal polity.

There is the paradox of successful development under conditions in which rights are not respected, for instance, social engineering, state paternalism and benevolent dictatorships. The ethical foundations of human development are therefore, frequently tested at a practical level by context problems. These do not however, deal mortal blows to the human rights approach to development for a number of reasons. First, the 'suspension of rights' during periods of great emergencies such as war or disease epidemics is not itself a reflection of the norm in society. It is an aberration that the citizenry would ordinarily tolerate under an emergency. People do develop higher levels of tolerance for disruptions to their normal lives if the objective is known and justifiable. For instance, they may tolerate higher taxes to finance an emergency such as war or an aggressive response to HIV/AIDS, or curfews to support a justifiable security operation.

The human rights approach ultimately derives its strength from an inherent preference for freedom among human beings. Across the world, authoritarian rule, including benevolent dictatorship, has proved unsustainable in the long term. It imposes on people psychic costs that they are not able to sustain indefinitely in the natural course of development. When deprivation is extensive, people may submit to a benevolent dictatorship, perhaps because extensive deprivation is an

3 Table extracted from United Nations Development Programme. 2004. Botswana Millennium Development Goals Status Report, Gaborone

emergency that requires a strong central authority. However, freedom from deprivation inevitably leads to a quest for higher order freedoms.

It is human nature to demand higher order 'satisfactions' as more basic needs are met. One such order of satisfaction is freedom for people to do the kind of things that make their lives complete. No authoritarian system can meet this need consistently for long enough to make authoritarian rule viable. In the end, people will revolt against any such system because in the final analysis, "all human beings are born free and equal in dignity and rights"[4].

It is for these reasons and the considerable progress made by proponents for an ethical human centred and human rights based approach to development, that over the last two decades, the conception of development has shifted from its focus on economic development to a decisive focus on the more inclusive idea of human development. Appreciation of this concept of development, if not the degree to which it has evolved, can be traced as far back as classical economists and philosophers such as Robert Malthus and Vilfredo Ricardo. It is not that economic development and human development are incompatible. Managed properly, these are mutually supportive processes. Human development is, in part, about translating economic development – growth etc. - more efficiently, into broad-based improvements in human welfare.

Human Development and Poverty

Poverty is a widespread and exceedingly destructive phenomenon. Around the world, an estimated 1.2 billion people, one in every five human beings, subsist on less than $US1[5], the equivalent of five pula (BWP5), per day. In Sub-Saharan Africa alone, nearly half of the population live below this threshold. In Botswana, an estimated 47% of the population was income poor in 1993/94, down from 59% in 1985/86. Furthermore 30% (of the total population) subsisted under conditions of extreme poverty in 1993/94, down from 41% in 1985/86. The latest estimates indicate that in 2002/03, 30% of the population was income poor.[6]

Poverty is an exceedingly destructive phenomenon. It is in itself an emergency and the very antithesis of development. But it is a "silent emergency" because despite its extent and impact, it is relatively easier to ignore compared to war and HIV/AIDS for example, by those who do not experience it directly even if they have the power and direct responsibility to do something about it. In Sub-Saharan Africa as a whole, poverty destroys human potential and the human spirit on a scale matched only by HIV/AIDS. It perpetuates itself by creating disease, conflict and hopelessness. And because it is less dramatic than war, or HIV/AIDS, it is a more silent, but no less destructive, emergency.

The Millennium Development Goals (MDGs), developed over the 1990s and adopted as a compact for development by the United Nations General Assembly in 2000, reaffirms poverty as the world's priority development goal in the 21st century. Whereas war, violence and authoritarian rule provide the most dramatic assaults on human development and human freedom, it is poverty and related forms of deprivation that lie at the core of the human development challenge. But what is poverty?

The World Bank[7] defines poverty as pronounced deprivation in wellbeing. Such deprivation includes hunger, lack of shelter, poor health, lack of education, social exclusion, powerlessness, lack of voice, and vulnerability to disease and natural disasters. So poverty may have several dimensions, the most common being income poverty and capability/human poverty. Individuals and/or households are considered income poor if their income or consumption falls below some threshold[6] below which it is impossible to meet basic needs. People are also considered poor if they lack the essential capabilities such literacy, health and basic functional skills for elevating themselves out of poverty.

Human capabilities define the range of things people can be or can do. To earn an income, human beings need good health, some level of functional literacy and some useful skills. The conception of poverty is thus often broadened to cover education, health, participation and vulnerability. Consistent with this broader conception of poverty, UNDP[8], identifies three levels/types of poverty, viz.,

> **Overall Income Poverty:** This defines poverty as lack of sufficient income to satisfy essential needs beyond food, including shelter, clothing and energy. Since 1995, the global threshold for income poverty has been pegged at $US2 (about P12) per day per person compared to $US1 per day per person for extreme poverty.
>
> **Human Poverty:** This is a more serious condition. It refers to deprivation in the most essential human capabilities and so includes severely circumscribed life expectancy, poor health, illiteracy, and social exclusion. The intense levels of morbidity, mortality, orphan-hood and psychosocial trauma that HIV/AIDS is inflicting on the Southern African population is a measure of the extremes human poverty can reach.
>
> **Extreme Poverty:** It exists when an individual or household does not have sufficient income to meet basic food needs. Extreme poverty, sometimes referred to as food poverty, inevitably leads to high vulnerability to disease because of malnutrition.

The consequences of poverty are severe. Its greatest cost is the expansive destruction of human potential it causes. About one in five people in the world, 1.2 billion in total, live in poverty. In Botswana, nearly three in ten people subsisted below the national poverty threshold in 2002/03. The opportunity costs these levels of poverty imply for individuals, their societies and the human race in general are incalculable. Many brilliant people who, had they been born under different circumstances, could have sharply altered the course of their nations or even humanity, die illiterate and without having made anything close to their potential contribution. Yet many others die of easily preventable diseases, the so-called diseases of poverty.

The link between poverty on the one hand and S&T on the other is self-evident. The Intermediate Technology for Development Group (ITDG) thus observes:

> The lack of access by poor women and men to the most basic technologies and knowledge needed to create sustainable livelihoods has condemned billions of people to an existence of recurrent poverty, disease and hunger.[9]

The point is simple and clear. Poor people are not only deprived of basic resources and capabilities. They are also deprived of access to some of the basic technologies that are relevant to their most basic needs: clean water, modern medicine, high yield seeds, improved farm equipment and access to markets and information. Poverty even denies people access to policies and programmes designed for them.

Poor people and poor countries also lack the basic capabilities that support innovation and the transfer, adaptation and diffusion of technology. In particular low incomes constrain access to education and basic technologies such as the radio, the computer and the internet.

4 State of the Nation Address by His Excellency Mr. Festus G. Mogae, President of the Republic of Botswana, to the first session of the ninth parliament: "Renewed Responsibility", 8th November 2004, Gaborone
5 This is the global threshold for extreme poverty.
6 Oxfam. 1995. The Oxfam Poverty Report. 1995. Oxfam Publishing
7 World Book. 2001. World Development Report 2001
8 United Nations Development Programme
9 August 2002, http://www.itdg.org.

Low fiscal capacity leads to under funded and under performing educational and research and development institutions. The result is that poor people and poor countries are being by-passed by every round of breakthrough technologies. For instance, in contemporary development discourse, the phrase "digital divide" refers to the reality that the current communications revolution has bypassed and is marginalizing poor people and poor countries.

For poor people and poor countries, knowledge, innovation and technology can very easily be instruments of exclusion. The poor are seldom innovators but innovation by others often undermines their production systems and their competitiveness and erodes their terms of trade. Thus, building capacity for innovation and technological diffusion in poor countries and improving poor people's access to basic life improving technologies - in agriculture, health, manufacturing, transport, communications etc. - could make a difference in the fight against poverty.

On access to technologies, the case has been made for the reform of the current Patent and Intellectual Property Regime (PIPR). Patents, whose main purpose is to encourage innovation, have evolved into powerful instruments for rent seeking and anti-competitive behaviour. Patents, along with unfair trade rules, are the primary building blocks for the technology divide that keeps the human development gap between rich and poor nations wide and growing. Poor people and poor countries need improved access to simple life improving technologies - in areas such as agriculture, health and communications.

Human Development and Health

Health is an essential basic human right. It is also one of the areas of human development where progress in S&T has delivered truly great differences in human wellbeing. It continues to be an exceptionally active area of scientific research and innovation. As far back as 8000 BC[10], the history of medicine and health has been replete with revolutionary innovations with high human development impact; some of which have been fairly basic. These include:

- Ambroise Pare's "Dressing and Bandages" in 1536, replacing hot oil as treatment for wounds.
- James Lind's discovery of a cure for Scurvy in 1752.
- Edward Jenner's discovery of a Small Pox Vaccine in 1798.
- Charles Gabriel Pravaz and Alexander Wood independently inventing the Hypodermic Syringe in 1853.
- Wilhelm Rontgen's discovery of X-Rays in 1895.
- The Discovery of Insulin for treating diabetes in 1921 by Frederick Banting and Charles Best.
- Alexander Flemming's discovery of Penicillin in 1928.
- Selman Waksman's discovery of a cure for Tuberculosis in 1943.
- Jonas Salk's discovery of a Polio Vaccine in 1954.
- Francis H. Crick and James Watson's co-discovery of molecular structure of nucleic acids in 1962 and
- Paul Lauterbur and Sir Peter Mansfield' s discovery concerning magnetic resonance imaging in 2003.

S&T still has a lot to offer human development. For example, in Sub-Saharan Africa, a breakthrough in medical innovation that delivers an affordable HIV/AIDS vaccine or cure could create a monumental developmental dividend. With such a breakthrough, the years of life expectancy lost since the beginning of the 1990s could be recovered quickly.

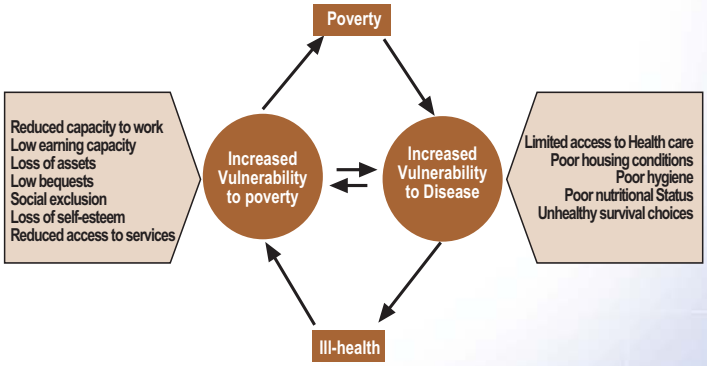
The link between health and human development is self evident and strong. Good health is a sign, a result even, of development success; just as ill-health is often a sign, a result of poverty or lack of human development. Poverty breeds vulnerability to disease. It creates the conditions on which diseases thrive: illiteracy and ignorance, malnutrition; poor sanitation; unsafe water; and high exposure to natural negatives factors such as bad weather and floods. Poverty also creates a predisposition to unhealthy survival strategies - picking waste food from rubbish dumps, commercial sex work, maintaining multiple sexual partners according to economic need and turning to alcohol and drug consumption as coping strategies.

Across the world, particularly in poor countries, poor people are severely deprived of access to health. In some countries, poor people's access to health is constrained both by weaknesses in supply (lack of state resources to finance health infrastructure, drugs and personnel), and poor people's lack of ability to pay for medical fees and drugs. Botswana is blessed with a fairly well resourced and financially accessible public health system but access remains an issue because of shortage of personnel, which has become more acute as a result of an increase in demand for health services due to HIV/AIDS and the erosion of delivery capacity, also by HIV/AIDS. It is noteworthy that despite the challenge posed by HIV/AIDS, there is a general trend that shows an increase in both communicable and non-communicable diseases. This puts a further strain on an already burdened health system; this has the potential to compromise the fight against HIV/AIDs.

The poverty health link is also dire in the reverse. Poor health inevitably breeds poverty. HIV/AIDS, the biggest health challenge in Sub-Saharan Africa, is exceptionally devastating in this regard. It erodes capacity to work and reduces earning potential for the sick and those who care for them. It erodes accumulated assets through medical expenses. It also creates a new class of orphans: very young children whose parents died young, often leaving no bequests. This is a growing and exceptionally vulnerable group. In Sub-Saharan Africa, children orphaned by HIV/AIDS have been known to be dispossessed of assets, and to drop out of school to assume parental duties.

Furthermore, as John Hopkins University's Thomas Quinn argues, being orphaned by AIDS is itself a health hazard[11]. AIDS orphans are not only deprived of basics such as food, shelter, clothing and health but their condition engenders a higher degree of predisposition to life choices that increase vulnerability to diseases, including HIV/AIDS. These include premature sex, multiple material-based sexual relationships, commercial sex work, crime and alcohol and substance abuse, (see Figure 1.1).

Figure 1.1: The Vicious Circle of Poverty and Ill- Health



10 when trepanning - boring a hole in the human skull - was used to relieve severe headaches
11 http://www.aegis.com/news/upi/2003/UP030904.html

Because of its nature and extent - nearly 40% of the sexually active populations of Botswana and Swaziland are HIV positive - HIV/AIDS also impoverishes governments and whole nations. A 2000 assessment of the Macroeconomic Impacts of HIV/AIDS in Botswana predicts that HIV/AIDS could account for 10% of the number of poor people by 2010 and that it could cause a 70-270% increase in health spending, a 20% reduction in government revenue and significantly reduce the rate of economic growth. The Burkina Faso 2001 National Human Development Report projects a 15% increase in the prevalence of poverty, from 45% of the population to 60%, by 2010 as a result of HIV/AIDS.

In fact, HIV/AIDS could occasion development failure on a grand scale. An estimated 50-80% of hospital beds in the 20 countries with prevalence rates of more than 10% are occupied by People Living with AIDS (PLWA). Health systems are paralysed by low staff morale, and institutions are experiencing unusual staff attrition rates. HIV/AIDS may cripple institutions of governance and service delivery. In order to address some of these aspects, the National Aids Coordinating Agency (NACA), is developing a new software to be used by the Ministry of Education (MoE), in capturing and analysing data and producing reports on student and teacher absenteeism. These efforts reflect a realisation that the epidemic has evolved into a potent economic and national security threat.

For poor people and poor countries, many of the medical technologies that could make a difference, drugs and condoms for instance, already exist. But these remain largely inaccessible because of low personal incomes and poor state finances. An especially severe constraint on access to these technologies is the patent and intellectual property regime. It locks monopoly rents into the prices of new technologies and keeps them beyond the reach of poor people and poor countries. These life-saving technologies include Anti-Retrovirals (ARVs), for which generic equivalents are available but may be proscribed by the patent and intellectual property regime.

In some instances, poor people are let down by policy failures and weaknesses in institutional delivery capacities. At the global level, a partnership based on new S&T to address the problems of poor people remains elusive. The policies of developed countries continue to deny health systems in developing countries life saving drugs needed to fight AIDS, malaria and tuberculosis. And too little is spent on research into developing biomedical solutions to the health problems of developing countries. And when drugs are available, misguided policies and/or delivery capacity constraints deny poor people access to them. For instance, Botswana still lacks the human resource capacity to make its ARV programme truly national. It does not have enough doctors, counsellors and nurses to effectively implement the programme and manage its risks.

Technology can mitigate the human resource problems that afflict health service in poor countries. Virtual medicine, or telemedicine, is an option already in use in many countries around the world to accord clinics and health centres in remote areas the services of doctors. In an effort to mitigate the effects of HIV/AIDS on education in Botswana ICTs have been put to use. An ICT-based initiative modeled on the television programme Escola in Brazil, the Teacher Capacity Building Programme (TCB), was developed in partnership with African Comprehensive AIDS Partnership (ACHAP), UNDP, United Nations Population Fund (UNFPA), MoE, and MCST. The interactive distance education program is delivered through Botswana Television (BTV).

The objective of the TCB program is to contribute towards prevention and mitigating the impact of HIV/AIDS by enhancing the response capacity and resilience of the education and communication sectors. It is hoped that through the TCB, stigma associated with the disease will be addressed through discussions about HIV prevention, and living with and caring for adults and children infected or affected by HIV/AIDS. On 20th March 2003, the first TCB broadcast took place countrywide through a weekly programme called "Talk Back"; 400 schools participated in this initiative. Teacher Capacity Building is being used to equip teachers with the skills to effectively deliver to pupils and communities, HIV/AIDS Information, Education and Communication (IEC) services. Teacher Capacity Building also mitigates the effects of HIV/AIDS induced staff attrition on tuition by providing for delivery of tuition through the medium of television.

Human Development and the Environment: Issues of Sustainability

"The earth provides enough to satisfy every man's need but not every man's greed"

- Mahatma Gandhi

Nature provides the primary resources for human development - water, air, food, energy, raw materials, shelter, clothing and so on. It also performs invaluable sink[12] functions. This relationship is however tense and fragile because nature's resources are available only in finite quantities, its capacity to absorb waste is limited and it can regenerate lost capacity only if the pace of development so permits. Although it is not by any means the only element of sustainable development, the judicious use of environmental resources is the core of sustainable development. For an overview of sustainable development, see Box 1.3. Given the mismatch between the available stock of environmental resources and the demands placed on them, a destructive contest exists for these resources - amongst nations; between communities; between individuals; between species; and between the present and the future. In this contest, the most powerful - the human species and within it rich nations and rich people - control and consume an unsustainably disproportionate share of nature's resources.

In aggregate terms therefore, nature's capacity to sustain life on earth is eroding much faster than it regenerates. The earth's finite resources are

Nature provides the primary resources for human development

12 Nature absorbs a lot of the impurities generated by human activity, including carbon dioxide emissions.

being used for the current benefit of a few in a way that encroaches on the entitlements and posperity of others. Balancing temporal and inter-temporal interests in the use of natural resources is a fundamental challenge in ensuring sustainable human development.

According to Haven (2002), about 25% of the world's top soil and a third of its forest cover have been lost in the last half century to 2002. The irreversible loss of biodiversity now proceeds at rates as high as 1000 species per million per year. Human beings consume, waste or divert an estimated 45% of net biological productivity on land and use more than half of the world's supply of renewable fresh water. Global warming and climate change continue to disrupt arable production systems around the world.

The transition to sustainable development will be difficult without progress in science, engineering and technology[13] that expands the earth's capacity to support life on earth. The combination of the desire of the rich for higher consumption levels, and the aspirations of the poor for the consumption levels of their richer counterparts makes innovation an important part of the solution to the problem of sustainability. Furthermore, sustainability also requires a fair distribution of the burden of environmental costs and gains from environmental resources in favour of poor people and poor countries. Equally urgent is the need for cleaner and productivity enhancing technologies. Technology can help reduce environmental stress and to raise the earth's carrying capacity.

In the specific case of Botswana, some of the more immediate sustainable development problems are soil erosion and the expansion of farming activity to "virgin" land; the destruction of biodiversity resources in pristine natural heritages such as the Okavango; the contamination of underground water resources, the uncontrolled mining of river sand and the conflict between different forms of land use, in particular, wildlife, farming and human real estate.

Poor people would benefit the most from the effective application of S&T towards optimising the use of land resources for current and future generations. They depend more on land for food, shelter, health, clothing, transport and housing than the non-poor. They suffer the most when nature's resources are degraded or their access to them is restricted. They do not have the resources - money and technology - to access alternative sources of livelihood. For similar reasons, they suffer the most from nature's fury for they are more vulnerable to floods, droughts, hailstorms and other natural disasters. In 2001-02, poor rainfall raised the incidence of hunger and malnutrition in the SADC region. Food insecurity reached famine levels in six countries – Zimbabwe, Malawi, Mozambique, Swaziland, Zambia and Lesotho – where 10.2 million people required emergency food aid. In general, low-income households slip into abject poverty and lose sizeable proportions of their assets, especially livestock, whenever rains fail.

Box 1.3: The Concept of Sustainable Development

The ECA[14] identifies three elements of sustainable development, viz., economic sustainability, institutional sustainability and environmental sustainability.

Economic sustainability: This refers to the maintenance of the long-term health of the economy through human and physical capital formation; knowledge creation; sustained broad-based growth; and equitable access to resources such as education and health. In this context, equity also entails the notion that current generations should not profit through policies that impose an unfair economic burden on posterity. Examples include runaway long-term sovereign debt, inequitable social security systems, and the use of exhaustible resources such as minerals to finance current consumption.

Institutional sustainability: This is about how well institutions and mechanisms of governance and service delivery serve the development needs of current and future generations. It is concerned with whether the political system provides space for all to participate in the formulation of societal choice; whether the judicial system adequately defines and protects individual rights and freedoms; whether institutional capacity exists to manage the economy towards long term growth; and whether markets are allowed to mediate the interaction between sellers and consumers. In short, institutional sustainability is about the viability of governance institutions as mechanisms for minimising both Government and market failure.

Environmental sustainability: At the core of environmental sustainability is allowing nature to recover from human induced damage and using non-renewable natural resources to enhance the wellbeing of both current and future generations. The Economic Communication for Africa (ECA) puts it well:

… it implies a temporal pattern of natural resource use that leads to the conservation of an economy's natural capital base, including its land, renewable and non-renewable natural resources, and climatic conditions. Environmental sustainability therefore involves reducing environmental stress (pollution, deforestation, population pressure and excessive extraction of mineral resources) and maintaining or improving environmental quality (biodiversity, air quality, water quantity and quality) ...

Arguing for an approach to sustainability that addresses both inter and intra generational equity, Nobel Laureate, Robert Solow argued in HDR 1996[15] that:

It is not a good thing that "we" should be well off, or get better off if that entails that our (distant) descendants will be much poorer than we are … human development should be shared equitably between the present and the future.

But sustainable development is not exclusively an issue of inequality between current and future generations. It is also about temporal inequalities, i.e., whether nations and individuals do in fact use no more than their fair share of nature's resources or contribute more than their fair share to the irreversible damage of the environment. Once again, Solow makes the argument convincingly that:

If the underlying reason has to do with dislike for inequality, there is at least as strong a case for reducing contemporary inequality (and probably stronger) as for worrying about the uncertain status of future generations.

Part of the problem of environmental degradation is that "… natural assets

13 United Nations Conference on Environment and Development. 1992
14 Economic Communication for Africa. 2002. Annual Economic Report.
15 United Nations Development Programme. 1996. Human Development Report 1996. Economic Growth and Human Development, NY

Box 1.3 continued

such as forests, fisheries and water tend to be common property goods for which markets cannot provide basic co-ordination functions – revealing true values, balancing interests over time and providing diversity"[16]. The unregulated use of a common property resource inevitably results in excessive exploitation of the resource. Communal rangeland may be overstocked, fisheries 'over-fished', forests 'over-logged' and greenhouse gas emissions allowed to run into excess in the face of competitive pressures. Regulation and cooperation – global, national and local – is essential ensure sustainable, efficient and equitable use of nature's resources.

In countries such as Botswana, new technologies that raise input productivity, deliver more drought tolerant crop varieties, and raise crop yields are needed to transform agriculture, improve household food and income security and slowdown agricultural encroachment on more "virgin land". UN Secretary General, Kofi Annan, puts emphasis on "…new seeds and farming strategies that produce hardier, more drought-resistant and higher yielding crops…", and water management strategies that achieve "more crop per drop"[17]. More generally, a combination of cleaner and more efficient technologies and tougher environmental standards may slowdown the rate of environmental degradation, including climate change and ozone depletion.

Technology alone will not resolve all the environmental concerns of poor people. Some, especially those revolving around access, security, equity and quality, require political and administrative action. Poor people may have rights of use of environmental resources but these are often poorly defined and poorly protected. For instance, communal land may be privatised without the consent of local farmers or local hunter-gatherer communities who may, through such acts be deprived of access to dependable sources of wild foods and game. River sand may be mined in violation of poor people's rights of access to water and other river-based resources. For instance, sand mining along the Motloutse River in the North and East of Selibe Phikwe is being done at great cost to the local farming community and the environment. In all these instances, the activities of others, rich farmers and/or corporate interests, limit the access of poor people to environmental resources.

Quality and equity issues arise in respect of land resources because too often, poor people subsist on relatively marginal and shrinking land. Because they cannot afford boreholes, poor farmers congregate in overstocked areas where the water table is high enough for low technology hand-dug wells to yield sufficient water for humans and livestock, or along rivers. Rich farmers on the other hand often control the best arable and grazing land and have better defined and more secure ownership or use rights. Equity issues also arise because even though poor people bear the brunt of environmental degradation, they contribute less to the destruction of the environment. Rich people, rich nations, governments and powerful commercial interests are the principal agents for the destruction of the environment.

The Millennium Development Goals: A Global Framework for Human Development

The quest for human development is a global concern, requiring global coordination, cooperation and accountability. And though this is seldom said, development failure or success generates global externalities. Thus, beyond moral responsibility, it is in the self-interest of the well off to help the poor out of poverty and to make human development a universal outcome. Just as successful development in one country generates positive externalities within its neighbourhood and beyond, development failure generates negative externalities, including cross border criminal activity and international terrorism. Thus, former US Secretary of State, Cordell Hull, argued in 1945 that the battle for peace had to be fought on both the security and socio-economic fronts. In a like manner, former UK International Development Secretary, Claire Short, would, in a post September 11 address to the House of Commons Committee on International Development, argue thus,

"The suicide bombers of September 11 appeared not to come from poor countries. But the conditions that bred their bitterness and hatred are poverty and injustice".

In a reaffirmation of the manifest need and urgency for a more focussed, better coordinated and monitorable approach to international development, the 2000 UN General Assembly adopted the Millennium Development Declaration, which gave rise to eight development goals whose attainment would make the greatest impact on poverty reduction and human development. The Millennium Development Goals were developed over the 1990s through a series of international development conferences held in the 1990s and based on a common set of values and principles, including human dignity, equality and equity.

The MDGs are primarily about eradicating poverty but it is a given that without a renewed focus on S&T solutions that address the priority needs of poor people and poor countries, poverty shall not be overcome. The human development gap between rich and poor people, and between rich and poor nations, itself a source of poverty, persists to a large measure because of an innovation divide that has made technological innovators increasingly more competitive. This divide exists and grows because very little of the current research effort is focused on the specific problems of poor countries. New York Times Columnist, Nicholas Kristof, recently lamented in an opinion piece:

AIDS, malaria and tuberculosis now kill a combined six million people per year... "in the developing world"

Meeting the MDGs will require a major increase in the research effort in the developing world. At present, too little of the global research effort is committed to the specific needs of poor countries. Yet, developing countries are in need of basic low cost technologies that raise productivity and competitiveness and those that save lives. Many of these technologies exist and have low supply costs but are rendered inaccessible by steep patent barriers. Some problems require new technological solutions based on new research and innovation. The research effort in developing countries is however stifled by a combination of factors: inadequate funding, poor research infrastructure and low supplies of research expertise. Generally governments in the developing world have a low accepts of the fact that research would benefit mankind. These constraints can be overcome through collaboration between researchers and institutions in developed and developing countries.

As a framework for development, the MDGs are a powerful tool for galvanising countries into action and for rewarding them with clear measures of success. They have inspired progressive initiatives such as the New Partnership for Africa's Development (NEPAD) and national long-term perspective plans such as Botswana's Vision 2016. They have also emerged as a common platform for players in international development, in particular, multilateral institutions such as UNDP, the World Bank, and the International Monetary Fund (IMF) and bilateral agencies such as Department for International Development (DFID) and United States Agency for International Development (USAID).

The Secretary General's maiden MDGs Report shows that the countries

16 Economic Communication for Africa. 2002. Annual Economic Report
17 United Nations. 2001. Road Map Towards the Implementation of the UN Millennium Declaration. Report of the Secretary General

of the UN are serious about the MDGs. For a start, the preparation of the Report was demanded by the General Assembly through Resolutions 55/162 of December 2000 and 56/95 of December 2001. Only two years after the adoption of the millennium development declaration, nation states are already publishing MDG Reports and many have committed themselves to producing them by 2004 – one hundred have already been produced.

In his report, the Secretary General observes that the Millennium General Assembly's vision i.e. the MDGs "…was not focussed on horizons too remote"* and provides evidence for this surmise. According to his report, East Asia and the Pacific had by 1999, halved the prevalence rate of extreme poverty to 14% from 28% in 1990 and had made significant strides in reducing the number of people who suffer from hunger. Overall, the world is on course to halving the prevalence rate of poverty by 2015, thanks to good progress in China and India.

Sub-Saharan Africa is however, off target. Little progress has been made in reducing the prevalence of extreme poverty and hunger in Africa. In fact, over the ten years to the end of 1999, a net 27 million more Africans became malnourished. Furthermore, Africa made the least progress on universal access to primary education and experienced deterioration in mortality rates. Sub-Saharan Africa and South East Asia will not meet the 2015 child and maternal mortality target, mainly because of high HIV/AIDS burdens.

Much like Botswana's Vision 2016, the MDGs are firm statements of intent, with clear time bound targets and process indicators for achieving rapid and measurable human development gains. They spell out the commitments of developed and developing nations to shared principles and values in a global partnership for development. And no less important, they provide a universal framework for measuring progress in development.

In purpose and in substance, the MDGs are similar to Botswana's Long Term Vision: Towards Prosperity for All (Box 1.5). Both perceive the dignity of the human person as the fundamental basis for development. Whereas the philosophical basis for the MDGs can be traced to the United Nations Charter and the Universal Declaration of Human Rights, that for Vision 2016 can be traced to one of the tenets of African culture – Botho in Setswana, or human kindness. This very rich concept embodies all that is good about a human being: respect, character, discipline, success, humility, compassion and justice, and celebrates the dignity and worth of the human person á la the UN Charter.

Box 1.4: The Millennium Development Goals

GOAL	TARGET
1. Eradicate extreme poverty and hunger	Target 1: Halve, between 1990 and 2015, the proportion of people whose income is less than $1 a day. Target 2: Halve, between 1990 and 2015, the proportion of people who suffer from hunger
2. Achieve Universal Primary education	Target 3: Ensure that by 2015, children everywhere, boys and girls alike, will be able to receive a full course of primary schooling
3. Promote Gender Equality and Empower Women	Target 4: Eliminate gender disparity in primary and secondary education, preferably by 2005 and at all levels of education no later than 2015.
4. Reduce Child Mortality	Target 5: Reduce by two thirds, between 1990 and 2015, the under-five mortality rate.
5. Improve Maternal Health	Target 6: Reduce by three quarters, between 1990 and 2015, the maternal mortality ratio
6. Combat HIV/AIDS, Malaria and other diseases	Target 7: Have halted by 2015 and begun to reverse the spread of HIV/AIDS. Target 8: Have halted by 2015 and begun to reverse the incidence of malaria and other major diseases.
7. Ensure Environmental Sustainability	Target 9: Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources. Target 10: Halve, by 2015, the proportion of people without access to safe drinking water. Target 11: By 2020, to have achieved a significant improvement in the lives of at least 100 million slum dwellers.
8. Develop a global partnership for development	Target 12: Develop further, an open, rule based, predictable and non discriminatory trading and financial system. Includes: commitment to good governance, development, and poverty reduction – both nationally and internationally. Target 13: Address the special needs of developing countries. Includes: tariff and quota free access for least developed countries' exports; enhanced programme of debt relief for heavily indebted poor countries (HIPC) and cancellation of official bilateral debt; and more generous Official Development Assistence (ODA) for countries committed to poverty reduction.*

Source: Implementation of the United Nations Millennium Declaration: Report of the Secretary General.

Long-Term Vision For Botswana: Towards Prosperity for All

Botswana's long-term Vision, popularly referred to as Vision 2016, challenges Batswana to work towards broad-based prosperity and a just and compassionate nation by 2016. It invokes and seeks to strengthen in Batswana, individually and collectively, the attributes that will deliver success in seven broad dimensions, viz.:

1. An Educated and Informed Nation,
2. A Prosperous, Productive and Innovative Nation,
3. A Compassionate, Just and Caring Nation,
4. A Safe and Secure Nation,
5. An Open, Democratic and Accountable Nation,
6. A Moral and Tolerant Nation and,
7. A United and Proud Nation.

Botswana needs to enhance S&T capabilities

Botswana will struggle to meet its Vision 2016 goals unless it takes decisive measures to significantly strengthen its S&T capability because the key requirements for the realisation of the vision – quality education, an information society, productivity growth, export competitiveness and industrialisation all require strong technological input. And the vision is both aware of this imperative and explicit in emphasising it. Botswana has no choice but to adopt high technology practices. The pace of international developments means that we will be forced to do so in order to compete in the export markets.

Consistent with this prognosis, the vision emphasises the following in a strategy for building a national S&T capability:

(a) Sufficient investment in the development of a national S&T capability through a combination of public funding for research and incentives for private research and development.
(b) Establishment of a S&T Council that would actively promote innovation and invention.
(c) Reorienting the education system towards S&T.
(d) Effective adoption and adaptation of foreign technology. This in recognition of the reality that Botswana lacks a tradition of technical research and development that can be used as a basis for developing 'home grown' technology.

No less important in the quest for prosperity for all will be careful investment in infrastructure that supports a technology-enabled society. So building an effective communications network and supporting legislation such as a 21st century Freedom of Information Act are absolute prerequisites.

Human Agency and Public Provisioning

Human development is an internally and externally driven process, concerned with what people can and should do for themselves - human agency - and what should of necessity be provided by a higher authority such as a government or a multilateral institution. Thus, building human capabilities through investment in people i.e. raising their health, knowledge and skill levels, is as important for human development as the provision of public goods, including the creation of an environment of peace, stability and law and order; of development friendly policies; and of freedom so that people may freely engage in their preferred pursuits. Building human capabilities allows human agency to thrive. It empowers people to become the key agents for the improvement of their own wellbeing and simultaneously reduces dependence on the state and its agencies. Effective provision of public goods delivers a development context that is conducive for human agency.

The framework of empowerment, opportunity and human security discussed in this report revolves around building human capabilities and providing public goods. And this has in effect been Botswana's development strategy. The country has sought to strengthen human agency through investment in education and health and a range of economic empowerment initiatives. It has done a good job of providing the institutions and macro management functions that have turned a naturally hostile environment (small market and a poor natural resousrc base) into a relatively competitive investment. In this regard, the country's greatest assets are peace, law and order, disciplined fiscal and monetary policies and capable public institutions.

Building human capabilities

BOX 1.5: The Millennium Development Goals and Vision 2016

An Extract From an Address to the Steering Committee on Botswana's Millennium Development Goals Report

by Dr Gloria Somolekae
Chairperson, Botswana Vision Council

It is not an exaggeration to say that the MDGs and the Vision are basically the same thing. Both are concerned about virtually the same issues.

(a) To eradicate extreme poverty and hunger

Vision: By year 2016, Botswana will have eradicated absolute poverty, so that no part of the country will have people living with incomes below the appropriate poverty datum line. Within the next ten years, the percentage of people in poverty will have been reduced to at most 23%, which is half the level in 1994".

(b) To achieve universal primary education

Vision: By 2016, all Batswana will have the opportunity for continued and universal education … improvements in the relevance, the quality, and access to education lie at the core of the vision for the future".

(c) To promote gender equality and empower women

Vision: The strategies to ensure the full empowerment of Batswana women should be focused on six areas, for which sufficient resources will need to be allocated. First, to eradicate the persistent burden of poverty on women by formulating, reviewing and adopting economic policies, laws and practices which target women's needs to ensure their equal access to and control of productive resources. Second, all laws and practices that discriminate against women should be reviewed, amended or repealed... Third, positive measures, including affirmative action in favour of women should been taken to ensure women's full participation in positions of power, leadership and decision making at all levels of Botswana society".

(d) To reduce child mortality

Vision: … implied in the text on health

(e) To Improve maternal health

Vision: "Strengthen programmes specific to the health needs of women, particularly adolescents, menopausal and elderly women. There must be a national cervical and breast cancer education, screening and treatment policy, including an in-service training programme for workers".

(f) To combat HIV/AIDS, Malaria and other diseases

Vision: to halt or reverse the rising incidence of the HIV virus, particularly among young people. The task of mitigating the effects of AIDS related illnesses must be given priority throughout the health and education systems.

(g) To ensure environmental sustainability

Vision: "The challenge of preserving the environment and making prudent use of the natural resource base of Botswana is crucial to its survival and prosperity".

(h) To develop a global partnership for development

Vision: "… Botswana will continue to cooperate with other nations for mutual benefit. In particular, it will work with its neighbours to increase the degree of regional integration in trade and other policies, with a view to improving the competitiveness of the region as whole.

Chapter 2

Botswana: Thirty-eight Years of Progress and The Challenge of HIV/AIDS

An Extraordinary Record of Development Success

As Botswana must look to S&T for new impetus to national development, it should be emboldened by its record of development success and the resources – finance, infrastructure, institutions and human capital - it has accumulated as a result. It is this success that in part inspires the ambitious Vision 2016, Botswana's 1997-2016 agenda for inclusive development and participation in a knowledge economy. Whilst the challenges of yesteryear – basic infrastructure and basic services – are still relevant, their relative importance has diminished. Over the decades, the challenges have changed, as has the context.

National development management must now respond to the more complex challenges of creating individual, firm level, and national level competitiveness. The compelling lesson from the history of developed nations is that this is impossible without investing in knowledge, S&T capabilities. Botswana must invest in (a) incentives across sectors for investment in knowledge, and productivity growth; (b) changing the national psyche to instil a high sense of pride in work, excellence and competitiveness, whilst simultaneously debunking the damaging dependence on the state and its institutions as providers of first resort; (c) raising the quality of knowledge assets such as education and skills through public and private investment and; (d) modernising infrastructure services to meet the demands of the modern firm.

It is no longer enough, for instance, to have a national telecommunications grid with wide coverage. It must also perform in a manner that, at the very least, does not leave users – firms, the Government, educational and research institutions, and individuals at a competitive disadvantage in terms of the system's;

1. relevance
2. accessibility
3. reliability
4. speed, and
5. cost efficiency.

Botswana's decision to conduct an e-readiness assessment in 2003 is thus both timely and appropriate. Botswana must respond to these challenges strategically and with purpose, and should constantly be aware that failure means marginalisation from the knowledge economy.

The Record

At the time of independence in 1966, Botswana was one of the ten poorest countries in the world. In 1993 prices, its per capita GDP amounted to only P1, 682[1], the equivalent of $656 or $1.80 per day. The economy was predominantly agrarian (40% of GDP came from agriculture), the population largely semi-literate, and the known natural resource base very poor. Institutional and physical infrastructure was at best very rudimentary: an administrative capital did not exist and there were only 7 kilometres of tarred road in the whole country and no other communications infrastructure or services of note. Batswana were thus a people profoundly separated by physical space in their 582,000 kilometres[2] of land.

An even more serious development constraint was the lack of state capability. The entire development budget and more than half of the recurrent budget was funded through grants in aid, primarily from the United Kingdom. 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. Thus, Botswana's development record, one of rapid and sustained growth for more than three decades, could not have been more defiant of initial assessments of the country's post independence development prospects.

Investing in infrastructure

Five interrelated factors: mineral wealth; a disciplined, if not cautious approach to macroeconomic management; democracy and good governance; international goodwill; and policy activism towards priority development goals, were decisive in shaping Botswana's development trajectory. Mineral wealth conferred fiscal capacity on the state and with it the ability to drive the development process by, for instance (a) developing capable state institutions to provide public goods such as law and order, foreign policy and macroeconomic management and

1 National Development Plan 9. The pula per dollar exchange rate was 0.3899 dollars per pula in 1993 (Bank of Botswana Annual Report. 2002).

2 This is at the 1993 exchange rate of 0.3899 dollars per pula.

management of externalities; (b) investing in infrastructure, human resource development and agriculture; and (c) providing incentives for economic diversification and employment creation.

Good economic and political governance secured, in the first instance, the fundamentals for attracting foreign capital, technology and expertise to develop the mining industry and the non-mining non-agricultural sector. It also secured space for people and traditional institutions of exercising power to adjust to the political processes as a mechanism for exercising power and public choice. International goodwill delivered aid resources needed to support the development of physical and institutional infrastructure. The aggregate outcome was rapid economic development and widespread gains in human welfare. For instance in the period from the time of independence to 1999, that is the period before HIV/AIDS began to reverse the earlier developmental gains:

- Life expectancy at birth rose from 46 years in 1966 to 67.5 years in 1999, thanks to an accelerated programme of expanding access to public health services and improvements in incomes and nutrition.
- The Under-five child mortality rate fell from 151 deaths per thousand live births in 1981 to 49 in 1997 for the above stated reasons.
- The infant mortality rate fell from 71 per thousand live births in 1981 to 38 in 1999.
- The Under-five malnutrition rate fell from 25% in 1981 to 12.9% in 1999.
- The maternal mortality rate fell as a result of an aggressive reproductive health programme.
- Adult literacy rose from 34% in 1981 to 75% in 1999.
- Female illiteracy fell from 64% in 1981 to 29.7% in 1996.
- The net enrolment rate rose from 42% in 1971 to 98.4% in 1997.
- The rate of income poverty fell from 59% of the population in 1985 to 47% in 1993.
- The Human Development Index rose from 0.63 in 1991 to 0.72 in 1997.

The transformation of physical infrastructure, so crucial in building a national S&T capability, and itself a factor in the improvement of human wellbeing, was no less impressive. By 2002, Botswana had bituminised 6, 872 kilometres of the national road network, up from 7 kilometres in 1966. From a zero base in 1966, Botswana has developed a fully digital telecommunications infrastructure, deployed along a circular central transportation corridor linking the country's major population centres, and with spurs connecting these to rural centres off the central corridor. Virtually all major population centres now have electricity, thanks to an aggressive rural electrification programme. Equally spectacular results were achieved in the provision of portable water and the development of health and education infrastructure. The driving force behind these developments was a successful economy and an accountable and conscientious leadership.

The Economy

From a human development perspective, three aspects of an economy's development are critical. One is growth, which is a necessary condition for human development. The second is the quality of growth, expressed in terms of breadth and sustainability. The development process benefits the most from sustainable broad-based and pro-poor growth because it has the greatest impact on poverty. The third essential aspect is the structure of the economy i.e. the sectoral origins of national output, itself a factor in the breadth and sustainability of growth. Structure determines the resilience of the economy in the face of external shocks because a broad based or diversified economy has multiple engines of growth and development and can therefore cope better with a major downturn in one or two sectors than a concentrated economy. Development thus requires a diversified economy.

Botswana's economy is one of the strongest and best managed in the developing world. It exhibits strong fundamentals - fiscal solvency, monetary stability, a healthy external balance, robust growth, and a good sovereign credit rating. But Botswana is essentially a mineral economy; this has several implications for human development. Mining accounts for more than a third of GDP, about 80% of export receipts and about 50% of government revenue. Thus, directly and through its contribution to government revenue and foreign exchange earnings, mining exerts a strong influence on the economy. Figure 2.1 summarises the structure of the economy as it evolved in the 10 years between 1990 and 2000.

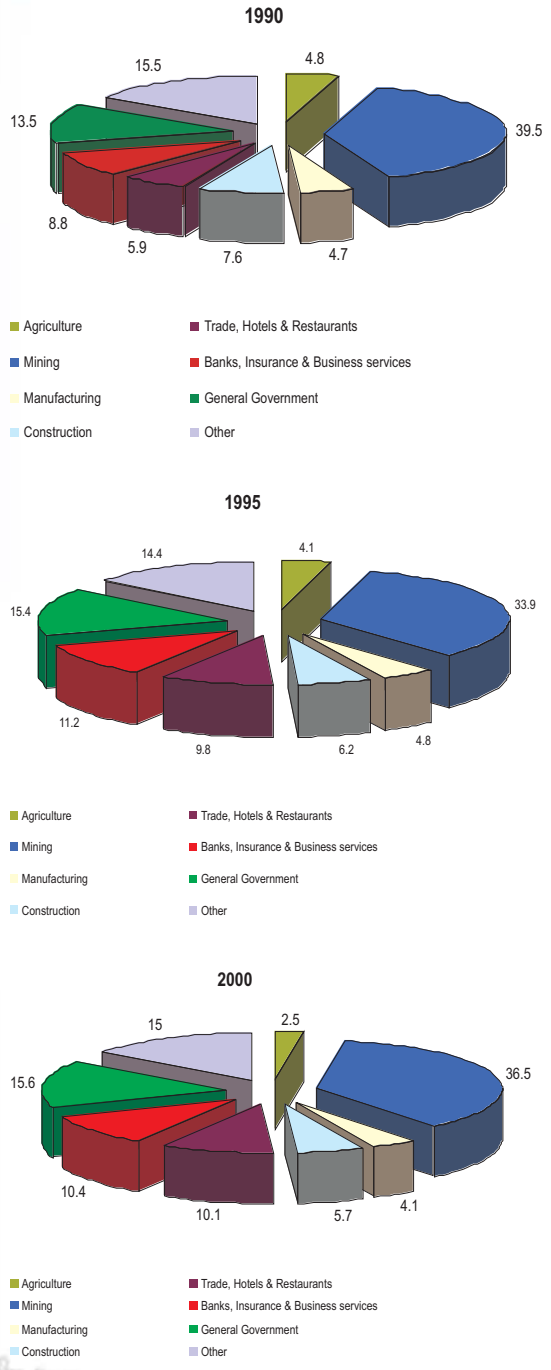
In 1966, the economy was dominated by agriculture, which accounted for about 40% of GDP. By 1985/86, the structure of the economy had changed profoundly. Mining, which was virtually non-existent in 1966, had become the dominant economic activity, accounting for 50.7% of Botswana's GDP. Agriculture's GDP share had by then slumped to 5.8%. It further declined to 3% of GDP in 2002. Mining has a pervasive influence on the magnitude and quality of growth. Driven by mining, Botswana's real GDP growth rate averaged 9.2% per annum over the period 1966-96, 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.

The indirect effects of mining on the economy have nevertheless been significant. The GoB receives more than 60% of all mining profits in dividend income (based on its 50% share in DEBSWANA, the diamond mining company) and tax income. The Government thus provides the single most important medium for transforming diamond revenues into benefits for other sectors of the economy. The Government has a deliberate policy of using mineral revenue for investment in incremental productive capacity outside mining. The investments of choice for the GoB have typically been human capital formation, infrastructure development and incentives for non-mining activities. As such, through Botswana's mineral wealth, the Government has attempted to transform its fiscal capital into sustainable capital sources namely human, physical and social capital.

An important but seldom acknowledged function played by mining in Botswana is skills development and inward transfer and diffusion of skills and technology. Mining is both skill and technology intensive. Botswana's mines have trained hundreds of professionals, especially in engineering, to meet their skill requirements. They have also imported technology through equipment, skilled expatriate personnel and mining processes. These have become part of Botswana's invaluable knowledge and technology capital, a sizeable proportion of which has been deployed outside mining.

According to Figure 2.1, some progress was made towards economic diversification in the 10 years to 2000. The mining share of GDP fell 3.4 percentage points to 36.5%. The share of agriculture in GDP declined further from 4.8% in 1990 to 2.5% in 2000. Manufacturing, a key beneficiary of Government assistance under the Financial Assistance Policy of 1982, virtually stagnated whilst the services sector – business services, banking, insurance and retail and leisure/tourism - asserted its position as the economy's best performer in the future.

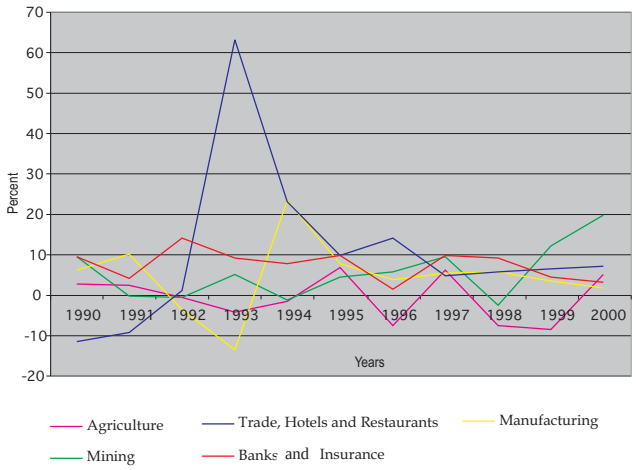
Figure 2.1: The Structure of the Economy



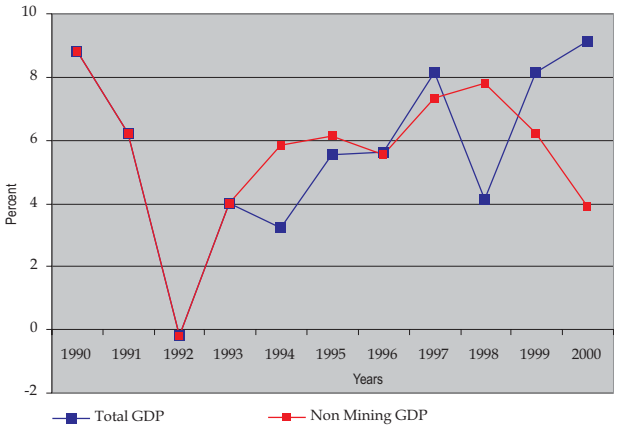
Source: Based on Data from Annual Economic Report. 2002

Fig 2.2: Annual Growth performance (%) - 1990-2000

(a) Selected Sectors



(b) GDP



Source: Data from The Botswana Government Annual Economic Report. 2002.

On the basis of sectoral GDP shares, diversification has progressed at a somewhat sluggish pace but this conclusion undervalues the rapid expansion of the financial services and the trade, hotels and restaurants sectors and the momentum they give to the non mineral economy, which, as Figure 2.2(a) shows, have outperformed mining in the 1990s. Besides, with the exception of agriculture, every sector posted decent growth for more than two decades.

A view of diversification based on trends in sectoral GDP shares neglects an important though often under-emphasised aspect of diversification in Botswana, viz., the emergence of fairly potent growth poles across the country. Maun and Kasane in the North are high performance tourist hubs around which vibrant local service economies – retail, building and construction, metal works, garments, food processing etc. - are being built. Other villages, notably Gantsi in the Western region; Letlhakane, Mahalapye, Tutume, Serowe, Palapye and Bobonong in the Central District; and Molepolole and Kanye in the Southern Region have become increasingly viable markets for light industrial, service and commercial artisan based activities.

The emergence of new growth poles could herald the resurgence of agriculture and the rural economy, as they not only become viable regional markets but also serve as input supply points for local producers. But it is still critical to ask the question: could mining have played a bigger role in the development of the economy than it has to date? Probably. The relatively weak linkages with the rest of the economy could perhaps have been stronger had the mining sector and the Government proactively sought to support the creation of local supply capacity for the industry.

DEBSWANA has in fact started on the route of deliberate use of procurement resources to develop backward linkages with the rest of the economy and to support the development of the local SMME sector. One aspect of its approach is investment in the development of agriculture, small business development and tourism. In agriculture, the DEBSWANA approach is based on the application of new knowledge and technology to raise arable farm productivity and viability. Young farmers are being sent to Australia for advanced training to become agricultural entrepreneurs. Locally, both small and large farmers are being introduced to better crop husbandry techniques. The second aspect of the DEBSWANA approach is the affirmative use of procurement resources in favour of local firms. This could of course be taken further to include technical support for firms that supply the mining industry.

The Government has a broadly similar approach in the form of the Reservation Policy and the Local Procurement Programme. It does not, however, use large procurement contracts to support the creation of local supply capacity or to facilitate technological diffusion. Perhaps Botswana should look carefully at the controversial but potentially effective strategy of counter-trade and offset transactions designed to build local supply capacity and diffuse technology. Under such an arrangement, large foreign suppliers will be required to invest a proportion of the value of the contract amount in the local economy in one or several of a number of options that may be prescribed by law. The options include sourcing some inputs locally, investing in the manufacture of some components, creating local capacity to maintain the investment or making a productive investment in an unrelated activity. The Government should consider adopting a similar strategy in the development of ICT skills.

Some of the Critical Weaknesses in Botswana's Development

Botswana's rapid economic and human development has not been perfect. Apart from a slow pace of diversification five other problems, all related to the structure of the economy have dogged Botswana's development. These are, in no particular order, inequality, unemployment, poverty, excessive dependence on the state, and a slow pace of citizen economic empowerment. Technology, or more precisely the technology gap, has had a significant influence on these.

Problems of Inequality Persist

Botswana has always had an unequal society. Ownership of the main resource in pre-mining Botswana, cattle, has always been highly concentrated. Among traditional farming households, 47% have no cattle and 24% have between one and eleven. At the other extreme, the wealthiest 2.5% of farming households own 40% of the national herd. In addition, there is a gender dimension to the inequality in cattle ownership that is rooted firmly in a tradition and culture that ascribes ownership and control of livestock and related assets – farms, boreholes etc. - to men. Approximately 66% of all female farmers have no cattle compared to 33% for male farmers. The average herd size for women farmers is six compared to twenty for men[3].

The modern mineral economy has not produced equitable economic development either. Even as it changed the structure of the economy profoundly, mining created new divides. It disproportionately benefited those employed in mining, government and relatively skilled and technology intensive sectors. It has also intensified rural-urban income differentials. According to the 1993/94 Household Income and Expenditure Survey (HIES), the poorest 40% of the population received 12% of national income in 1993/94. The next 40% received 29% whilst the richest 20% received 59%[4]. Botswana's GINI coefficient, estimated at 0.54 in 1993/94, represents a marginal improvement from 0.56 in 1985/86. Inequality has an urban dimension as well. In 1993/94, Rural Botswana had a GINI coefficient of 0.41 compared to 0.45 in urban villages and 0.54 in urban areas[5].

Employment and Unemployment

Botswana's spectacular growth performance in the first three decades after independence did not translate well in terms of employment creation. Whereas real GDP grew by 45% between 1991 and 1999, formal sector employment increased by only 13% from 222 800 people in 1991 to 255 607 in 1999. This represents an average annual increase of 1.6% compared to 5% for GDP, or a poor growth to employment conversion rate of 3.1 percentage points of GDP growth to one percentage point increase in employment. However, between 1997 and 2001, formal sector employment grew at the rate of 4.9% per annum, before declining to 1.8% between 1999 and 2002. Thus, unemployment and poverty are serious problems for Botswana despite decent rates of economic growth. More than one in six job seekers could not find a job in 2000. Table 1.4 below gives a breakdown of the structure of the economically active population in 2001.

Table 2.1 provides anecdotal evidence of some interesting labour market trends and policy implications. Wage employment and self-employment have both grown in importance, each rising by three percentage points to 66% and 10% respectively. In the case of self-employment, this is a significant leap (42%), albeit from a small base (7%), and an indication that policy and programme emphasis on promoting self-employment may not be a misplaced bet. Second, labour is leaving the agricultural sector. Whereas 15% of the economically

3 United Nations Development Programme. 1998. Botswana Human Development Report 1997, Gaborone
4 Central Statistics Office. 1995
5 United Nations Development Programme. 1998. Botswana Human Development Report 1997, Gaborone

Table 2.1:
Breakdown of the Economically Active Population in 1991 and 2001 (%).

	1999	2001
Salaried/Waged	63	66
Self Employed	6	10
Family Business	2	1
Lands and Cattle Post	15	3
Seeking Work	14	20
TOTAL	**100**	**100**

active population was associated with lands and cattle posts in 1991, the figure had dwindled to 3% in 2001. This has significant implications for the future of agriculture.

One likely, and perhaps inevitable, scenario is the emergence of bigger and technology intensive farm holdings, leading to increasing concentration ratios in the sector. The 2002 National Master Plan for Arable Agriculture and Dairy Development (NAMPAADD) will facilitate movement in this direction. Another likely scenario, closely related to the former and also likely to be aided by NAMPAADD, is increased utilisation of labour saving technology in agriculture. Both trends, if they play out, will further squeeze poor people out of agriculture and out of land ownership and control unless mechanisms for creating large farm production units can be found without driving small-holder farmers out of their land.

Although growth in formal sector employment has been sluggish, informal sector employment has generally been buoyant precisely because of strong informal sector employment growth. Employment grew at an annual rate of 8% between 1996 and 2000[6]. Over the same period, the rate of unemployment fell from 21.5% to 15.8%.

Botswana's unemployment problem is a diversification problem. Mining contributes less than five percent of formal sector employment even though its contribution to GDP amounts to nearly 40%. The Government sector accounted for 38% of formal sector employment in 2002. There is therefore an urgent need to generate growth in high job content sectors other than government and hence the Government's heavy emphasis on diversification as an objective.

Poverty

The relatively low impact of economic growth on poverty is also straining Botwana's development. Most countries with per capita GDP comparable to Botswana's, e.g. Tunisia and Algeria, have income poverty rates of less than 10%. Yet, for Botswana, nearly half the population subsists below the poverty line. This surmise is based on Botswana Institute of Development Poicy Analysis (BIDPA), 1997 analysis of the 1985/86 and 1993/94 Household Income and Expenditure Surveys. These surveys suggest that the incidence of poverty declined by only 12 percentage points from 59% to 47% between 1985/86 and 1993/94. But these measures do not account adequately for public provisioning for basic needs – education, health, sanitation etc. and so underestimate the degree of success in poverty reduction from a basic needs perspective. It is precisely because of public provisioning for basic needs that Botswana's indicators of wellbeing improved markedly between 1966 and 1996.

Consensus has emerged that Botswana's problems of poverty and unemployment are ultimately structural. Some of the frequently citied factors are that:

- Outside mining, Botswana's resource endowment is actually very poor. In particular, the climate and the soils are not well suited to the low-tech small-scale arable farming of the type Batswana are used to and people, as a resource, are too few;
- The market is, at 1.7 million people, too small to support employment creation on the scale required to make rapid progress against poverty and unemployment. It limits the nature and size of firms setting up in Botswana and so influences Forign Direct Investment (FDI) inflows, technology transfer and growth;
- Botswana is landlocked, which creates high export and import costs because road haulage and air transport are considerably more expensive than shipping and;
- The size of the country and sparse distribution of the population make service provision to this fragmented market costly and difficult.

Technology is a necessary input towards overcoming some of these structural barriers. Agriculture requires hardier seeds and crop husbandry techniques suited to Botswana's harsh soil and climatic conditions. Export growth requires significant gains in productivity and competitiveness. Building a credible S&T capability is an absolute necessity. Among the eight listed issues from the analysis of responses by a group of stakeholders to the question "what causes poverty in Botswana?" were the lack of access to technology, skills and information.

The battle against poverty will be made somewhat more difficult by the toll HIV/AIDS takes on the population's health and the viability of the country's institutions, especially public institutions. Indications are that HIV/AIDS could very easily generate governance failures of catastrophic proportions. Though less dramatic than over crowded hospitals and a high incidence of death, failing education and stunted emotional and intellectual development of children will count amongst the greatest tragedies of this epidemic.

The Trap of State Provision

An unintended but inevitable outcome of the Government's strategies for expanding access to essential services, expanding opportunities for investment and employment, and ensuring minimum welfare for poor people is an unhealthy dependence on the state. State provision has become a trap. Thus, in a 2002 review of anti poverty initiatives in Botswana, stakeholders are reported as having cited "welfare policies that promote a culture of dependency" among the causes of poverty in Botswana. In the specific cases of drought relief and Accelerated Rain-fed Arable Development Programme (ARAP)[7], the Report observes:

Whilst poor people were unanimous in their view of drought relief as a useful programme, many of the relatively well-off respondents, including civil servants, expressed concern about the extent to which the programme distorted incentives and choices (e.g. drought relief vis-à-vis arable farming) and engendered a culture of inefficiency thus policy may not only fail to reduce poverty but may in fact exacerbate or cause.

6 Ministry of Finance and Development Planning. 2003. National Development Plan 9, 2003-2009, Gaborone
7 Accelerated rainfed agricultural program

Box 2.1: Botswana's Broad Strategy Against Poverty

Poverty and unemployment have been subjects of considerable policy attention and resource commitment since the early 1980s. They are, quite naturally, key objectives of Vision 2016, which sets ambitious targets for poverty reduction and employment creation - halving the proportion of Batswana living below the poverty line by the year 2006, reducing it to zero by the year 2016, and securing full employment. In 2000/01, the Government undertook a review of the Rural Development Policy of 1973, which it followed in 2002/03 with the development of a National Strategy for Poverty Reduction (NSPR). The Government's approach to poverty reduction has always encompassed three complementary elements, viz.:

a) Aggressive investment in human capital formation: This is essentially the Government's basic empowerment strategy. It entails public investment in building essential capabilities such as knowledge, skills and health to enhance human agency and empower people to earn a living. The main interventions are universal access to education, training and health, universal provisioning for basic needs thorough public and private means and extension services for small, medium and micro entrepreneurs, including farmers.

b) Infrastructure development: Infrastructure development may be seen as part of the broader strategy to expand local productive capacity by linking producers to markets and sources of inputs and creating locational incentives for investors in order to create jobs.
c) Employment creation: Interventions in this area seek to address the underlying structural causes of poverty: a narrow economic base, lack of access to formal sector employment and the low economic potential of agriculture given local technological and environmental constraints. These measures seek to diversify the economy towards sectors with high labour absorption capacities. To this end, they create opportunity for people to create employment for themselves and others. The most prominent of these are run under the Industrial Development Policy and the SMME Policy. They include the now defunct Financial Assistance Policy (FAP) and its successor, the Citizen Entrepreneurial Development Agency (CEDA). Agriculture specific initiatives, e.g. the Accelerated Rain-fed arable programme (ALDEP) have also been employed. These programmes typically provide subsidies to investors.

d) Social safety nets: These measures are intended to address chronic poverty resulting from social disadvantage or adverse circumstances resulting from shocks such as drought, other natural disasters, disease, and infirmity. The programmes include systematic government support for the destitute, the aged, orphans and people with disabilities. They also include direct food transfers to vulnerable groups such as pregnant women, nursing mothers and school children. Drought relief, a measure intended to help people cope with temporary poverty induced by drought, falls within this category.

The malaise of dependency also afflicts the well-off and investors. For instance, the debate on cost sharing and cost recovery in the provision of public services, suggests widespread and stoic resistance. In the business community, lobbying for generous subsidy support diverts government attention from more serious constraints on entrepreneurship development, for instance, skill and technology deficiencies. FAP[8] floundered for these reasons and there are indications that CEDA[9] may experience similar problems. These lessons, still unlearned after more than two decades of undue policy and programme emphasis on finance as a constraint to enterprise development, are the gateway to reform of the business development services support regime.

8 Financial Assistance Policy (that offered grants and loans to would be investors)
9 Citizen Entrepreneural Development Agency (the successor agency to Financial Assistance Policy that offers loans below market interest rates)

Citizen Economic Empowerment

Although citizen economic empowerment is often equated to citizen enrichment, which it can very easily amount to if mismanaged, it is in reality a call for inclusive development. Addressing the 1999 Citizen Economic Empowerment Conference, President Festus Mogae observed that citizen concern about economic empowerment is fundamentally about citizens. He says that " ... our success in economic development must be mirrored in full and active participation of all citizens in the mainstream of our economic life. This demand … is legitimate and it must, as such, be espoused vigorously without fear or apology"[10].
Contrary to the impression created by the citizen economic

There is a need for citizen economic empowerment

empowerment lobby, Botswana has never paid lip service to citizen economic empowerment. Its policy and programme arsenal towards citizen economic empowerment includes subsidised credit through the National Development Bank, FAP , CEDA and similar programmes; reservation of certain economic activities for Batswana entrepreneurs; farm subsidies; and business development support services from partial incubator services to entrepreneurship training. The intensification of the lobby may thus reflect unsatisfactory performance by these programmes.

Unless citizens participate meaningfully in the economy, the economy may in the long run be crippled by political instability emanating from citizen resentment of foreign domination of the economy. Thus, the liberal policies that Botswana has put in place to encourage FDI may require counterbalancing through measures that ensure significant citizen ownership of the economy. If this is a priority, as indeed it is, the Government, think tanks and organisations such as the Botswana Confederation of Commerce, Industry and Manpower (BOCCIM), should develop mechanisms for systematic monitoring and appraisal of progress towards citizen economic empowerment. Thus the country is challenged both to improve the capacity of citizens to participate in the economy, but also to stop the potential brain drain that might follow once individuals have saleable skills to the global world.

Three of the Emerging Priority Development Challenges

The HIV/AIDS epidemic, globalisation and the threat of digital exclusion have emerged as three of the most critical development challenges Botswana must deal with decisively in order to realise sustainable development in the 21st century. Perhaps land and inequality would qualify as a fourth issue because the commoditisation of land and the inefficient mediation of land transactions by the unregulated market has

10 Ministry of Finance and Development Planning. 2000 Report of the National Conference on Citizen Economic Empowerment

unleashed a powerful wave of disempowerment that may evolve into political and racial instability in the foreseeable future.

Health: Two Decades of Accomplishments Under Threat

From the health perspective, Botswana should have declared "Mission Accomplished" on 31st December 2000 because that date would have marked the successful conclusion of a purposeful crusade for universal access to health by 2000. The "Health for All" crusade was about putting a quality minimum basic health services package within physical and economic reach for every Motswana and the development of capacity within the health system and within individuals and households (through information) to accord all a decent opportunity for a life of "…optimum duration and quality"[11]. Even if the necessary infrastructure and drugs had been put in place, the accomplishment would have rung hollow given the devastating toll the HIV/AIDS epidemic had taken on health sector outcomes and capability. HIV/AIDS is the single most urgent human development concern in Botswana. Botswana is now enduring what must be the worst stage of the epidemic. Poor physical health and death are sapping energy out of households, communities and the entire nation. It's a brutal crisis because it has laid to waste what should no doubt be one of Botswana's greatest achievements; providing universal good basic health care for all.

Until the mid 1990s, when the HIV/AIDS epidemic became visible, Botswana was on course to achieve "Health for All by 2000". That "Health for All" was never about the absence of disease and infirmity should be emphasised. HIV/AIDS took the appeal out of "Health for All by 2000". It was a shock to society and to the health system. It is worth noting that the National Health Policy of 1995 does not explicitly mention HIV/AIDS. In the face of high morbidity and mortality levels, "Health for All by 2000" suddenly sounded hollow because neither the Government nor society were prepared to deal with a shock of the magnitude of Botswana's HIV/AIDS epidemic.

In 1968, Botswana had 141 health facilities of any kind. By 1998 it had built 1324 health facilities, including 30 hospitals, 222 clinics, 330 health posts and 740 mobile stops. In 1968, there was only one Doctor per 26, 315 population. By 1996, this ratio had improved to one Doctor per 3,850 population. Botswana had simply put enough money into the development of health infrastructure and personnel to radically transform the capacity of its health system. And there were tangible rewards in health outcomes in the pre-HIV/AIDS era: - By 1998, 88% of the population lived within 8km of a health facility and trained health personnel attended to 99% of births. Through expanded immunisation, the country has virtually eradicated neonatal tetanus, measles and polio by 2000[12].

In general, health indicators rose spectacularly from very low levels at independence, suggesting high productivity gains for the health sector. For instance, the infant mortality rate fell from 108 deaths per thousand live births in 1966 to 38.1 in 1999, whilst life expectancy increased by twenty years from 47 in 1966 to 67 in 1999. With the proportion of outpatients treated for tuberculosis (TB) declining from 4.5% in 1983 to about 0.7% in 1989, Botswana was firmly on course to eradicating tuberculosis.

Sadly, these and other achievements are being rapidly obliterated by an HIV/AIDS epidemic of crisis proportions. Tuberculosis, a killer opportunistic infection that thrives on compromised immunity is on the rise. So are infant and child mortality rates. The incidence of malnutrition is also increasing. Life expectancy at birth has fallen from a peak of 67 years in 1999 to 56 years in 2001.

The returns from sustained investment in developing service delivery capacity across sectors are now being eroded because the direct victims of HIV/AIDS are primarily men and women aged 15-49, in essence the work force. In health, education, agriculture, the military, commerce, industry etc., delivery capacity is shrinking and with it both the supply and quality of public services. The health sector was the first to show signs of stress because the epidemic not only destroys its capacity to deliver but also creates incremental demand for health services.

HIV also puts people out of work, deprives the aged and children of breadwinners. The orphan population in Botswana is estimated at 67, 000 and has already surpassed the capacity of traditional mechanisms for coping with orphanhood. Apart from being dependent on the state and relatives, orphans are an exceptionally vulnerable group because few of them have a decent chance at a normal childhood. Many, especially girls, have had to sacrifice their own childhood and assume parental responsibilities and their attendant dangers prematurely. This has often meant early exit from school, early involvement in sex, often for material reasons and outright commercial sex work to meet basic needs.

The epidemic also erodes the productivity of labour and the competitiveness of Botswana as a country. HIV/AIDS prevalence is a variable with a negative influence in decisions to invest in Botswana because of its impact on labour costs and export competitiveness.

By 1998, 88% of the population lived within 8km of a health facility

Globalisation and the threat of Digital Exclusion

Poor people and poor countries are simply being bypassed by the benefits of the current phase of globalisation thanks to iniquitous global trade, investment and intellectual property regimes. Given the preferential market access terms it enjoys for its main non-mineral exports under the EU-ACP (Cotonou) Agreement and Africa Growth and Opportunity Act (AGOA), Botswana may in the short term not suffer as much as other developing countries from the relative lack of progress towards a development friendly global trade and investment dispensation. Even so, it is in the interest of Botswana for a secure and equitable trade and investment architecture to emerge particularly since the special access terms and preferential terms are not guaranteed far into the future. Thus whilst globalisation can be a force for good, through its potential to generate wealth and improve living standards, it is not doing that very well at the moment particularly for developing

11 Ministry of Finance and Development Planning. 1997. National Development Plan 8, 1997-2003, Government Printer

12 Ministry of Finance and Development Planning. 2003. National Development Plan 9, 2003 - 2009, Government Printer

economies.

At the apex of the problems is unfair distribution of benefits from increased trade, investment, and technological innovation. Evidence exists that shows globalisation as practiced is increasing the gap between rich and poor, perhaps due to the act that the policies that drive the globalisation process are largely focussed on the needs of business. The relentless drive to liberalise trade (to remove trade barriers, promote privatisation, and reduce regulation (including in some instances, legal protection for workers)), has had a negative impact on the lives of millions of people around the world. In addition, many of the poorer countries have been pressured to orientate their economies towards producing exports and to reduce already inadequate spending on public services such as health and education so that they can repay their foreign debt. Whilst Botswana is safe for now from the burden of foreign debts, it has escaped the other pressures of trade liberalisation. The assumed inevitability of globalisation as a technologically driven process that all must adapt to in order to survive and prosper, has resulted in millions of workers living with greater job insecurity.

The impact of globalisation on men and women is often different. Women, particularly those in developing countries, suffer disproportionately when public services are cut back particularly following some of the privatisations as part of the liberalisation process. This is because they have primary responsibility for caring for children and other family members. While the expansion of international trade has generated employment opportunities for women in certain circumstances, trade policies have often served to entrench the traditionally inferior role assigned to women in many countries. Occupational segregation, pay inequality, and unequal access to resources are but a few of the discriminatory measures that women face. The rise of Export Processing zones where large numbers of young women labour in poor and dangerous conditions to produce cheap consumer goods, and the expansion of outsourcing and home-based employment have also raised new issues and concerns for women workers.

Thus Botswana as part of the global society must fight for and find better ways to manage and structure globalisation so that it supports fundamental human rights and sustainable development, and generates prosperity for ordinary people, particularly the poorest. Left unchecked, globalisation could lead to their further marginalisation and impoverishment, thus totally negating the huge development potential that technological developments, especially in the ICT sector, offers.

Environmental Sustainability

The supply of nature's resources is finite. Thus for development to be sustained, all – current and future generations - must have their fair share of nature's scarce resources. In Botswana, rangeland degradation, depletion of underground water resources, loss of biodiversity and climate change suggest that the management of natural resources is yet to strike an equitable balance within and across generations. Some examples of the challenges include the following:

Land degradation: The main environmental issue related to land in Botswana is the degradation of rangeland, defined as "all processes which cause bush encroachment, soil erosion and ultimately result in desertification". About 60% of Botswana's land area consists of rangeland, supporting cattle, goats, other livestock, and – in many places – wildlife as well. Archaeological evidence indicates that cattle have been reared in eastern Botswana for over 1,500 years. For many people – including many urban dwellers –cattle are an important form of holding wealth.

Since independence, cattle and goat numbers in Botswana have increased considerably fast. Between 1966 and 1982, cattle numbers rose from 1.2 million to almost three million. By 1999, drought and disease had reduced their numbers to 2.4 million. In communal areas, where nearly 85% of Botswana's cattle graze, overstocking has caused extensive overgrazing and rangeland degradation, including soil erosion and bush encroachment. Overstocking is of course not the only cause of soil erosion in Botswana. Climate change, inappropriate crop husbandry techniques, veld fires and land denudation through logging, wood harvesting and human settlement also contribute.

Depletion of water resources: That 97% of Botswana's population has access to safe drinking water within a maximum distance of 2.5 kilometers from their homes is remarkable given that water is a very scarce resource in Botswana. But Botswana's water resources are under stress and are being depleted.

There are currently over 18,000 registered boreholes, equipped with diesel pumps, which have been drilled into aquifers all over the country. These supply two-thirds of the water consumed by Botswana, which in 2000 was estimated at 194 billion cubic litres annually. Some 80% of the population, the mining industry, as well as most of the country's livestock, are dependent on underground 'well fields', tapped by boreholes. Just over half the registered boreholes in the country are owned by government, and the remainder by private individuals.

The depletion of Botswana's water resources is a function of low and unpredictable rainfall (average rainfall ranges from a high of 650mm per annum in the North East to only 250mm per annum in the South West), contamination of underground and surface water resources, growing pressure from a rapidly increasing urban population, industrial expansion and livestock consumption.

Forest and veld products: About 95% of Botswana is normally covered by vegetation, mostly by mixed tree and grass savannah, with only a small amount of forest. Botswana has 2,600 – 2,800 different plant species, including 17 endemic species. These plants directly sustain human life and provide habitats for many species of wildlife. Moreover, they make a major contribution to water and soil conservation, preserving fragile ecosystems, and maintaining biodiversity. The GoB recognizes over 150 different species of wild plants - vegetables, melons, tubers, herbs, fruits, nuts, grasses - and an equal number of insects.

Forrest and veldt resources are however being depleted rapidly through unsustainable human consumption, e.g. wood for cooking, heating and lighting. Though declining in importance, wood is a dominant source of energy for cooking, heating and lighting in urban and rural areas. It has a host of other critical uses e.g. construction, fencing, furniture and other household goods.

The main factors behind the depletion of woodlands and veld products in many parts of Botswana are population pressure, arable agriculture, privatisation of communal land, competition from livestock and commercial activities

Wildlife: Botswana has a rich stock of more wild animals: 164 species of mammals, over 500 species of birds, 157 species of reptiles, 38 species of amphibians and 80 species of fish. The country runs the risk of losing many of these species because of appropriation of their natural habitat for alternative use, drought, poaching and over population.

Pollution, waste and sanitation: The rapid urbanisation of Botswana

during the past two decades has resulted in increased pollution of water, air and soil. Only 38% of the 250,000 tons of household waste produced in Botswana annually are actually delivered to disposal sites.2 In the larger villages, 60% of residents have their refuse collected by the local authority compared to only 70% in rural villages. In rural areas, cattle posts and lands, there is no such service.

In the copper-nickel mining town of Selebi-Phikwe, air pollution is caused by sulphur dioxide emissions from the smelter chimneys and the evaporation of waste liquids from the mine dump. The coal-fed power station at Morupule and the tanneries at Pilane have also been identified as causes of air pollution. Veld fires, windstorms, smoke from wood-burning cooking fires, and the uncontrolled burning of waste at dump sites also contribute to atmospheric pollution. With rapidly rising numbers of cars on the road in Gaborone, the possibility of air pollution from exhaust fumes also needs to be studied.

Climate change: Botswana's climate is strongly influenced by global weather phenomena. The El Nino Southern Oscillation, for example, has a decisive influence on rainfall.

Africa's global greenhouse gas emissions contributions are fairly small, contributing only between 5% and 7% of the global total. Botswana in turn contributes only 0.04% of the global total[13]. Moreover, Botswana's Carbon Dioxide (CO2) emissions are more than balanced by the CO2 uptake of the country's woodlands, making the country a net 'sink' for atmospheric CO2.

13 Based on data from C. J. Matale. 1995. Botswana Dept. of Mines and World Resources 1994-95, A Guide to he Global Environment. World Resources Institute.

Chapter 3

Human Development and Science & Technology: A Two Way Street

We cannot survive the ruthless competitive world of today without harvesting science and technology. Only science led development will give us a chance to become serious players in the international market place

- Quett Masire, President of Botswana, 1995

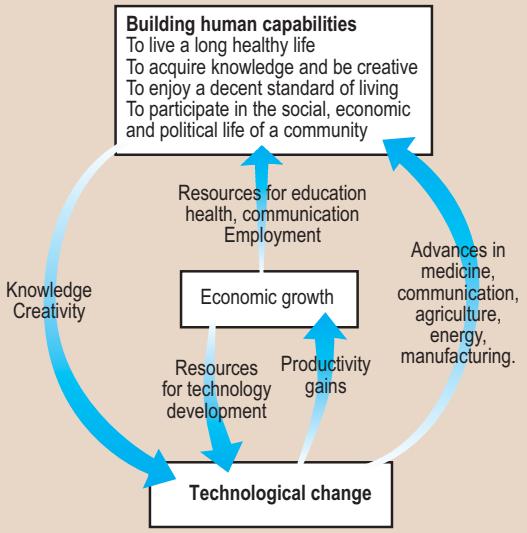
A Complex Relationship

Science, technology and human development share a close, though often complex, relationship. Progress in S&T has supported human development for as long as humankind has existed. Yet, many of mankind's problems are traceable to technology. The incredible power of death and destruction - nuclear, biological and chemical weapons – that man now yields is a result of progress in S&T. And so is the extensive damage to environmental resources through pollution and unsustainable exploitation, for instance through overgrazing, excessive sand mining and annexation of more virgin land for arable use. Overall though, progress in S&T aids development.

Science and Technology: A Key Factor Behind Progress in Human Development

Advances in S&T have driven progress in human development in industrialised countries. In the emerging Asian economies, rapid technological diffusion and to a lesser extent innovation, are playing a critical role in human development, introducing new products and services, raising product competitiveness, creating new job opportunities, expanding markets and accelerating growth. When progress in S&T serves human development purposes, it does so in two interrelated ways, as shown in Figure 3.1.

Figure 3.1: Links between technology and human development



Source: United Nations Development Programme. 2001. Human Development Report 2001. Making new technologies work for human development, NY

First, by directly strengthening essential human capabilities, for instance good health, literacy, knowledge and skills, technology extends the frontiers of human achievement and human wellbeing. New products and services, new industries and new employment opportunities are created. Second, through its impact on productivity and economic growth, technology raises the efficiency with which human beings do things and extends their achievement possibilities over time. By raising productivity and incomes, it provides opportunities for human beings to meet higher wants such as leisure and to do research, experiment and discover more knowledge.

Technology, and in particular ICTs can also facilitate popular participation and promote accountability and transparency in public decision-making. It can also facilitate the delivery of essential services. For instance, e-learning, e-governance and e-commerce are emerging ICT based phenomena in service delivery and doing business in an information economy. In chapters four and five, we discuss the extent to which this potential has been realised in Botswana and propose an agenda towards an information society for Botswana. The rationale for the pursuit of an information society is simple: Technology drives the development process and ICTs are the latest in a series of breakthrough technologies that perpetuate the development gap.

In the World Development Report 2001, the World Bank emphasizes three defining attributes of the human development process – the creation of opportunity for people to earn a decent living; the empowerment of people and communities to function as viable agents for their own development; and the creation of an environment of security through the reduction of risk and vulnerability, for instance through prevention and impact mitigation measures for natural disasters. Technology has served all three functions well in the developed world and has the potential to deliver development for poor people and poor countries and help the world achieve the MDGs. The green revolution raised farm productivity and incomes in Europe, enabled farming communities to market their produce and enhanced household and national food and income security.

The telephone, the telegraph, the fax, and the steam engine before them, expanded development benefits to human kind in all three dimensions, as do modern ICTs today. Each of these developments brought down communication costs, reduced the space between buyer and seller, and created new opportunities for investment, trade, growth and development. Today's information technology revolution is a central feature of the globalisation process, and a potent source of economic growth, income, wealth and development (See Box 3.1). It is also an agent for exclusionary development.

Botswana's development needs do not require exclusively new technologies. Like the rest of the developing world, most of Botswana's

development needs require access to simple and existing technologies by poor people and poor countries so that they may raise their productivity, access new markets and raise their incomes. Poor farmers need seed and fertilizer technologies that raise farm yields with less water and less damage to the soil and the ecosystem. They need low cost farm implements that save labour and preserve soil moisture. Weavers and tailors need faster and more precise machines and better fabrics. Health systems require disease prevention and curative technologies - inexpensive drugs and condoms - to overcome many of the preventable diseases of poverty: HIV/AIDS, malaria, tuberculosis, polio etc.

Many of these technologies exist but access to them is constrained (a) by patents that build exorbitant monopoly rents into the prices of otherwise inexpensive technologies, (b) state failure in developing countries for reasons of lack of fiscal capacity and bad governance, (c) the low research and innovation effort committed to solving the particular problems of poor countries and (d) the failure of developed nations to fulfil their long standing commitments to meet the development resource gaps in developing countries (only a few members of the Organisation for Economic Cooperation and Development (OECD) honour their commitment to spend 0.7% of their GDP on Official Development Assistance (ODA)). Therefore the challenge in the technological development process is to build diffusion capacities for innovations in the developing world.

One mode through which development benefits expanded to human kind

Box 3.1:

The Development Promise of a Special Class of Technologies

According to a recent study on the impact of ICTs on the global economy:

- The worldwide ICT industry is worth more than $1 trillion and is expected to grow to more than $1.5 trillion by 2006. Spending on services and software will grow twice as fast as spending on hardware.
- ICT-related employment between 1995 and 2001 grew at an annual rate of seven percent, 50% faster than the average rate of employment growth in developed countries.
- Tax revenues from ICT-related activities registered a 40% increase between 1995 and 2001 and should grow another 40% by 2005.
- Asia is expected to lead in IT spending with China projected to grow the fastest at an annual growth rate of 27% to 2005.
- The value of the e-commerce marketplace is estimated at several hundreds of billions of USD. The share of GDP composed of electronic trade - mostly distribution, finance and business services - is around 30%.
- ICTs and personal computers (PCs), high speed networks and the Internet, drive this technology-facilitated trillion dollar global economy
- The internet is a technology that combines many of the most recent inventions and developments into an increasingly pervasive, open and user-friendly platform for near instantaneous access to and sharing of local and global communications, markets and resources. The internet is quickly becoming the most important platform for enabling business of all types to take place.

Human Development: A Key Factor in Both Innovation and Technological Diffusion

The relationship between human development on the one hand and S&T on the other is not unidirectional. True, progress in S&T facilitates human development but so does human development facilitate progress in S&T. The two are mutually reinforcing phenomena. Each is both an input for and an output of the other.

The relationship between human development on the one hand and technology on the other, may best be understood within the framework used by Jeffrey Sachs,[1] who identifies three groups of countries on the basis of their role in the creation, diffusion and utilisation of S&T. The first group comprises countries where technological innovation takes place on a significant scale.

They hold patents on new products and technologies that are sold both domestically and externally and give them a competitive edge in a significant range of activities. These countries are found mainly in North America and Western Europe. In this instance, technology aids development not only by creating comparative advantage but also by creating high value economic rents that are protected by patents.

1 Jeffrey Sachs, economic advisor to Kofi Annan, the Secretary General of the United Nations

The second group of countries comprises "technological diffusers," countries that adopt, adapt and use new technologies developed in the first group of countries within 5-20 years. They include China and India, much of Latin America, and some parts of Eastern Europe. Whilst these countries are not leaders in innovation themselves, they have the capacity to import and use technologies from the innovating countries to build their own competitiveness. They typically realise significant development gains from new technologies. China is on course to meet the MDG target of halving poverty by 2016 in a decade, thanks to a technology inspired productivity revolution in agriculture and manufacturing.

Human development and S&T facilitate each other

The third group comprises countries in which neither innovation nor diffusion takes place on any significant scale. This group is being marginalized from the knowledge economy. The rate and extent of technological diffusion e.g. computers per capita is too low in these countries for them to raise their competitiveness in the global economy. Thus they find themselves on the wrong side of the digital divide and are unable to capitalise on new technologies before they become obsolete. These countries include most of Sub-Saharan Africa and South Central Asia.

A number of factors explain the disparities in both innovation and technological diffusion across nations, but they all point to one thing: a country's state of development is central to its capacity to create, diffuse and use technology. These factors include:

- The quality of physical and institutional infrastructure e.g. telecommunications, electricity and knowledge creation institutions such as research institutes, universities, polytechnics and colleges;
- The state of education in terms of content and the educational attainment of the citizenry;
- The size and maturity of the market, in terms of incomes and systems of governance[2] and;
- Integration into the world economy through trade and investment.

The state of development facilitates the creation and/or diffusion of technology because of four key attributes of the processes of technological innovation and diffusion:

1. **Economies of Scale:** Knowledge creation is an "Increasing Returns to Scale process because it requires that large volumes of resources be committed to research infrastructure, equipment and the salaries and incentives of scarce and expensive research specialists. Firms in developed countries often have sufficiently large markets, domestic and foreign, to support such investments. The firms that lead the innovation process are typically large multinational corporations or state supported institutions.

2. **Public Sector Support:** Progress in S&T depends significantly on the public sector as a user, a producer, and a facilitator of the production, of scientific knowledge and technology. Whilst developed countries can afford to spend billions of dollars annually supporting cutting edge private and public research, and have the requisite physical and institutional infrastructure, poor countries spend too little, their research institutions are too few and poorly resourced, and their infrastructure is weak.

3. **Human development:** Innovation and technological diffusion require high levels of literacy, good quality higher education and adequate incomes: in other words high human development. Thus, the limited penetration of modern technology in Sub-Saharan Africa is primarily accounted for by low human development. People are either not sufficiently literate to use the technologies that come their way, e.g. the computer and the Internet, too poor to buy them and more often than not, both.

4. **Foreign Direct Investment:** Innovation and technological diffusion are functions of FDI. Trends in technological diffusion closely follow FDI trends. China, Singapore, Malaysia, South Africa and other technological diffusers are also host to billions of dollars' worth of FDI, which serves as a medium for the transfer of knowledge and skills.

Progress in S&T is important not as an end in itself but rather as a vehicle for further human development. In turn, human development facilitates progress in S&T. Quality infrastructure, a quality human resource base, a quality education system, quality incomes and quality public support for research and development through a strong and competitive business sector facilitate further innovation.

Botswana meets the main requirements for developing a strong science and technology capability. Fiscally, it is strong. It can finance at least some of the requisite initiatives. Its communications infrastructure is good, literacy levels are high and improving, the education sector is well resourced and private incomes are of the order of upper middle income countries. Furthermore, Botswana has a strong market oriented economy. It is remarkable that despite being a small economy, Botswana ranks second in Africa in terms of economic freedom, and alongside mature economies such as Japan, Norway, Sweden, South Korea and Taiwan. The country is favourably disposed to foreign trade and investment. These attributes are not, by themselves, sufficient to turn Botswana into a competent technological diffuser, let alone a leader in innovation. A deliberate strategy, purposely pursued to exploit these conditions is required to create a national S&T capability.

2 Governance in this instance refers to the statues, regulations, and institutions that facilitate and regulate the exchange of goods and services as well as the conduct of players - sellers, investors and government – in the market and define and protect their roles and rights.

Building a Science and Technology Capability

Botswana has a number of institutions tasked with researching, developing and/or adapting technologies for application in Botswana. These institutions are central to Botswana's quest for a meaningful S&T capability. In this regard, four questions require answers as Botswana gears up for the creation of a national S&T capability.

Botswana Technology Centre (BOTEC) one of the key research institutes

- Are Botswana's research and development institutions delivering value in terms of generating viable and accessible knowledge relevant to the needs of the economy?
- Is Botswana doing enough to keep abreast of developments that form the basis for establishing and maintaining comparative and competitive advantages in a knowledge driven global economy?
- What examples can Botswana draw inspiration from in her quest to meet the challenges of rapid technological innovation and/or diffusion?
- Is the limited S&T expertise in the country used in the most optimal of ways?

The general impression, borne out of lack of results on the ground, is that this research infrastructure has failed to deliver and perhaps Botswana should re-learn how to build capacity the Malaysia and Singapore ways, as per Text Box 3.2.

The Institutional Infrastructure

On paper, Botswana's research and development infrastructure includes the UB, the country's only university and several Government funded applied sciences institutes that undertake research and development work to meet the specific needs of Botswana. The UB is endowed with cutting edge equipment and instrumentation, however there is absolutely no funding infrastructure that can allow a quantum of research outputs to match the equipment potential. This has resulted in the UB failing to build a significant capability for research and development in spite of the wonderful endowment it possesses.

Botswana's key research institutes are 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), 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 forest products and medicinal plants respectively.

3 Milne, D., Palmer, C. and Yeabsley, J. 2000. Focusing investment in innovation. On the co-ordination and rationalization of science and technology and research and development in Botswana. New Zealand Science and Technology Consortium (Wellington).

The applied research institutions' mandate and focus is on developing and adapting technologies for the local market. These inward looking institutions on the whole do not undertake research and develop technologies that could be of interest to markets and users abroad. Similarly, collaboration with the private sector seems to be very limited to meeting the needs of local SMMEs, particularly rural enterprises and the farm sector[3] through low technology products. Thus, these institutions rarely hold patents over their innovations.

The Policy and Legislative Environment

The Science and Technology Policy: The National Assembly approved the Science and Technology Policy for Botswana in July 1998. As per the policy, S&T is critical to productivity growth, national competitiveness and the diversification of the economy. The Policy thus commits Botswana to developing a S&T capability through, amongst others, increased spending on scientific research. Whereas successful developing and emerging economies spend in the order of 2-3% of GDP on S&T related research, Botswana's research expenditure is estimated to amount to less than 1% of GDP.

The Policy assigns priorities to each of several critical sectors, including agriculture, commerce and industry, education and human resource development, energy, environment, health, meteorology, mining, population planning and human settlement, tourism, transport and communication, water and wildlife. It also gives priority to strengthening telecommunications infrastructure and the use of ICTs and attracting women to professions and careers in the field of S&T.

S&T Policy prioritises industry among other sectors

Significantly, the policy provides for the coordination of scientific research within the country and with the rest of the world. To this end, it proposes the establishment of three institutions to coordinate and promote scientific and technological research. These are, the National Commission for Science and Technology (The Commission or NCST) to deal with policy issues), the National Council on Research, Science and Technology (The Council), whose concern will be resource allocation for S&T research, and a National Centre for Scientific and Industrial Research (NCSIR) whose primary responsibility would be to undertake publicly funded applied research.

The above institutional framework has since been modified along the Incentive model as per the New Zealand Consortium's recommendations, which proposed the 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. The constraints that have hindered the progression of the country on the S&T path, partly as a result of the fact that policy on S&T is recent, has been the lack of articulation and coordination, backed up by legislative muscle to ensure the objectives of the Science and Technology Policy are actually realised. There are moves afoot to legislate for the BRSTIA, the proposal having gone to the Attorney General's Chambers, but the fact that the legislative framework is not all encompassing, but rather piece-meal in approach might perpetuate problems such as lack of articulation.

Whereas actual research on S&T in Botswana is spread across several sectors, only a few patents have been registered since Botswana enacted the requisite legislation in 1996. There is an urgent need to increase awareness about the advantages of patenting knowledge. Knowledge is a commodity with public good elements and whilst patents often restrict access to essential technologies at great cost to society and the development process, it is equally true that patents generate great benefits for society and the development process, simply by making it worthwhile to invest in knowledge creation.

It may cost money and time to create knowledge, but it is relatively easy to replicate once created. Thus, for the nation' innovators to realise the commodity value of their innovations, to gain competitive advantage from their innovations, and to have the incentive to invest in research and development, they must patent their knowledge. Furthermore, Botswana should develop standards, including industrial and consumer standards, to ensure research excellence, assure the quality of Botswana products and promote their international competitiveness.

Intellectual Property Rights (IPR): Botswana has IPR legislation that is in accord with the World Trade Organisation (WTO) Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS). The legislation comprises the Copyright Act of March 2000, The Patent and Trademark Act, and the Industrial Property Act of 1997 and it's implementing legislation in late 1998. The IPR legislation provides internationally recognized standards of protection for both foreign and domestic holders of patents, industrial designs, and trademarks, and fully complies with the TRIPS agreement[4]. Botswana is a member of both the Bern and Paris Conventions, the international baseline IPR agreements.

Botswana is now an original Registrar of Trademarks, Patents and Designs. Previously, any trademark, patent or design originating from Botswana had to be registered in South Africa or the United Kingdom to be accorded protection in Botswana[5]. Despite this development, the documentation, and registration of intellectual property by Batswana artisans, artists and inventors is hardly taking place. According to the World Bank World Development Indicators published in 2001[6], there were seven (7) patent applications of Botswana origin recorded in the World Intellectual Property Organisation (WIPO[7]) database in 1998. WIPO further reports that only one (1) patent was granted to a citizen of Botswana in 2000 whereas the patent office of the GoB recorded 51 patents registered to foreign entities in 1999 and 5 in the year 2000[8]. Not one patent recorded by the Patent Office of the GoB over the period 1985 to date was considered of national origin.

One explanation for the foregoing may be that changes permitting registration of patents in Botswana have only recently been made. Another could be lack of capacity in the patent office. The patent office in the Office of the Registrar of Companies is, like the Registrar's Office itself, yet to computerise its record keeping. Furthermore, it is presently ill-equipped to undertake the advocacy necessary to create awareness about IPRs. Awareness about IPRs and the patent office itself is low. Some patents are registered in Harare. The third constraint on patent registration may be the cost and complexity of the process. The patent must be filed in several jurisdictions around the world in order to secure effective protection and benefit. Often, this requires the services of lawyers and/or other specialists whose services may be inaccessible to individuals and small firms.

Local and traditional knowledge, especially of natural products, is another area that requires patent protection. There are difficulties peculiar to securing patents for local and traditional knowledge. For instance, documenting such knowledge may be difficult and costly. It may be difficult to ascribe such knowledge to a beneficiary because indigenous knowledge creation and innovation is often collective, intergenerational and for the social good[9]. Seeking a way to channel the benefits to the community may require the creation of a legal entity[10] such as a Community Trust. Another approach may be to create a database of indigenous knowledge so that in the event of perceived unauthorised use, or undue restrictions on the use, of traditional knowledge resources, a legal challenge may be considered on the basis of information in the database[11].

Effective protection of intellectual property rights is the foundation for innovation and research. IPR regimes allow those who invest resources in the creation of knowledge to realise the benefit of their investment. In the absence of a credible IPR framework, research and development will be stifled because whilst new knowledge is costly to produce, it is often easy to replicate. Thus IPR legislation must strike an efficient balance between incentives for innovation and the public interest in the diffusion of new knowledge. Through Patent and Copy Rights Legislation, this balance is struck by granting innovators monopoly rights over their ideas for a period long enough for them to recoup their costs.

Levering Science and Technology for Human Development – Achievements and Possibilities

Apart from mining technologies, Botswana's achievements in S&T have occurred in the areas of livestock and crop sciences, and natural resources management, including rangeland management and water resources management. These achievements generally take the form of adaptation of existing low level technologies to Botswana's needs at the SMME level and in agriculture, or low technology innovations again aimed at the Botswana market rather than breakthrough innovations of the type that give a country a decisive gain in comparative and/or competitive advantage. In this regard, some achievements have been made in the development, adaptation and use of village level technologies such as the rough planter and in the use of natural products such as non-timber forest and rangeland products. A new and promising area is HIV/AIDS, where intense research work is now being done on HIV/AIDS and related diseases (TB) through two USA/Botswana collaborative initiatives. In discussing the potential of Botswana's initiatives, the experiences of other countries, given the title best practices (Textbox 3.2), must be considered to set the right context under which the striving for a better technology driven Botswana economy can be based. One must consider in Singapore's case, that its development is driven by the systematic development of human resources as opposed to Botswana's that is reliant on natural resources.

Livestock Sciences

Given the strategic role of beef in the Botswana economy and the sector's vulnerability to disease outbreaks, Botswana invested resources in the creation of research, development and training capabilities to service the livestock sector. For training purposes, the

4 US Commercial Service. 2001. Botswana country commercial guide FY2002. Investment climate statement. http://www.usatrade.gov/Website/CCG.nsf/CCGurl/CCG-BOTSWANA2002-CH-7:-005CDCA9
5 http://mbendi.co.za/werksmns/lexaf/busbo.htm#Intellectual
6 World Bank. 2001. World Development Indicators 2001. Science and technology, Table 5.11
7 World Intellectual Property Organisation. http://www.wipo.int/ipstats/en/
8 United Nations Development Programme. 2002. List of patents collected by Botswana Human Development Report research team
9 United Nations Development Programme and Institute of Statistical, Social and Economic Research, University of Ghana. 2001. Ghana Human Development Report 2000. Science, technology and human development. Accra.
10 Inger, D. 2002. CEO. Veld Products Research and Development, Gaborone. Personal communication.
11 Van Dijshorst, Hilde. 2002. Protecting indigenous knowledge by intellectual property rights: a suitable solution? Report for Veld Products Research and Development. Gaborone. 28 pp.

Botswana College of Agriculture (BCA), was created to train extension staff to the Certificate, Diploma and Degree levels. Whilst its primary role is to train extension workers, the college also has research specialists. The Botswana Vaccine Institute (BVI) was developed specifically to undertake research into livestock diseases and to develop vaccines and cures, and have successfully developed foot and mouth vaccines over the years.

One important outcome of this investment is for the Botswana livestock industry to have been able to meet the quality and disease control standards of the European Union. This was made possible through the development of a solid research and livestock disease management capability covering veterinary science/medicine and environmental monitoring and evaluation.

In the past, research has been focussed on the evaluation of beef breeds and their crosses to determine their potential for beef production and also the potential to use composite breeds. The composite breed that continues to be evaluated has a genetic population of 28.24, 4.44, 22.6, 26.32, 24.79, 2.8 and 1.8 % of Tswana, Tuli, Brahman, Simmental, Africander, Hereford and Shorthorn, respectively. However recently there have been indications that the European market prefers the organically bred beef, as it is supposed to have less fat. This should favour the Tswana breeds that are currently disadvantaged by the Botswana Meat Commission's prizing that is based mainly on body weight. The demand for organic beef should see such a policy reversed as it was also contributing to the marginalisation of indigenous breeds. There is already evidence that local populations in Southern Africa would have to re-import African Boran and Tuli breeds that have been improved by the Australians[12].

Water Management and Conservation

Botswana has also made significant progress in using S&T to access sub-surface water resources. In the 1950s, the installation of boreholes in the hard veld and sand veld areas enabled cattle posts to be established on a year round basis. As a result, livestock numbers increased through the 1960s and 1970s to reach a peak in 1981.

The introduction of borehole technology has enabled the country to cope better with recurring droughts and maintain the livestock industry in a relatively stable fashion because it has given the livestock industry access to good rangeland that could hitherto not be used because of lack of water. In addition, access to ground water and water supply infrastructure has allowed for more efficient use of water and rangeland resources.

The downside of the development of this technology is three fold. First, it is expensive and is therefore inaccessible to poor farmers. Second It has therefore conferred disproportionate benefits, including de facto exclusive grazing rights, on well off farmers. Worse still, because of policy weakness, such farmers retain access to the more congested areas where ground surface water is available and the user rights are neither de jure nor de facto exclusive.

By building on Botswana's capabilities in water management, this area of applied research could be further strengthened to deal with national water conservation and management issues and build up into an area of national as well as international expertise.

Natural Resources and Rangeland Management

Botswana has developed expertise in the use of non-mineral natural products such as non-timber forest products. Veld Products Research and Development, an applied science research and development institute, has a strong and internationally recognised track record of research into veld products. Its research covers medicinal plants, herbal teas, wild fruits, bee-keeping, wild birds, the Mophane worm and truffles, most of which have significant potential to enhance rural livelihoods in Botswana.

Many of these resources have traditionally been used for subsistence purposes and the viability of their commercial use is still uncertain. Research by non-governmental organizations, the UB and Ministry of Agriculture (MoA) into the development of efficient and sustainable cultivation and harvesting technologies is ongoing. Combined with existing scientific and research expertise, this work could provide a basis for structured ethno-botanical and pharmaceutical research.

Health care and HIV/AIDS

The research collaboration on HIV/AIDS that Botswana has secured in partnership with the international community is an example of the kind of North South partnership for development envisaged under the eighth MDG – developing a global partnership for development. Two North South partnerships are worthy of consideration. The first is the collaboration between Botswana and the US Centre for Disease Control (CDC) and is known as the BOTUSA Project.

The BOTUSA Project: The BOTUSA Project is part of the Global AIDS Programme (GAP) of the CDC. The principal goal of the project is to investigate the relationship between the parallel epidemics of TB and HIV/AIDS in order to develop prevention strategies to control the spread of both. The specific objectives of the programme are as follows:

- Improve access to voluntary HIV/AIDS counselling and testing (VCT);
- Increase the coverage of the national programme to prevent mother-to-child transmission (MTCT) of HIV;
- Improve youth access to youth-oriented HIV/AIDS prevention services;
- Develop media and community strategies to deliver more effective information and education about HIV/AIDS and TB;
- Improve treatment and care services for People Living with HIV/AIDS (PLWA), especially through TB preventive therapy;
- Strengthen HIV surveillance to include young males and measurement of behavioural risk factors and;
- Conduct research on the epidemiology of TB and HIV, and on TB prevention, diagnosis and treatment. BOTUSA is also preparing to conduct research on the Carraguard HIV vaginal microbicide.

12 Rege, J.E.O. and Gibson, J.P. 2003. Animal genetic resources and economic development: issues in relation to economic valuation. Ecological Economics 45: 319-330

Box 3.2: Some Best Practices to Consider

Singapore

Singapore is a world-class leader in science and technology and research and development. Its priority development goal is to attain an unrivalled living standard and surpass the U.S. standard of living by 2010 based on S&T led growth and development. To become a world-class technology leader, Singapore, along with South Korea, Malaysia, China, China Taiwan and China Hong Kong, went through three stages of economic development, viz., industrial development through low-cost labour; upgrading technology and other infrastructure; and developing globally competitive businesses.

Singapore's success in digital transformation was built on three main pillars. First, the development of electronic engineering and an ICT base as the key gateways to Singapore's global competitiveness. When Singapore lost wage competitiveness, it shifted focus to building a national S&T capability. It upgraded its industrial and research infrastructure and committed resources to advanced science and technology research and incentives to attract global technology leaders. It encouraged offshore manufacturing while retaining the headquarters and Research and Development (R&D) facilities of offshore enterprises in Singapore. In the 1991–96 five-year plan, Singapore allocated over US$3 billion to upgrade and transform infrastructure from that of a manufacturing centre to that of an innovation hub capable of creating new and better products for the region and the world. This sum included $500 million to promote private sector innovation by covering up to 70% of eligible project costs.

Second, Singapore aggressively pursued foreign direct investment through appropriate adjustments of the local environment. It paid particular attention to:

(a) The development of specialised skills for emerging industries and wafer fabrication projects required for assembling microprocessors.

(b) Upgrading infrastructure and services: To further deepen its science and technology capability, Singapore decided to build a multi-technology, ultramodern telecommunications and information infrastructure. It plans to make its port the most automated in the world. Its Tradenet system now links (in 1999) government agencies through computer networks that can process over 10,000 customs declarations daily. The system can handle complete documentation for trade, government administration, transport, banking, and insurance.

(c) Meeting the land requirements of foreign investors.

Finally, Singapore had a strategic focus on creating an electronics industry cluster, including semiconductors, communications, display, and data storage businesses. Singapore's successful electronics development strategy produced revenues of over $45 billion in 1995. The Government offers tax incentives for pioneering investments, skills training, R&D training, and special reduced taxation for specific industries and technologies. Singapore also has introduced a value added tax system to reduce overall taxation on individuals as well as on corporations.

The lesson from Singapore is that an economic transformation of the type sought by Botswana requires a deliberate strategy and a political conviction of the type that will ensure allocation of sufficient resources for transformation. This is precisely the route Botswana has taken with regard to development of an International Financial Services Centre (IFSC). The technology and knowledge initiatives have on the other hand been relatively more tentative. The R&D institutions appear under resourced and ill-equipped to attract and retain the right calibre of researchers.

Adapted from Boulton, R., Kelly, M.J., Yoshida, P.G. 1999. *Information technologies in the development strategies of Asia. I*nternational Technology Research Institute. USA.

Malaysia

Malaysia's vision is to become a developed country by the year 2020. Part of the effort to achieve this goal has involved the creation of Government-supported research institutes (GRIs). Malaysia's GRIs include the Standards and Industrial Research Institute of Malaysia and the Malaysian Institute for Microelectronic Systems (MIMOS). MIMOS, which was started in 1985 within the prime minister's office, is now a department of the Ministry of Science, Technology, and the Environment. MIMOS is Malaysia's national center of excellence in microelectronics and information technology. MIMOS projects are product oriented and focused on boosting the competitive and innovative levels of the domestic electronics industry.

Malaysia has relied heavily on cooperation with foreign technology leaders, often by expanding on relationships begun in contract labour arrangements, to enter and compete in markets for technologically advanced components and products. Thus, like Taiwan, Singapore and South Korea, Malaysia is committed to attracting and keeping the involvement of companies that are technology leaders, recognising that once foreign corporations have a stake in the local market, they typically continue to upgrade technologies.

Malaysia is committed to the use of ICTs to achieve its development objectives. It has a vision to utilize ICTs to transform all of Malaysian society into an information society, a knowledge society and finally a values-based knowledge society in that order.

Malaysia plans to invest more than $2 billion over the next decade to become the multimedia hub of Southeast Asia. In August 1995, Prime Minister Mahathir proposed the Multimedia Super Corridor (MSC) project to foster IT industries. MSC stretches south of the capital of Kuala Lumpur to where a new international airport and new federal capital are under construction - a 9-mile by 30-mile zone about the size of Singapore. This corridor will attract a workforce of 150,000.

By creating an advanced information network, Malaysia's government hopes to lure leading R&D companies and software developers from abroad. More than 900 companies have applied to participate in the MSC program. Qualifying firms must be suppliers of multimedia and other information technology products or services and be willing to transfer technology to Malaysia. Non-manual workers such as engineers should account for at least 15% of the workforce. Companies that joined the project by the end of 1997 will be exempted from corporate taxes for up to ten years.

The Botswana-Harvard Partnership for HIV/AIDS Research and Education: Established in 1996, The Botswana-Harvard Partnership for HIV/AIDS Research and Education is a collaborative research and training initiative of the GoB and the Harvard AIDS Institute of the USA. The partnership has developed, in Botswana, a state-of-the-art laboratory and research capability on the grounds of the Princess Marina Hospital in Gaborone and collaboration with research specialists in the USA. The aim of the laboratory is to conduct cutting-edge research on HIV/AIDS in Botswana and Southern Africa.

The laboratory houses epidemiological and laboratory-based research on the prevention of mother-to-infant transmission of HIV, treatment for AIDS and vaccine design and testing. It serves as the leading facility for the processing and testing of specimens from the Partnership's HIV research studies as well as specimens from Botswana's national programs. The research initiatives focuses on the HIV-1 subtype C, the viral subtype predominant in southern Africa, and the subtype causing the highest numbers of new HIV infection worldwide.

The new facility has the capacity to run qualitative Deoxyribonucleic Acid (DNA), Polymerised Chain Reaction (PCR) tests, Enzyme Linked Immunosorbent Assay (ELISA), and Western Blot serological assays to accurately diagnose infection, together with quantitative viral load determination and CD4/CD8 counts to support the treatment and monitoring of HIV/AIDS patients. It is also possible to culture the virus, carry out DNA cloning, sequencing, immune function assays and flow cytometry within the facility. These techniques allow scientists to improve their understanding of HIV - how it functions and how the immune system responds to it - to support the development of effective and locally relevant treatment and prevention programs.

The MoH in Botswana, the Harvard AIDS Institute, the National Institutes of Health (USA), the Harvard Medical School, the HIV vaccine Trials Network, St Louis University, and Epimmune (the California company that developed the experimental vaccine), have formed a partnership that resulted in the first HIV vaccine trials in Botswana since July 2003.

Other key players in the fight against HIV/AIDS

The National Aids Council (NAC), chaired by the President, is the policy forming and directing agency on HIV/AIDS matters. Its implementing arm, the National Aids Coordinating Agency (NACA) which operates from the office of the President, was formed in 1999 by a cabinet directive and is charged with coordinating and facilitating the nation's response to the HIV/AIDS epidemic. The coordination involves identifying the key strategic priorities in the war on HIV/AIDS, development and support of programs and policies that can deliver on the priorities and the development of tools and mechanisms to monitor and evaluate progress in the war on HIV/AIDS.

ACHAP is a collaboration between the Government of Botswana, the Bill & Melinda Gates Foundation and the Merck Company Foundation to prevent and treat HIV/AIDS in Botswana. ACHAP was formed in 2000 and it supports GoB in its endeavour to decrease HIV incidence, significantly increase the rate of diagnosis and the treatment of the disease, by rapidly advancing prevention programmes, healthcare access, patient management and treatment of HIV/AIDS.

Knowledge, Innovation and Training Shall Overcome (KITSO) AIDS Training program is a collaborative program MoH, the Harvard AIDS Institute and the Botswana-Harvard AIDS Institute Partnership. Taking its name from the Setswana word for knowledge, KITSO combines classroom and facility based learning to provide quality, multidisciplinary and standardised training designed to meet the needs for Botswana's health professionals.

Other initiatives include the TCB Programme, IEC Programme, Masa ARV Therapy programme, Botswana Christian AIDS Intervention Programme (BOCAIP), HIV/AIDS capacity building in the private sector in Botswana, highly mobile populations sexually transmitted infections prevention programme and Coping centres for people living with HIV/AIDS (COCEPWA). The role of the IEC programme is to manage the demand for, and promote adherence to, treatment by managing expectations, standardising messages and coordinating communications activities. Masa, derived from a Setswana word meaning 'new dawn', is a bold initiative by the GoB that seeks to provide ARV therapy free of charge to all Batswana who need it. COCEPWA provides a base and platform where HIV-infected people can speak and share their experiences and the challenge of living a positive life.

Many other civil society organisations and initiatives such as the Botswana network of AIDS service organisations (BONASO); Botswana network of people living with HIV/AIDS (BONEPWA); home-based care centres; and many others exist and respond to HIV/AIDS in a diversity of ways. The list of these and other corporate entities that have joined the fight against the epidemic is long and is not exhausted, but what it shows is the slow realisation in Botswana that HIV/AIDS is no longer just a health issue; it is an all encompassing social, economic and political problem that must be confronted if its negative impact is to be reversed.

Alternative Energy Sources

Botswana has had limited success in introducing alternative energy sources such as biomass and solar energy. Botswana enjoys more than 3,200 hours of sunshine per year and receives 21 MJ per square metre on average in daily solar radiation on a horizontal surface[13]. 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.

Solar energy: 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 Botswana Telecommunications Corporation (BTC) and for lighting in remote areas. District councils use solar power to provide electricity to clinics and schools for refrigeration and lighting purposes. The GoB National Photovoltaic Rural Electrification Programme of 1997 that is implemented by the RIIC in Kanye (which is ending in 2004) has made 300 photovoltaic energy installations throughout the country, predominantly in households.

Despite its potential, solar energy is not widely used because of high initial investment costs and deficiencies in backup service owing to lack of appropriately skilled personnel.

Fuel wood: This is an important source of energy for cooking and lighting purposes, especially in rural areas. It is an overexploited resource whose use, though declining in favour of low-pressure gas and electricity, has serious environmental consequences. In the neighbourhood of major population centres, where a market for fuel wood exists, sellers frequently chop down live trees for fuel wood instead of dead ones, thus accelerating desertification.

Precisely because fuel wood is an extensively used energy source, the absence of fuel wood plantations, community woodlots, fast growing fuel wood species, and limited research in this direction, appears anomalous.

13 Mogotsi and Kumar. 2001

The ascent of low-pressure gas as the fastest growing source of energy for cooking may however explain the situation[14].

Other sources of energy: Two other sources of energy in Botswana have attracted both research and application interest. One is biomass, from which methane gas may be extracted. The other is wind energy, which may be used to power boreholes. Both have to date proved lacking in viability. The utilisation of biomass is constrained by low concentration of biomass and large distances between prospective production centres and consumption centres. The use of wind technology on the other hand is constrained by a combination of low wind speeds, product failure and lack of technical support.

Crop Research

There have been efforts by crop scientists at the Department of Agricultural research to develop sorghum hybrids in Botswana. Sorghum (Sorghum bicolor L. Moench) was domesticated in Africa and has emerged to be an important cereal crop for Botswana. In Botswana, sorghum ranks first in the total tonnage of grain produced and the total area planted and thus makes it the most important cereal and forage crop. Generally small-scale farmers grow open pollinated varieties and the large-scale farmers grow mainly hybrids. The first Botswana sorghum hybrid, developed in conjunction with the sorghum and millet improvement program, Southern African Development Community and the International Crops Research Institute for the Semi-Arid Tropics (ICRIST) was introduced in 1995. Although many other hybrids have since been available, most are well suited to brewing and thus further tests are essential to identify those that are adapted to specific agro zones. According to Stimela and Lekgari, significant increases in sorghum production in Botswana will require improved agronomic practises in addition to improved hybrids.

A Change in the Focus on Research and Development may be in Order

The point has been made in this section that by design, Botswana's publicly funded research programme is largely focused on low value technologies of the type that does not transform an industry or an economy through quantum gains in productivity and/or competitiveness. The New Zealand Science and Technology Consortium[15] picks this as a fundamental flaw and observes in a 2000 report that the emphasis on rural technologies in research activities and funding is a problem for the following reasons:

- It has a low technology content and is focussed on rural development based on mild improvements through mechanisation. Thus, the programme is not seeking breakthrough innovations.
- Because of the above flaw, the programme will not close the gap between Botswana and technology leaders i.e. it will not produce the quantum leap required to make a discernible impact on the economy.

Beyond these, there are questions regarding incentives for research. Whilst facilities may have been developed, Botswana's research institutions do not reward researchers sufficiently to attract and retain thinkers. The field of knowledge creation requires the brightest of a nation's educated people. Unless they offer better pay packages than the civil service and employ strict selection criteria, research institutions will not accumulate experience and expertise and will in the main be no better than extensions of the civil service.

14 Afrane-Okese (2001). Energy in Botswana: Trends and use of fuel wood, gas, electricity coal and paraffin. Energy and Development Research Centre. University of Cape Town, http://www.eldis.org/static/DOC11189.htm

15 Milne, D., Palmer, C. and Yeabsley, J. 2000. Focusing investment in innovation. On the co-ordination and rationalization of science and technology and research and development in Botswana. New Zealand Science and Technology Consortium. 182 pp. Wellington.

Chapter 4

Creating a Development Dynamic

Introduction

Human development has come to be understood as going beyond the three basic rights to decent shelter, good health and freedom from poverty. It encompasses the strengthening of human capabilities through literacy, knowledge and skills, access to services and freedom from all forms of deprivation, such as coercive cultural, religious or political systems, gender discrimination, relative and absolute poverty, etc. A country's future development is closely linked to the success with which it can unleash each citizen's true potential to play a meaningful part in the development process.

This is often a four stage process of skills (through education and training), attitudes (in the form of an enterprise culture), the necessary infrastructure and trade and investment or technology transfer. To seed a development dynamic, all four should exist in a mutually re-enforcing and supportive manner, since provision of one without the others would not set in train the complex integrated development process to usher in new opportunities for growth. If a hierarchy were formed of the four-piece unit, then education (skills) would be the prime resource, followed by infrastructure and entrepreneurship together as they compliment each other and lastly trade and investment.

Education and Human Development

EDUCATION: a Human Right

A country's development is measured by the quality of life of its citizens, rather than the overall country's wealth. To this end, education is an important factor in achieving human development. By informing citizens, education sets the stage for conscientiousness about individual rights and responsibilities, hence citizens are cognisant of the need to conserve and preserve their environment for the good of future generations[1]. It is therefore not surprising that education is also an important component of the universally recognised measure of human development, the human development index (HDI). In consonance with the above, the United Nations Universal Declaration of Human Rights (1948), recognises education as the right to life, a human right, meaning every man, woman and child should have the right to basic education. Several other treaties reflect this belief, for example the International Covenant on Economic, Social, and Cultural Rights (1966), the Convention on the Elimination of All Forms of Discrimination Against Women (1981), and the Convention on the Rights of the Child (1990). Botswana, like many other nations, has ratified some of these treaties, and through its Vision 2016, is positioning itself to work towards the attainment of universal access to basic education.

Countries that invest in human development legitimately expect their citizens to not only promote healthy living, but also expect spin-offs that will enhance the development process. ICTs, are typical gains realised from investments in human development. Indeed countries that have registered high development gains in the recent past are those that have made investments in information infrastructure coupled with the development of proactive policy frameworks for access and diffusion of ICTs. Inversely, there is a strong likelihood that with the use of ICTs, the existing digital divide between economically prosperous countries and the developing world will widen. As a result of this widened gap, human development differentials will be exacerbated further[1]. ICTs are also increasingly being cited and used as a powerful tool for increasing access to education and learning.

Education is an important factor in acheiving human development

As a middle-low income country that was extremely poor nearly four decades ago at independence, the public education sector in Botswana has performed relatively well in improving the quality of its human capital. Botswana owes its success thus far to its investment in education, and an education policy framework, which is aimed at attaining equity in the provision of the education service. The guiding philosophies for policy development at the national level in Botswana are the principles of democracy, development, self-reliance, and unity, the combined effect of which should give form to kagisano, or social harmony. To the extent that there is kagisano in Botswana, it can be argued that the education system has achieved a considerable measure of success. This argument develops from the premise that even though Botswana cannot purport to be a developed nation in the sense of having a highly competitive economy or highly developed human resource base, the necessary building blocks in terms of education infrastructure and participation at all levels of education have already been laid down. Evidence of this can be inferred from the achievement of universal access to basic education,[2] and a high level of participation at the secondary school level as shown in Table 4.1.

1 United Nations Development Prpgramme. 2001. Human Development Report 2001: Making new technologies work for human development, NY
2 Ministry of Education. 2000. Education Statistica Report, Government of Botswana

Table 4.1:
Gross and Net Intake and Enrolment Rates: Primary Education, 2000

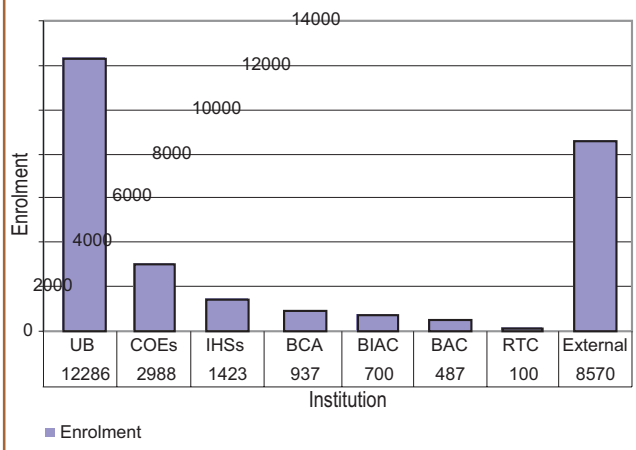
	Primary	Secondary
Gross Enrolment Ratio (GER)	118.0	99.7
Net Enrolment Ratio (NER)	100.0	52.6

Source: Education Statistics Report. 2000. Government of Botswana.

There is a corresponding increase in enrolment and participation at the tertiary level. Tertiary education is provided by the UB, the Institutes of Health Sciences, Colleges of Education, Botswana College of Agriculture (BCA), Botswana Accounting College (BAC) and institutions that are affiliated to universities or colleges outside Botswana. There was a notable increase in participation at this level in the 1990s, from 9 345 in 1992 to about 22 221 in 2000. In 2002, the number enrolled in tertiary institutions at home and abroad was estimated at 27 491. Figure 4.1 below provides the number of government sponsored students, in institutions around the country and abroad. The data does not show the contribution of the vocational training centres (VTCs), which have to date been regarded as part of the second level before they became technical training colleges (TTCs).

The University of Botswana, one of Botswana's tertiary institutions

Figure 4.1: Enrolment in tertiary institutions, 2002



Source: Ministry of Education, 2003

With the exception of the UB and the BCA, all tertiary level institutions in Botswana offer certificate and diploma level courses only. In the 2001/2002 school year the UB enrolled 12286, (an increase of 48.3% over 5 years). Thirty-four per cent were enrolled in certificate and diploma programs, 58.2 % in undergraduate degree level courses, while 7.7% were enrolled for higher degrees (Masters and Doctoral levels). About (8 570) other students at tertiary level are enrolled in universities outside Botswana; 6,529 of these in South African universities, 168 in other African countries, while an estimated 1873 students were studying elsewhere (Europe, the Americas, Australia, etc). More than half of these are pursuing science and technology related courses.

Botswana's Education Policy

Access, infrastructure and participation in school are necessary conditions for all forms of learning. Countries that have made investments in infusing technology into learning culture have achieved higher success rates in leveraging education for development[3]. Such success depends on sound education policies that require continuous evaluation and updating to incorporate current science and practice. In line with this thinking, Botswana has realised the need to review its current education policy, the Revised National Policy on Education of 1994 (RNPE) (see Text Box 4.1), with a view to better articulate proactive strategies for technology driven learning.

Box 4.1: RNPE national education objectives

The overall objectives of education, from the national perspective, are pronounced in the RNPE to be the following:

1. To raise educational standards at all levels.
2. To emphasise science and technology in the education system.
3. To make further education and training more relevant and available to larger numbers of people.
4. To improve the partnership between school and community in the development of education.
5. To provide life-long education to all sections of the population.
6. To assume more effective control of the examination mechanism in order to ensure that the broad objectives of the curriculum are realised.
7. To achieve efficiency in educational development.[4]

Given that Botswana needs to develop a human capacity that will enable her to diversify the mineral driven economy, it is apparent that the RNPE needs to be reviewed so as to nurture learners who will have more than just an appreciation of S&T as a vital component for the country's development. For its TyBEP, Botswana repackaged the objectives of the RNPE into Botswana's Aims for the TyBEP. Of these aims, two are directly relevant to the development of S&T:

- To acquire the basic science knowledge and skills, including basic knowledge of the laws governing the natural world.
- To acquire an appreciation of technology and technological skills including basic skills in handling tools and materials.

Thus, the RNPE is a clear demonstration by the GoB of its commitment to providing and improving the infrastructure, facilities and resources that will enhance the overall capacity for delivery of the entire curriculum, as well as teaching and learning of basic science by employing all the available technologies. From an overall national development perspective, the most compelling statement of Botswana's education policy is the declaration of equity as a goal of education, and the call for monitoring of equity using a set of equity indicators to be developed by educators. This recommendation is interpreted to mean that providers of the education

3 Ministry of Education. 1994. Singapore, 1997
4 Revised National Policy on Education, 1994: p.5

service should ensure equitable distribution of the limited public resources in this sector, and use information from the equity indicators to correct any errant actions or patterns of behaviour. In the context of S&T and utilization of ICTs, in the education policy sets out to discourage, if not prevent the digital divide in public education, between different groups of our society. The RNPE also calls for a Science and Technology Policy which is envisaged as a multi-sectoral policy tapping the minds of experts to deliver benefits to all the different sectors of society.

Promoting Science and Technology

Access and participation in school are necessary conditions for all forms of learning. In Botswana, access to education at the primary level is universal, while participation was almost universal in 2000 as shown in Table 4.2. Unfortunately, the rest of the achievements that relate to S&T are infrastructural. At the primary level, science teaching facilities have been built in all new primary schools built since the beginning of NDP8, while buildings in existing schools are being upgraded to include a science room and a library. Telephone lines have been installed in more than 50% of the schools with many more connections anticipated in the near future. Table 4.2 presents a summary of the physical resources and facilities that support learning at both primary and secondary levels.

Table 4.2:
Facilities and technology resources in schools in 2000

Facilities and equipment in Basic Education	Primary Level	Secondary Level
Number of schools across the country	A total of 736 schools (664 government schools catering for 93% of the learners)	A total of 273 schools (233 government schools catering for 87.5% of the learners)
Classrooms *(in government schools across the country)*	78% of streams have classrooms	90% of streams have classrooms
**Special Learning Rooms *(in government schools across the country)*	30 general science labs 53 computer labs	215 general science labs 233 computer labs 312 Home Economics labs 471 Design & Technology labs 235 libraries
Multimedia Equipment *(in **all** schools across the country)*	69 Television Sets 63 VCRs 3429 radios	Television Sets VCRs Overhead projector
Computer Equipment *(per school, for government schools)*	None	19/20 computers; 2 multimedia PCs; 2 network printers; 1 colour printer; 1 scanner; 1 multimedia projector;1 Windows 2000 server; 50 surge protection power plugs; 50 security plugs; 10 KVA Online UPS; Local area network; Microsoft Office XP standard
Power Supply *(in all schools across the country)*	251 of 736 schools have national grid electricity, and 181 schools on solar power and generators	All schools either on national grid electricity, solar power or generators

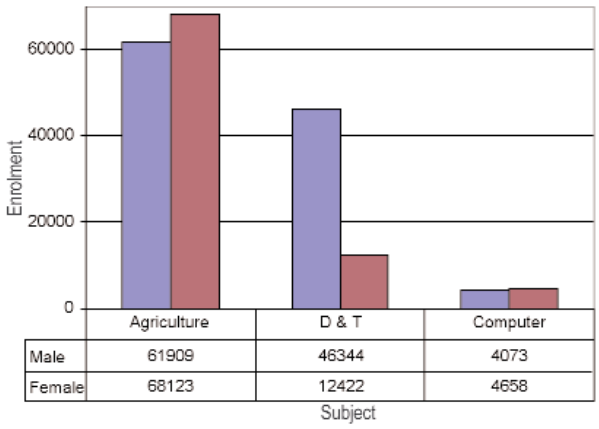
Source: Ministry of Education, 2003

Through MoE, government has also increased the number of S&T subjects in the curriculum. Students at the secondary level can take Mathematics, Science, Agriculture as well as Design and Technology. Mathematics and Science are compulsory subjects for all secondary school students, while Design and Technology is only compulsory for the first three years of secondary school. In 1999 a computer awareness course was introduced in 71 government secondary schools which had adequate resources. All senior secondary schools offer Computer Studies as an optional course as outlined in Figure 2. It is obvious from the distribution of learners that Agriculture is the most popular optional subject. There is a significant difference in the sex breakdown figures for Design and Technology compared to the other two optional subjects.

Generally it is viewed that the low enrolment by female students in Design and Technology mirrors their participation in technical tertiary courses either at the UB or in institutions outside Botswana. Following the 1995 World Conference on Women held in Beijing, the Botswana Government took a bold decision to promote S&T amongst women through its National Gender Programme Framework. The policy has specific strategies adopted to:

- Promote education and skills training of girls/women in a variety of non-traditional career programmes.
- Strengthen career guidance and counselling in schools to include the provision of better advice to young girls on diversified career opportunities.
- Encourage female students through positive action to take science subjects and enrol in vocational training institutions.
- Promote access by women on training programmes at different levels, including types of skills and the range of methods and appropriate technologies.
- Sensitise parents and teachers on gender socialisation from pre-school through to secondary education, through Parents and Teachers Association meetings and the media.

Figure 4.2: Students enrolled in optional Science-based courses, 1999

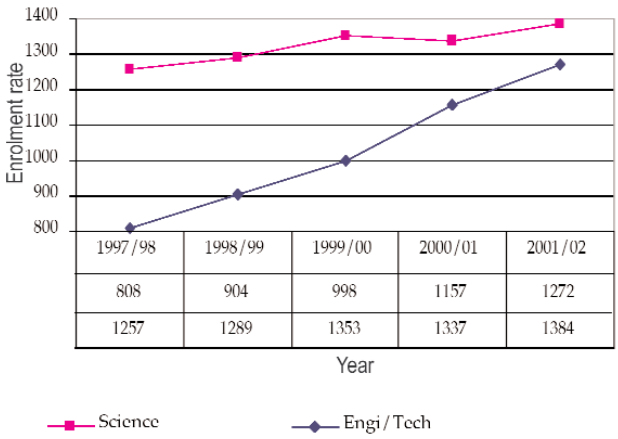


Source: Central Statistics Office. July 2001. Education Statistics 1999

Institutions, specifically secondary schools, promote S&T through exercises such as maths and science fairs. In preparation for these fairs that are carried out at the regional and national level, students are encouraged to come up with S&T projects that have relevance to society. The national Maths and Science Fair takes place at the UB, where the students defend their projects to a selected panel of judges. Although there is no follow up to any of the winning projects, this exercise is very important in enhancing the interests of the learners. Institutions also participate in career road fairs where different people in the area of S&T talk to the students, particularly at the secondary school level to encourage them to take up science.

Computer studies are offered at all senior secondary schools on an optional course

Figure 4.3: Time series of enrolment in S&T programs, UB



Source: University of Botswana. FactBook 2002

There has been a drive at the UB to promote S&T amongst women through the Women in Science and Technology component of the Botswana Education, Democracy and Development Initiative (EDDI) Programme. The Botswana EDDI programme launched by the former US Secretary of State, Madeleine Albright in 2000, has the theme, 'Transformation of the University of Botswana through technology applications', and is part of collaboration between the USA State Department, USAID, Peace Corps and the African Education Ministers. The Women in Science and Technology committee in Botswana involves members of the Faculties of Engineering and Technology, Science, Education and the Botswana College of Agriculture. To date, the committee has been involved in the following:

- Organising of conferences addressing equity in S&T
- Production of a motivational video on women's participation in S&T in Botswana
- Production of booklets to be used by both pupils and their parents
- Running of S&T clinics over the school holidays for girls
- Visits to schools by female scientists, playing the part of role models

Some of the literature produced includes booklets on 'Profiles of female Batswana scientists', career description for Science, Agriculture, Mathematics, Engineering as well as Computing. These booklets specifically written for parents to encourage their daughters to do science subjects in schools, and calendars profiling Batswana women in S&T, are very well distributed in Botswana.

For more than 20 years, the mining industry in Botswana, mainly diamond and copper/nickel, has offered incentives to students with good grades to pursue careers in S&T. These incentives have been mainly in the form of scholarships to study abroad as well as a job guarantee after completion of studies. In 2000, the UB and the BOTEC collaborated to promote S&T by hosting the first Botswana Symposium on Harnessing of Science and Technology for Economic Development (BOSHASTED). The symposium brought together S&T practitioners as well as policy makers from various countries, institutions as well as disciplines who examined how S&T could be used for economic development.

An Evaluation of the Revised National Policy on Education

The RNPE is a sound policy and roadmap for overall provision of education that is meant to deliver on the promises of NDP 9, by achieving technological and/or information literacy, or positioning the workforce for global competitiveness. It is the framework within which the education sector is to realise the transition of enrolments and resources in schools into high quality human capital for Botswana. However given that it is almost ten years after its inception, in order to retain its relevance with respect to technological developments, the policy needs to be revised to address its limitations. Some of the major limitations of the RNPE have been associated with quality of delivery, harnessing of ICTs, access and leadership.

The major limitation of the policy has been the lack of a comprehensive quality framework and indicators of success. There is a need to assess and ascertain the quality of the learner as well as contribution to society. Therefore the policy has failed to live up to its overall objective to raise educational standards at all levels. Secondly, the concept of harnessing of ICTs as a priority goal of the education systems is not clearly pronounced. E-learning has an impact on harnessing of technologies by learners as well as on access, particularly in special education. Given that one of the guiding principles of the policy is the spirit of botho, it is rather surprising that providing for access by children with disabilities only comes as an afterthought. Indeed this can be blamed on the leadership, as what is seemingly an obvious component of the policy is not realised. There has

probably been a lack of implementation capacity that would have ensured that all recommendations of the RNPE are effectively transformed into strategic plans. For example, the establishment of the National Council on Education (NCE) was supposed to ensure that government was well advised on the education system: to monitor and evaluate implementation of the education policy, to monitor quality, to initiate reviews and propose changes in the educational policy[5]. Unfortunately, the NCE seems to have abdicated some of its responsibilities to structures such as the MoE's Policy Advisory Committee. Botswana has thus failed to benefit from United Nations Education and Scientific Cultural Organisation's (UNESCO) initiative of setting an agenda for harnessing ICTs for educational development. Other short comings of the policy framework as it applies to the harnessing of S&T for education include:

- Absence of pronouncement on developing the implementation capacity of non-school personnel who have to develop strategies and plans for the school system.
- Absence of implementation targets, "smart planning" or monitoring. An example of this is failure to take advantage of the availability of electricity supply in most localities, with the result that primary schools have remained the "poorer cousins" of secondary school in the provision of physical facilities that promote learning.
- Perpetuating an implementation environment that is tolerant of mediocrity, and fails to reward excellence[6].
- Failure to create an environment where the school and the community progress on parallel paths, where the school could be the learning centre for community life.

Botswana's Response to UNESCO's Education for All Initiative

The MoE has recently developed an embargoed national action plan (NAP)[7] in order to fulfil the Darkar Framework for Action, Education for All (EFA): Meeting our Collective Commitments initiative. The action plan borrowing primarily from the Darkar framework, has been contextualised to Botswana policy instruments and development strategies. The plan, "realigned with the Botswana National Development Plan 9 (2003/4-2008/09)" as stated in the foreword by the then Minister of Education, K.G. Kgoroba, addresses issues raised in the RNPE and the national vision (Vision 2016). The NAP sets out the process to achieving the six EFA goals by indicating the objectives to be achieved, target groups, implementation strategy, time frame, resources required, lead department and organs, performance indicators and lastly means of verifying that indeed the objectives have been met. The six goals are:

- Expanding and improving comprehensive early childhood care and education especially for the most vulnerable and disadvantaged children
- Ensuring that by 2015 all children, particularly girls, in difficult circumstances and those belonging to ethnic minorities, have access to and complete free and compulsory primary education of good quality (to date, it had never been government policy to compel primary education attendance).
- Ensuring that the learning needs of all young people and adults are met through equitable access to appropriate learning and life-skills programmes.
- Achieving a 50% improvement in levels of adult literacy by 2015, especially for women, and equitable access to basic and continuing education for all adults
- Eliminating gender disparities in primary and secondary education by 2005, achieving gender equality in education by 2015 with a focus on ensuring girls' full and equal access to and achievement in basic education of good quality
- Improving all aspects in the quality of education and ensuring excellence so that recognised and measurable learning outcomes are achieved, especially in literacy, numeracy and essential life skills.

The fundamental shift in approach in the action plan is the acknowledgement that access per se is not a major problem in Botswana, what is lacking is the "matching of access with provision of good quality basic education system in terms of the curriculum and instructional delivery". Whilst it is too early to say whether or not government will deliver on this promise, it is encouraging that there is a budget estimate of how much it will cost to deliver on all six goals in the period 2004/05 to 2009/10. In total the ministry estimates a total of P660.4 million covering the provision of equipment, ICT facilities, human resources, buildings, development of curricula and learning materials, upgrading of facilities and competencies of trainers to developing a national qualifications framework, overseen by a national accreditation board and the financing going with such a venture.

Expanding and improving early childhood care is one of the 6 EFA goals

Enhancing Development Opportunities Through E-Learning

'E-learning is a means of becoming literate, involving new mechanisms for communication: computer networks, multimedia, content portals, search engines, electronic libraries, distance learning, and web based classrooms'

-Peter Stokes, Eduventures.com LLC

International Perspective

A report by the British Educational Communications and Technology Agency (Beca), claims the British government between 1998 and 2002 committed over £700 million to enable schools to connect to the National Grid for Learning. During the same period, a further £200 million was committed to enhance, through staff development, teachers' confidence, competence and effectiveness in delivering ICT to pupils in schools. Beca is the British Government's key partner in the strategic development and delivery of its ICT and e-learning strategy for the schools and the learning

5 Recommendation 6a, Revised National Policy on Education
6 Failure to reward excellence, as can be demonstrated by recruitment policies that reward longevity, is likely to place Botswana at the periphery of the IT industry.

7 Miinistry of Education. 2004. Education for all. Botswana National Action Plan 2003-2009. Pre-production copy October 2004, Gaborone

and skills sector. From the foregoing, it is apparent that the British Government acknowledged the role of e-learning in enhancing human development.

E-learning is a new type of education that enables learners to study at their own pace and convenience, provides access, provides a classroom without walls as well as provides a platform for the exchange of ideas. Learners and entrepreneurs drive this mode of learning. According to Cath Scott of the Elmfield community special school for the deaf in Bristol, UK, 'Using e-mail and computer-generated text gives children another choice in how they communicate. It is non-confrontational, non-judgemental and easy to edit'. Mobile phones, video phones and emails have opened up avenues for disabled learners who would otherwise be stuck in their own environment because of mobility limitations or other such issues. The Beca Report concluded that learners showed improvement in performance due to harnessing of e-learning facilities. However this does not necessarily mean that one suddenly becomes tech-wise due to e-learning. In fact there are some cynics who argue that learners lose the opportunity to develop basic social skills as they become glued to the computer screen or that they are not able to develop their hand writing, reading or spelling capabilities. Research has already shown that children are more concerned with playing with their friends in the playground than surfing the internet. It is true that with the ability to cut and paste, information can move from one document to the other without necessarily passing via the brain. Therefore there is a need to use proper strategies in order to help learners gain the advantage that e-learning offers. It has been demonstrated elsewhere, for instance, that e-Learning as a strategy is capable of making learning more enjoyable and meaningful. It can also enhance understanding of concepts, and cut down on the time it takes to learn difficult concepts[8]. It can be argued that e-learning can promote logical and analytical thought as it gives the pupil an opportunity to focus on higher order thinking skills.

However, the recent closure of UK's leading e-learning company, Xebec McGraw-Hill also shows that there are challenges to be met for the e-learning dream to be fully realised. According to Peter Stokes, the challenge is the connectivity, content and community. For most developing countries, the infrastructure that will enable connectivity is non-existent. Huge amounts of money have to be spent to address the issues of installing the infrastructure as well as maintaining it. Most institutions of higher learning in the African continent are still grappling with the aspect of providing a slow, but reliable e-mail service. The traffic rates for data will obviously determine the load that can be carried as well as the costs. Wireless communication has proven to be an attractive alternative, but learners need to wait a while before it is available. Generally computers and technology need to be updated regularly and as such the option of leasing rather than purchasing has to be explored if the e-learning drive has to be maintained.

Botswana's Efforts

Experiences from other countries suggest that creating an e-learning environment by harnessing ICTs requires progressive thinking and changes in public policy on telecommunications, education technology, human resource development, and resources to enable implementation of such policies. In developing countries such as Botswana, this means that desperately needed resources should be diverted from competing development priorities. There is need for clear justification for expenditure that maps out the anticipated development gains on such expenditure for individual learners and for the country. Above all, it should be demonstrated that investment translates into gains in human development. Recent trends in the USA and UK have shown that e-business, which really drives e-learning has grown at a very slow pace, much slower than was anticipated when governments in these countries pushed for the establishment of 'universities without walls.' Unlike developed countries that can boast of e-business, the GoB is faced with a situation where it needs to invest in infrastructure, human capacity development and given the small number of learners, invest in development of relevant information within the local context since the role of entrepreneurs is minimal.

NDP9 proposals on education and training outline lifelong learning as "a key component of national human resources development" and "a central element of the education strategy for NDP 9"[9]. The plan also proposes development of a national e-Learning strategy and strengthening the technological infrastructure, in particular the Education Network System so that computer laboratories in schools could be connected to the Internet. The MoE will also pay more attention to the Education Information System, as well as intensify efforts towards acquisition of computer literacy skills at the basic education level[9]. These plans are laudable since it is well understood that ICTs create more content than can be used to enhance learning, both in the classroom, and for lifelong learners. It avails an array of on-line resources that students can use to deepen their understanding of concepts. Also, specialised software in certain subject areas is available, sometimes with on-line interactive tutoring and feedback mechanisms. The other advantage of using on-line education resources is that information can be updated regularly, with the result that students are likely to graduate with the most up-to-date knowledge in their subject area. Also, investing in on-line material is cheaper than buying (science) textbooks for many students, some of which may even be out-of-date as soon as they enter the public domain.

Expanding and improving early childhood care is one of the six EFA goals

One of the most compelling reasons for introducing IT-based learning is its magnanimity with special populations of learners. Students benefit from active self-paced learning. "Assistive technologies" have

8 Milken Exchange, 2000
9 Ministry of Education, 2002

been developed both for students with disabilities, and for gifted students. For students with disabilities, some of which may have physical disabilities which impose limitations in movement, computer-based learning provides an opportunity to learn at their own pace, as well as to communicate with other learners via email, and/or engage in collaborative projects on the Internet. In the case of gifted students, computer resources are tools that they use to explore a subject matter in depth.

It is also true that e-learning and ICT resources are self-empowering in various ways, both for the learners as well as the communities. They provide information and also serve as a window for distributing information. However limited access is a major setback for most that could benefit. Minimal access is due to lack of resources as well as lack of the know-how to explore the available facilities. Botswana has introduced a compulsory computer awareness program for junior secondary school learners and an optional computer studies course for the senior secondary school learners in order to address the access problem. Progress in the first three years of the implementation of these programmes has been limited by deficiencies in both infrastructure and human resources as outlined below:

- The programme has not yet reached all students due to the shortage of teachers who have the necessary competencies[10]. Also, Computer Awareness teachers get their posting to teach their major subjects; hence their Computer Awareness assignment is, in most schools, considered to be secondary.
- The contact time of 40 minutes per week for each student, with no opportunity for additional practice time is not sufficient time for students, given that this is a new subject for most.
- With only one lab with a maximum of 20 computers in each school, and a student computer ratio of 1:50 in some schools, the computer room is almost always occupied with Computer Awareness students, hence other students do not get the opportunity to use the lab.
- The number of students per instructional computer (student computer ratio) is exorbitantly high in all schools.
- An overwhelming majority of teachers in other subject areas are themselves not skilled enough to infuse computer skills into their teaching, even if they so desired.

The desired approach of teaching computer skills through infusion into the curriculum is conceptually sound, but impracticable. Furthermore, there seems to be no plan on the ground to monitor if students acquire the necessary skills at the end of the course, given that the course is non-examinable. Also the intent of the Computer Awareness programme, indeed the overall education technology strategy, seems to be missing the point; ICTs should be deployed in education first and foremost to improve learning; they should not be the content of education. Trends in other countries that have been successful with e-Learning shows that ICTs are being deployed as tools for education. Where there is internet and on-line services, the spin-offs will be acquisition of information seeking and management skills, and the generation of interest in information technology as a career.

Infrastructure as a Lever for Development

As will become clear in Chapter 5 where we capture the ICT infrastructural endowments Botswana possesses, technological infrastructure is one input that critically contributes to the competitiveness of an economy. In the context of developing a development dynamic, it comes in two forms: the necessary infrastructure to deliver education and training, including creating a platform for life-long learning by the community, as well as an input to enterprise development in the larger economy (by making it easier and cheaper to conduct business).

Educational Infrastructure

As Table 4.2 indicates, there has been some attempt to provide the necessary ICT infrastructure in the public school system. The provision at secondary level has been somewhat accomplished and is improving yearly, where there is a glaring deficiency is at the primary school level. Considering the fact that primary schools exist in all communities in Botswana, if the idea is to encourage life-long learning habits for all citizens the provision of ICTs at primary schools, which will form community resource and access centres, is of an urgent nature. There are mooted intentions to engage the private sector by the MCST in technology provisioning for primary schools, but the urgency of the need means an opportunity is lost to dynamically plant the seeds for this country's future economic wellbeing. All this pre-supposes that the necessary electrical connections exist in schools; but this is not the case. Chapter 5 is testimony to the fact that much more needs to be done to bring schools into the information age.

ICT Infrastructure in the Broader Economy

The deployment of technology in schools will assure a multiplier effect in the economy through a number of streams: first learners will be availed the opportunity to tap into the rich resource that the Internet provides, with the added benefit of graduating students who have current skills that add to the country's knowledge base. This encounter with the internet should equally generate curiosity in the minds of users who could then use the platform as an exploration deck, as they navigate the rough waters of employment, further education and hopefully, enterprise development.

On the other hand by deploying ICTs in schools, they could be the seeds for community access centres and resource libraries,[11] which will not only guarantee life-long learning opportunities for the broader public, but more importantly bring technology within reach of the important but technologically disempowered SMME sector. By investing in technology in schools, to match the impressive overall ICT infrastructure in the broader economy (as will become clear in Chapter 5) the Government could sow the seeds for "eternal harvesting" as innovation and entrepreneurship can be nurtured and sustained by increasing access to information. Thus if Botswana is to prosper in the future, then there must be aggressive investment in educational infrastructure, particularly technological, to provide access and a platform for mostly rural communities and other urban poor families and enterprises that need the requisite leg-up to lead meaningful lives.

But provisioning of technology into the school system, by itself, will not be a sufficient stimulus to creating a development dynamic for Botswana. To be relevant, the ICT deployment in schools must the seedbed of activity for access and use by the communes in which these schools are located. It is only by making this platform available for use as a resource and business support tool for the wider community that a dynamic contribution to the wellbeing of these communities, necessary to ensure they can meaningfully participate in the economic life of the country, will be assured. Even this will not of its own suffice. We have indicated that to prosper a country needs to entrepreneurial flair in its citizens, and argued that Botswana needs to put in place a training and support scheme for entrepreneurship. Combining this training with ICT deployment to the remotest parts of rural Botswana will create a wider pool of entrepreneurs upon whom the future of this country depends.

10 Molopolole College of Education is the only college that trains teachers in Computing as a minor teaching subject. To date the programme has graduated about 120 teachers who have been deployed to the junior schools. Unfortunately, some of the teachers have been deployed to schools that are not yet equipped for the CA course.

11 (whether along the Senegal or South African teleaccess centre models, United Nations Development Programme Human Development Report 2001)

Botswana must equally join the international entrepreneurship monitoring programs to allow her to measure and compare her level of activity against the best performers in the world, and thus use this as a yardstick to focus further interventions to not get left behind by the competition.

Entrepreneurship

NFTE's mission is to teach entrepreneurship to low-income young people, ages eleven through eighteen, so they can become economically productive members of society by improving their academic, business, technology and life skills.

-The National Foundation For Teaching Entrepreneurship[12]

The leading economic thinkers have always held that entrepreneurship in a given country determines its position in the global world and the quality of the life of its citizens. Starting from this standpoint, one wishes to interrogate whether or not Botswana as a country has enough enterprising minds to guarantee its sustained growth in the highly competitive globalised market place. The country has, as has already been acknowledged in the first chapter, done very well economically over the last two or more decades. By all measures of development, such as child mortalities, educational achievements, GDP per capita, life expectancy at birth etc., it has surpassed many nations and achieved much by evolving from one of the world's poorest countries to its current middle income status. The mineral led rapid development that the country has experienced is certainly in danger unless other "engines of economic growth" are found urgently. Technology, particularly ICT can be used to jump start this process of diversification away from diamond mining to an economy based on the skills and creativity of its citizenry.

Although no base-line data exists to indicate the level of entrepreneurship in Botswana, it is safe to assert that there is very little of it in the broader economy. Some anectodal evidence can be garnered from the list of unsuccessful attempts of the Government subsidy programs such as the FAP and SMME, which have not led to sustained, manufacturing based companies, despite the focus of some of these schemes, in particular the FAP. A more recent scheme, CEDA, which in a break from the past where finance was advanced freely or on a shared basis (with government footing most of the cost), gives loan capital to any enterprise that can show it is profitable. The only concession being that the interest rate charged is below market rates. Even with this new scheme, there are no ground-breaking ideas coming forth other than copycat projects that have resulted in overflooding in some sectors since disbursement of CEDA. The number of new and operating companies is also unimpressive, although, since CEDA, more people are registering private companies or trade names. Thus Botswana urgently needs to develop and encourage an entrepreneurial culture and approach which is critical for economic growth desparately needed to maintain and improve the sustained current livelihoods.

Isolated attempts have been made to encourage just such a process, but these have been through local chapter of international associations (mostly for students) such as AISEC[13], Student in Free Enterprise (SIFE) at the UB, Junior Achievement Botswana (JAB) and similar initiatives. No national framework has been put in place to develop entrepreneurship, and worse still in the ICT field. The National Commission for Science and Technology (NCST) has recently at a workshop tasked itself with encouraging entrepreneurship in technology through a process of incubators and innovations centres. Even this noble idea is a few years from being piloted, let alone started meaningfully at a national level. But the example of the bar owner in Matenge village who is also operating a mobile phone battery charging service, is a practice that is replicated all-over rural Botswana where households with electricity connections in small vallages, indicates there are pockets of enterprise that require more structured support and training system to flourish and contribute to the unfulfilled national desire for economic diversification.

Putting an entrepreneurship training and support framework in place is a necessary but by no means adequate nor a sufficient step. To be competitive, Botswana must join the international mechanism where the level of entrepreneurship at both the firm and economy level is measured and compared. The global entrepreneurship monitor (GEM) is one such network that should give an indication of where Botswana is compared to leading countries such as Uganda and Venezuela in the developing world, or USA, Austria and Ireland amongst developed nations where entrepreneurship is vigorous and an important contributor to economic growth. Following the findings of this Report, Botswana could learn two important lessons:

1. Availing money will not solve lack of entrepreneurship problem as the report says,, "although financial support is identified as one of the main problems facing entrepreneurs in South Africa, this does not seem to account for why South Africa's rate of entrepreneurial activity is so much lower than in other developing countries".
2. If the education and training system is not geared towards developing an entrepreneurial society, then it should not come as a shock that despite an enabling socio-economic setup, no active entrepreneurial activity takes place: "overall, therefore, issues relating to skills and capacity and the failure of the education and training system to develop these (entrepreneurial skills) remain an important factor limiting entrepreneurial activity according to experts…".

Botswana must thus heed the overall conclusions of this study particularly on the policy front: "Two priorities seem to stand out. Firstly, changes in the school education system are required to raise entrepreneurial awareness and create a good grounding in basic financial and businesses skills. Secondly, effective training in specific financial administrative skills is required on a fairly large scale amongst existing entrepreneurs"[14].

To Botswana's credit, schemes such as the Integrated Field Services (IFS), that provide technical support to SMEs in their localities have been put in place. Enterprise Botswana, on the other hand provided entrepreneurs with business/management training as part of supporting entrepreneurship in the country. These two organs have recently been merged together with the former Small Business Promotion Agency (SBPA) and rationalised into two agencies: the Small Business Council (SBC) as the policy advisory arm and the Local Enterprise Authority (LEA) whose mandate is to promote the development of a vibrant SMME sector. Whether these new organisations will deliver and usher in new and successful enterprises, is yet to be seen.

Trade and Investment

Botswana is a country with a very small population. According to analysis by Jeffrey Sachs, Botswana falls into the third group of countries that is home to more than one and half billion people who are technologically excluded. These countries include much of the Andean region, most of Sub-Saharan Africa and a very good part of Central and South Asia. Botswana's foreign direct investment, as a

12 www.nfte.com
13 AISEC
14 Global Entrepreneurship Monitor, South African Executive Report 2003, http://www.gemconsortium.org/download/1086537011812/GEM%202003%20Update.pdf

mineral driven economy, depends mostly on its diamond industry. Therefore even though it is the largest producer of diamonds in the world, by virtue of the nature the industry, there are no technological spin-offs to other sectors of the economy.

In assessing the extent of trade and investment in Botswana, it is necessary to acknowledge the limitations associated with a small population. In highly populated countries like the USA, the need by government to address critical issues in sectors such as health, agriculture and the environment, results in intensive investment that encourage innovation. The need for S&T to address and provide public goods is in itself an important lever of development.

It is generally accepted that for technologically excluded countries, innovation systems are failing in many respects. There is no provision of public services as the Governments are mostly cash strapped. In contrast, this is not the case for Botswana, where investment has been made in many areas of the economy. For example, there are dedicated laboratories to deal with water quality (through Department of water affairs), food (national food technology research centre), health (HIV/AIDS laboratory), environment (National Environment laboratory) and to ascertain the quality of imported goods. The Botswana Bureau of Standards (BOBS) whose mandate it is to ascertain this quality will soon be moving into dedicated offices with laboratories equipped with state of the art facilities and instrumentation.

According to Sachs, the absence of scientific capability in the non-government sectors of the poorest countries, and the lack of purchasing power by governments in these countries, are critical elements of the technological stagnation and isolation of the world's poorest countries. Since technological innovation is a process of increasing returns to scale, in the sense that new discoveries depend on a culture of innovation, and that the scope of the market is itself an incentive for innovation, this presents a difficult scenario for excluded countries. For any development that is driven by S&T, there should be cost returns for direct investment. The cost return should be experienced in terms of the quality of life the researchers live if they are to remain in their own country, and also that there should be enough units sold to cover the initial investment. Because S&T is market driven and also somewhat ecologically dependent, to keep the development dynamic, Botswana must explore further ways of trading in and attracting investment in S&T, particularly ICTs. As will be discussed in Chapter 5, the massive investment in HIV/AIDS research and intervention programs should be an example the country could use to trade out of the expertise generated. The response of the international community to this crisis has formed the necessary technology and knowledge transfer for the development of a native base for the future.

Chapter 5

Towards an Information Society for Botswana

Information, Information and Communication Technologies and human development[1]

The introduction and rapid uptake of ICTs have expanded opportunities for people and increased the social and economic benefits of creating and using technology. The information economy spawned is pervasive and no government, organization, business or community, whatever the scale of its operation, can afford to ignore it.

Along with other breakthroughs, ICTs, are pushing forward the frontiers of how people can use technology to eradicate poverty. The development dilemma is that, for those with access to ICTs, the opportunities for individual and community empowerment have increased, whilst for those without, ICTs might remain elements of curiosity as the picture below seems to suggest. They could equally exacerbate the already widening access and empowerment gaps between urban and rural communities.

People and PCs in rural communities - useful and yet useless

Technological innovation affects human development in two ways: by enhancing human capabilities and by generating economic growth through increased productivity.

For people and communities, ICTs can enhance information sharing between development actors and connectedness with the mainstream of society and of the economy. By helping people acquire and share knowledge and be creative and by facilitating participation in the social, economic and political life of a community, ICTs empower and build human capabilities. They expand the choices people have to lead lives that they value.

The ability to use information and to communicate is fundamental to human welfare. In Section 19 of the Universal Declaration of Human Rights, the international community via the United Nations recognises that "*everyone has the right to freedom of opinion and expression; this right includes freedom to hold opinions without interference and to seek, receive and impart information and ideas through any media and regardless of frontiers*"[2].

In integrating this question of equity and freedom of expression and of access to information, human development shares a common vision with human rights. The common goal here is human freedom (see Box 5.1). Empowerment and freedom are closely related. Access to information and related factors, especially information policies, are fundamental when considering the role that ICTs can play in human development.

Box 5.1:

ICTs for human development: goal, objective, strategy and outcomes

The goal is empowering people by mainstreaming ICT use.

Goal: The human development goal of using ICTs is empowerment through information.

Objective: To open up new opportunities for people.

Strategy: To facilitate greater access to information, knowledge, resources and people by the mainstreaming ICTs at all levels of society in all sectors of the economy across the country and where and as appropriate, around the world.

Outcome: People and communities who can manage their own destiny better and reach their individual human development objectives because they are informed and because they are knowledgeable and free to act on decisions that influence them.

Information and Communication Technologiess and the Millennium Development Goals

There is no doubt that ICTs can help in the fight against poverty[3]. A considerable amount of evidence has been documented by organizations such as OECD, DFID, the World Bank, the International Development Research Centre (IDRC) of Canada, and by The Economist magazine in The Economist's Technology Quarterly.

At the Millennium Summit of the United Nations, to ensure that the benefits of new technology, especially information technology, are available to all, several targets were agreed upon, with Target 18 specifically relating to the diffusion of ICTs.

Target 18: In cooperation with the private sector, make available the benefits of new technologies,[4] especially information and communications technologies. While the Summit agreed on the following indicators of ICT diffusion, specifically the number of telephone lines per 1,000 people and

1 The exposition follows the UNDP. 2001. Human Development Report 2001. Making new technologies work for human development. NY

2 Office of the United Nations High Commissioner for Human Rights. Universal Declaration of Human Rights http://www.unhchr.ch/udhr/lang/eng.htm

3 vSee for example: Kenny, C., J. Navas-Sabater and Qiang, C.Z. 2001. Information and communication technologies and poverty. Draft for comments. World Bank. April 2001. 45 pp. and Department for International Development, U.K. 2002. The significance of information and communication technologies for reducing poverty.

4 http://www.un.org/documents/ga/docs/56/a56326.pdf

Table 5.2: How ICTs can help achieve the Millennium Development Goals[5]

Target	Role of ICT
Reduce the proportion of people living in extreme poverty by half between 1990 and 2015	Increase access to market information and lower transaction costs for poor farmers and traders; Increase efficiency, competitiveness and market access of developing country firms; Enhance ability of developing countries to participate in global economy and to exploit comparative advantages in factor costs (particularly skilled labour).
Reduce infant mortality rates by two-thirds between 1990 and 2015 Reduce maternal mortality rates by three-quarters between 1990 and 2015 Provide access to all who need reproductive	Enhance delivery of basic and in-service training for health workers; Increase monitoring and information-sharing on disease and famine; Increase access of rural care-givers to special support and remote diagnosis; Increase access to reproductive health information, including information on AIDS prevention, through locally appropriate content in local languages.
Implement national strategies for sustainable development by 2015 so as to reverse the loss of environmental resources by 2015	Remote sensing technologies and communications networks permit more effective monitoring, resource management, mitigation of environmental risks; Increase access to/awareness of sustainable development strategies in areas such as agriculture, sanitation and water management, mining, etc.; Greater transparency and monitoring of environmental abuses/enforcement of environmental regulations; Facilitate knowledge exchange and networking among policy makers, practitioners and advocacy groups.
Enrol all children in primary schools by 2015 Make progress towards gender equality and empowering women by eliminating gender disparities in primary and secondary education by 2015	Increase supply of trained teachers through ICT-enhanced and distance training of teachers and networks that link teachers to their colleagues; Improve the efficiency and effectiveness of education ministries and related bodies through strategic application of technologies and ICT-enabled skill development. Broaden availability of quality educational materials resources through ICTs; Deliver educational and literacy programmes specifically targeted to poor girls & women using appropriate technologies; Influence public opinion on gender equality through information communication programmes using a range of ICTs.

Source: ITU, adapted from United Kingdom Department for International Development (DFID), The significance of information and communication technologies for reducing poverty, January 2002

the number of PCs per 1,000 people, there are clearly other indicators that can also be used.

The International Telecommunications Union (ITU), based on the conclusions of a recent report prepared by tDFID of the UK, has reported on the links between the MDGs and ICTs. The details appear in a Text Box 5.2 entitled "How ICTs can help achieve the Millennium Development Goals".

Information and Communication Technologies and the global information society[6]

Several factors are now combining around the world to foster the creation of an information and knowledge based global society driven by nearly unlimited access to people, ideas, information, knowledge and resources of all kinds. The information economy is one outcome of this[7].

This globalised, knowledge and technology-facilitated economy of people, goods and services has the Internet as its major driver. The internet is uniquely placed as a technology that converges many of the most recent innovations into an increasingly pervasive, open and user-friendly platform allowing for near instantaneous access to and sharing of information across boundaries.

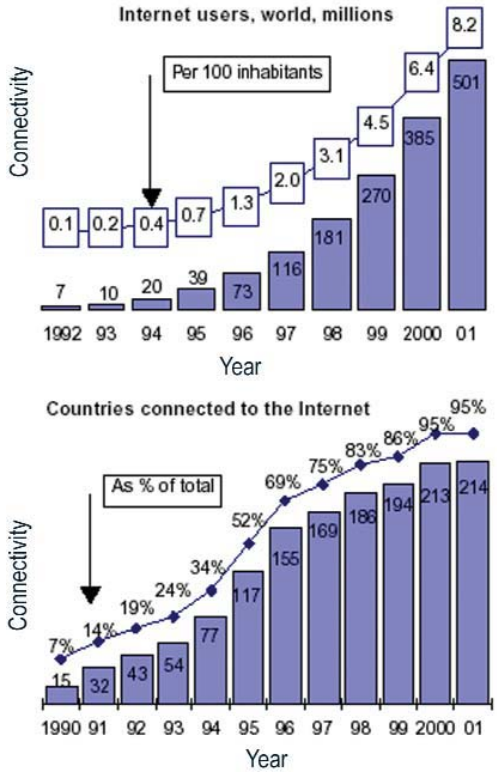
Box 5.3: Definition of the information economy

The term "information economy" refers to "a new global electronic structure, wherein the production of information goods and services dominates wealth and job creation, and is underpinned by the use of ICTs and the global information infrastructure".

Information and Communication Technologies and the internet around the world

As Figure 5.2 makes graphically clear, the use of the internet has grown rapidly over the past decade, reaching an estimated 606 million people[8] by 2001. The figure further illustrates the near universal presence of all countries in the internet superhighway (95% of all countries at the end of 2001).

Figure 5.1:
Number of internet users & number of countries connected to the internet



Number of internet users, millions, and number of countries connected to the internet. In the right chart, countries refer to 225 countries or territories. 'Connected' refers to the establishment of a direct link to the internet enabling it to be accessed by a local telephone call. Source: ITU World Telecommunication Indicators Database.

5 International Telecommunication Union. 2002. World Telecommunication Development Report. 2002. Reinventing telecommunications, Geneva and Department for International Development, U.K. 2002. The significance of information and communication technologies for reducing poverty

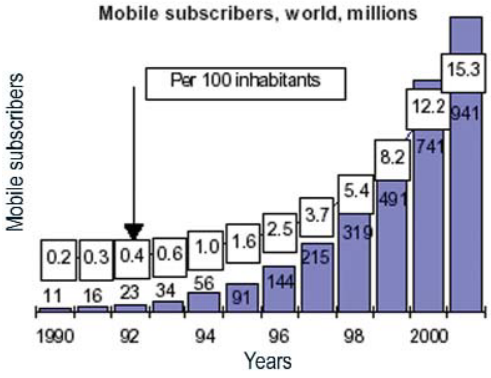
6 Adapted and updated from: Richard Labelle. 2000. Plan of action. ICT development in Mongolia over the period 2000-2003. http://www.infocon.mn/english/reference/ict_projects/p_left.html

7 Cogburn, D. 1999. Globalization and the information economy: challenges and opportunities for Africa. African Development Forum. ADF '99. www.un.org/depts/eca/adf/pub.htm. Taken from James, T. 2001. (See below).

8 Nua Internet Surveys. End November 2002. http://www.nua.com/surveys/how_many_online/index.html

The only communication technology that has grown faster than the internet is the growth in the number of users of cellular telephones (see Figure 5.3). Cell phone growth has contributed significantly to the access and use of ICTs particularly in the developing world where the ratio of mobile to mainline phones is more than one to one. In fact, the mobile has surpassed fixed lines the world over since the year 2002[9]. Convergence between the mobile and the internet is emerging since the latest cell phones come with micro browsers and email or messaging facilities that link seamlessly to the internet. The growth of the mobile phone is captured in Text Box 5.4, where it has improved the teledensity figures for the least developed nations of the world.

Figure 5.3:
Growth in no. of cellular phone subscribers worldwide.



Number of mobile cellular subscribers. Source: ITU World Telecommunication Indicators Database[10].

Box 5.4: Key ICT statistics and developments worldwide

The information economy: the worldwide IT industry is currently valued at over 1 trillion USD and is dominated by 29 countries[11]. It is expected to grow to more than $1.5 trillion by 2006. Spending on services and software will grow twice as fast as spending on hardware.
More than 483 million cell phone handsets will be sold to end-users globally, and one third of the world's population will own a wireless device by 2008.

Mobile messaging is a "killer application' of the internet: the GSM Association estimates that 24 billion SMS (short message service) messages were sent over GSM networks in May 2002 alone, compared with 15 billion a year earlier, and it estimates that 360 billion messages will be sent in 2002[12].

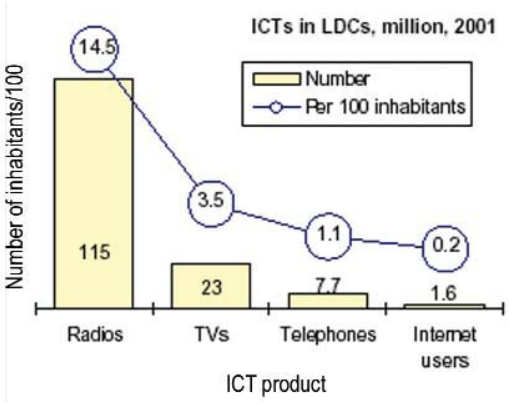
The world's Least Developed Countries (LDCs), surpassed the important threshold of one telephone subscriber per 100 inhabitants in the year 2001 and now have the world's fastest growing networks, due in large part to competition in mobile cellular markets[13].

The Challenge of the Digital Divide

The digital divide between developed and developing countries is huge. If one takes the widely held belief that the proliferation, diffusion and appropriate utilisation of ICTs presents enormous opportunities for economic and social development[14] as given, then in the least developed countries (LDCs), where ICTs have diffused the least (Figure 5.4) then prospects of an information society are far from assured. In Sub-Saharan Africa, where the digital divide is the greatest, radios are still the most pervasive ICT, achieving 25% penetration[15].

9 International Telecommunication Union. Statistics. 2002
10 International Telecommunication Union. 2002. World telecommunication development report 2002. Reinventing telecommunications. Geneva
11 IDC 2002. The Impact of IT on Local Economies. http://www.idc.com/en_US/st/itlmpact.jhtml
12 GSM Association. 2002. GSM statistics. http://www.gsmworld.com/news/statistics/index.shtml
13 International Telecommunication Union Press Release. 2002

Figure 5.4:
ICT products and services in LDCs, millions, 2001 (ITU)



ICT products and services in LDCs, millions, 2001. Source: ITU World Telecommunication Indicators Database[16].

E-business and E-governance

Electronic business refers to electronically assisted business processes in general. E-business ranges from simple office productivity applications such as word processing and data entry and manipulation, to specific and more complex corporate exchanges using tools such as electronic data interchange (EDI) and electronic funds transfer (EFT) and electronic networks such as the internet. More advanced and valuable e-business applications are essential for companies wishing to compete internationally and are the basis for the globalisation of the economy.

Electronic commerce and its variants business to business (B2B), e-commerce and business to consumer (B2C) e-commerce are part of e-business, as are e-government, government online, distance learning and telemedicine. In countries and jurisdictions where it works, e-governance has entailed using ICTs to turn government into a better servant of the public. It institutionalises and enhances access to information and services as well as access to government decision makers including parliamentarians, thus enhances transparency in decision making.

The Information Communication Technology Landscape and Human Development in Botswana

Botswana has acquired many of the assets and met some of the requirements that constitute the foundation of the information economy: a broad overarching vision; commitment to implementing this vision; a tradition of consultation and democracy; a state of the art high speed telecommunications network; an impartial and independent regulatory regime that is recognised the world over for having levelled the playing field in the ICT market for telecommunications services while remaining committed to achieving universal access; respect for the rule of law; functional and independent courts and most important of all, a commitment to equity for all in Botswana.

However, the vision is far from being achieved in part because ICTs and the benefits they engender have not been mainstreamed in Botswana society and in the economy. Although some aspects are better developed than others, the poor and those in rural and remote parts of the country are yet to benefit from the information revolution. As a result, there is a real digital divide in Botswana. Similarly, while there

http://www.itu.int/newsroom/press_releases/2002/05.html
14 Orbicom. 2003: Monitoring the Digital Divide and beyond. http://www.orbicom.uqam.ca
15 Jensen, M. 2002. The African Internet status report. Updated July 2002. http://www3.sn.apc.org/africa/afstat.htm
16 International Telecommunication Union. 2002. World telecommunication development report 2002. Reinventing telecoms. Geneva.

are elements of a national strategy that have resulted from the Vision 2016 exercise and as a result of initiatives in several specific sectors, for example in the telecommunications sector, there is really no national ICT strategy or action plan in place[17].

In other sectors, including government, computers are relatively pervasive. It is estimated that there are about 65,000 PCs[18] in the whole of Botswana and between 10,000 – 15,000 of these are in the government[19]. Many key government operations and some services have been computerized (payroll, passport control, drivers license, omang[20], etc.). But much remains to be done in order to fully automate document and data flow and management, ensure interoperability, streamline workflow and make best use of collaborative software applications that people actually use, open up access to the public while at the same time adhering to accepted standards of data security and emergency or disaster recovery.

More than Just Infrastructure

Botswana's National Vision, Vision 2016, and ICTs for Development

The Vision: Botswana's national vision, Vision 2016[21], envisions "an educated and informed nation that has mainstreamed computers and the internet and that has entered fully into the information age. Botswana will have sought and acquired the best available information technology, and have become a regional leader in the production and dissemination of information".

"All Batswana will have access to the media, all schools will have access to a computer and to computer-based communication such as the internet in a free and democratic society where information on the operations of government, the private sector and other organizations will be freely available to all citizens. There will be a culture of transparency and accountability. By 2016, the people of Botswana will be able to apply the potential of computer equipment in many aspects of their lives".

Living the Vision: Botswana starts its quest to live its vision well endowed in the African context, having enjoyed decades of social, political and economic stability, a world-class transport and telecommunications infrastructure, all pre-requisites for attracting the investments in the necessary communications and network infrastructure needed to fulfil the vision's ideals.

The open and fair telecommunications policy regime that has been put in place with the creation of the BTA is another significant asset that constitutes a real opportunity for Botswana. Few other countries or jurisdictions in Africa and around the world have levelled the playing field for telecommunications operators and service providers as has Botswana. The recent creation of MCST as the parent ministry of all S&T research and development institutions including the BTA, is a step that one hopes will help Botswana mainstream ICTs and information management issues.

In spite of its problems, Botswana has a well developed and resourced educational system, which attracts the highest spending in the world as a percentage of GDP[22]. This level of investment in education includes footing the bills 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 are well educated young people with a broad range of skills pertinent to having a world-class work force.

As stated in the previous chapter, the Government has embarked on an ambitious programme to equip all secondary schools with computers and related equipment, thus bringing the bulk of the school going citizens nearer the information highway.

The Challenges

Listed below are some of the more critical challenges to be addressed if the vision is to be realised:

1. Development and retention of ICT and other skills in the face of the devastation wrought by HIV/AIDS on the workforce.
2. Appropriate infrastructure (and information) developed to allow access.
3. Developing the plurality of media in all its forms; radio, television and print.
4. Guaranteeing ready and uninhibited access to useful and reliable government information in addition to assuring press freedom, two things which are impossible to achieve unless they are codified into law as part of a "freedom of information act".
5. Increasing labour productivity, along the lines of "working smarter and not necessarily harder."
6. Reform of the civil service and instilling the ethos of service to the public, by improving the efficiency with which they provide service.
7. Diversifying the economy by strengthening its commercial and industrial base, whilst growing its employment creation potential.
8. Decentralising government and deploying infrastructure and services to the smallest and remotest of population centres.
9. Putting in place an ICT policy (that integrates into the bigger Vision framework) that enables the use of ICTs to deliver the tenets of the national vision.

Intellectual Property Rights and the Legal Environment

Intellectual Property Rights regimes are legal instruments developed to allow inventors, artists and other creators to control and benefit from the fruits of their creativity. IPR regimes must strike a balance between "the need to protect intellectual property that is expensive to produce but easy to replicate, with the desire to promote competition and further innovation"[23]. IPRs can take several forms including patents, trademarks, trade secrets and copyright.

A clearly defined IPR framework is an essential component of advancement in science and technology because it creates the kind of enabling environment that encourages investors to pursue their interests, knowing they will be able to generate public as well as private interests[24].

In Botswana, legislation is now largely in accordance with the Agreement on the Trade Related Aspects of Intellectual Property Rights (TRIPS), and in 1998, it became a member of both the Bern and Paris Conventions, the international baseline intellectual property rights agreements. The Botswana Copyright and Neighbouring Rights Law was passed by Parliament in March 2000. However, whilst the law satisfies the minimum TRIPS provisions, it has not come into operation as yet. Botswana's patent and trademark legislation has also been recently updated. The Industrial Property Act was enacted in 1997 and it's implementing legislation in late 1998. The new act provides internationally recognized standards of protection for both foreign and domestic holders of patents, industrial designs, and trademarks, and fully complies with the TRIPS agreement[25].

17 The policy, under the heading Maitlamo is under development and maintains information at URL www.maitlamo.gov.bw
18 International Telecommunication Union. 2002. Internet for a mobile generation. ITU reports 2002. Geneva
19 Government Computer Bureau. 2002
20 The national identity card
21 Presidential Task Group for a long term vision for Botswana. 1997. Long term vision for Botswana. Towards prosperity for all. Gaborone
22 Milne, D., C. Palmer and J. Yeabsley. 2000. Focusing investment in innovation. On the co-ordination and rationalisation of science and technology and research and development in Botswana. Report for the Min. of Finance and Development Planning. New Zealand Science and Technology Consortium. Wellington.pp.
23 Mann, C.L., Eckert, S.E. and Knight, S.C. 2000. Global electronic commerce. A policy primer. Institute for International Economics. Washington. D.C. 213 pp.
24 United Nations Development Programme and Institute of Statistical, Social and Economic Research, University of Ghana. 2001. Ghana Human Development Report 2000. Science, technology and human development. Accra.
25 US Commercial Service. 2001. Botswana country commercial guide FY2002. Investment climate statement. http://www.usatrade.gov/Website/CCG.nsf/CCGurl/CCG-BOTSWANA2002-CH-7:-005CDCA9

Botswana is now an original registry for Trademarks, Patents and Designs. Previously, any trademark, patent or design was required to first be registered in South Africa or the United Kingdom and only thereafter was protection given in Botswana[26].

However, the documentation and registration of ownership or authorship by Batswana artisans, artists and inventors appears to be rarely undertaken. The inventions of Batswana are not patented in Botswana perhaps because changes have just been made permitting registration of patents in Botswana, as mentioned above. According to the WIPO[27], only one patent was granted to a citizen of Botswana in 2000 whereas the patent office of the GoB recorded fifty-one patents registered to foreign entities in 1999 and five in the year 2000[28]. Not one patent recorded by the Patent Office of the GoB over the period 1985 to date recorded during research undertaken in the preparation of this report was considered of national origin. On another note, the patent office and registrar of companies in Botswana are not computerized and a search through the files must be done manually. In addition, some patents are registered in Harare, Zimbabwe. There were seven patent applications of Batswana origin recorded in the WIPO database in 1998 according to the World Development Indicators published in 2001[29].

The cost and complexity of taking full advantage of patent protection is probably a serious deterrent to an individual Motswana as well as many other entities and companies because the patent must be filed in several jurisdictions around the world in order to secure the maximum protection and benefit. Only large companies can afford the cost of this level of patent protection.

While it is generally recognized that local and traditional knowledge and know-how may not always be properly documented and protected by copyright, modern day inventions, especially those that have been developed in Botswana should be protected and documented.

In the case of local and traditional knowledge, and especially for natural products, complexity is an issue – it may just be too difficult and costly to document and apply for a patent, let alone be granted a patent. That is only a starting point however, as the question of how the community should benefit also arises. Indigenous knowledge creation and innovation is usually collective, intergenerational and for the social good[30]. Seeking a way to channel the benefits to the community may require the creation of a legal entity[31]. Another way forward may be documenting and recording in a database all of the natural products and local practices that form what may be called indigenous knowledge. In the event of perceived unauthorized or restrictive use of these local knowledge resources, a legal challenge may be considered on the basis of information in the database[32].

Parastatals in Botswana as well as the UB and other organizations have made a significant contribution to the country by creating, developing and adapting technologies and processes appropriate to local needs and circumstances. The BOTEC has developed a solar powered hearing aid as well as a centralised photovoltaic (pv) electrical system. The MoA has implemented a livestock identification and trace back system (LITS) designed to ensure that cattle produced in Botswana are identified and traceable throughout their lives in order to meet EU Regulations for imported beef products. GODISA, a non-governmental organisation (NGO) that employs physically and mentally handicapped individuals has developed and produces a solar rechargeable battery that is used for powering hearing aids[33].

The NFTRC is using modern technologies and processes for preparing, marketing and labelling local foodstuffs. The work of RIIC develops and/or adapts new and/or existing technologies in the area of renewable energy, agricultural and building technologies. RIIC reports having registered one patent for an animal proof bin with the relevant authorities in Harare.

There is a need to strengthen these institutions to help them assist Batswana to exploit the benefits of patenting their inventions and innovations for the greater good of all in the country. IPRs are at the core of the cultural and intellectual assets that Botswana will want to strengthen and project globally as it comes to participate fully in the knowledge society.

Energy Technologies

The deployment and use of ICTs often depends on the availability of older technologies such as electricity for powering new innovations. The implication here is that lack of access to older technologies such as power and land-based telephones hinders new uptake of the innovations and hence renders a country uncompetitive, further worsening the divide between leading countries and those in the developing phase. A brief look at the prospects, availability and use of energy technologies gives an indicator of the current and future prospects of improving the information state of the country.

Grid Electricity

Membership in the South African Power Pool gives Botswana access to reliable electrical power. This arrangement added to the small generating capacity from the coal powered Morupule power station, has resulted in the country importing upwards of 60% of its electric power. The expenses incurred in generating and distributing power over a largely sparse country have rendered Botswana's electricity bills some of the highest in the region. A result of this is that in most rural households, electric power is used almost exclusively for lighting.

The distribution network of the Botswana Power Corporation (BPC), the power utility, covers potentially 90% of the population, transiting along the main telecommunications and transport corridors. Even with this extensive network, only 25% of households in Botswana have accounts with the BPC, with the mining sector accounting for 52% of BPC's electricity sales[34] in 1999.

There is however an ongoing, government sponsored, accelerated rural electrification programme which has covered most settlements other than about 230 settlements populated with less than a thousand people each that remain outside the power grid. These settlements account for over 122,000 people, or about 7% of the population.

As of the beginning of 1999, total electricity consumption was in the order of 1.5 billion Kilowatt hours[35]. In 2002, it was estimated at about 1,100 Kilowatt / inhabitant or about 1.76 billion Kilowatt hours. It has undoubtedly increased significantly since. As already mentioned, electricity tariffs in Botswana are the highest in the Southern African region and these high tariffs have been blamed for the re-location of certain energy-intensive industries to neighbouring countries[36]. On the whole, business operators consider the electrical power supply in Botswana to be one of the most reliable in Africa[37].

Solar Energy

According to the US Department of Commerce and the US State Department[38], "solar power is another method of energy production in use

26 http://mbendi.co.za/werksmns/lexaf/busbo.htm#Intellectual
27 World Intellectual Property Organisation. http://www.wipo.int/ipstats/en/
28 United Nations Development Programme. 2002. List of patents collected by Botswana Human Development Report research team
29 World Bank. 2001. World Development Indicators 2001. Science and technology, Table 5.11
30 United Nations Development Programme and Institute of Statistical, Social and Economic Research, University of Ghana. 2001. Ghana Human Development Report 2000. Science, technology and human development. Accra
31 Inger, D. 2002. CEO. Veld Products Research and Development, Gaborone. Personal communication
32 Van Dijshorst, Hilde. 2002. Protecting indigenous knowledge by intellectual property rights: a suitable solution? Report for Veld Products Research and Development. Gaborone

33 Weinstein, H. 2002. Godisa. Technologies for the developing world. Solar rechargeable hearing aids. Personal communication. mwb@info.bw
34 Ruffini, A. 1999. Botswana focuses on electricity network. African energy. Vol. 1 no. 3 http://www.africanenergy.co.za/magazines/evol1no3/story02.htm
35 http://www.botswanapower.com/
36 Mbendi. 2001. Botswana: electrical power – overview. http://mbendi.co.za/indy/powr/af/bo/p0005.htm
37 World Economic Forum. 2000. The Africa competitiveness report 2000/2001. Oxford University Press. Ny. London
38 US Foreign and Commercial Service and US Department of State. 1999. Botswana Energy Sector. http://www.tradeport.org/ts/countries/botswana/mrr/mark0006.html

in Botswana. Botswana receives over 3200 hours of sunshine per annum, and the average daily radiation on a horizontal surface is 21 MJ/meter squared. The GoB initiated the National Rural Photovoltaic Electrification Program (NRPEP) in March 1997 as an alternative source of power for those people or areas that cannot afford or do not have access to grid electricity or diesel. Under this program, which is run by the Rural Industries Innovation Centre based in Kanye, the GoBprovides loans to purchase solar power installations. From March 1997 to the year 2000, the NRPEP has put in 234 solar installations, mostly in the central district of Botswana".

Although Botswana is ideally suited for solar energy applications, its contribution to the national energy balance is insignificant. Solar energy is currently used for home lighting and water heating, electricity production for telecommunications equipment, and in the rural areas where access to conventional electricity is difficult[39]. There have equally been uses in borehole water pumping for farming purposes, but the uptake is still far from well registered on a national scale. Considering the ample solar irradiation that Botswana receives throughout the year, the lack of development of this alternative source of energy is a weakness, despite the fact that input costs are much higher relative to grid electricity.

Solar power is not widely used

Wind Energy

Wind is another potential source of electric power to power ICT tools, equipment and services, but the wind regime in Botswana, ranging in speed from 2.0 to 4.0 m/s, is too low to be useful as a commercial resource. However there is potential for small scale aero-generators for use by several households particularly in the more remote parts of the country where prospects for the extension of the national grid are minimal.

The Information Communication Technology Policy Regime

The Parliament approved Botswana's first Science and Technology Policy in July 1998. This policy clearly articulates the intent to encourage and incubate innovation and research, and goes on to define technology as "the application of science through practical utilization in the development of products and services, which can create wealth and improve the quality of life." One arm of three structures proposed by the policy, the NCST has been appointed with a mandate to advise Government on any policy matter in the S&T sphere. The second organ, the funding agency in the incentive model adopted post the consultancy review of the Science and Technology Policy, BRSTIA[40] is awaiting legislation to exist and begin funding research as per priorities identified by the NCST.

Work on developing a national ICT policy and strategy, which is to be driven by MCST, is nearing completion, with a target date for legislation being March 2005. The policy is to be anchored on the principles of e–Governance; (rural) community access to ICTs; education particularly on-line or distance education; ICT enabled access to health services in rural areas; productivity improvements; e-commerce and developing ICT services as both an industry and an employment generator. Whether the final policy document will run true to this expectation, only time will tell. Both government and the telecommunications regulator, BTA, are committed to implementing and funding a universal access policy. The exact funding arrangements and obligations are subjects of discussion, however operators are expected to contribute to the cost of rolling out access as part of their obligations.

"Freedom to hold opinions without interference, freedom to receive ideas and information without interference, freedom to communicate ideas and information without interference" are constitutionally guaranteed freedoms in Botswana, however without an explicit freedom of information act being in place these cannot, in practice be taken as given and the threat has been recognised internationally as the following quote from Transparency International[41] exemplifies:

"In Botswana, the head of television news and current affairs resigned in April claiming government interference prevented him from carrying out his task properly. Two of Botswana's leading newspapers, The Guardian and The Midweek Sun, were in danger of closing, following instructions to all ministries, state departments, parastatals and private businesses associated with the government to freeze their advertising in the papers. Government pressure on the media indicated the weakness of political commitment to anti-corruption measures and increased transparency."

Whilst lack of policy might have hindered a structured growth of the ICT industry, the realisation in government since the last National Development Plan (NDP 8, 1997-2003) is that computerisation must become a core aspect of government operations. This realissation was a direct result of the Government having computerised various functions such as: payroll, social security pension payments, drivers licenses and the national identity card register (Omang). The automation of customs administration through the deployment of UNCTAD's Automated System for Customs Data Application (ASYCUDA)[42] since July 2002, which allows customs traders to handle most of their transactions – from cargo manifests and transit documents to Customs declarations – via the internet is another practical manifest of this desire to computerise by government. This EDI platform is one element of the broader e-commerce.

During NDP 8, the GoB established an inter-office network, boosted computer literacy and introduced core business applications. Along with Long Area Networks (LANs), a high speed backbone wide area network infrastructure – the Government Data Network (GDN) - was established. The GDN is a high performance TCP/IP based network that uses frame-relay technology and a high speed fibre optic LAN backbone to link key government servers in Gaborone.

Print Media

Botswana has a well developed print media, with several national private newspapers, the largest of which has circulation figures of 27000 (see Table in the annex) and has converted from a weekly to a daily paper since 2003. Several other private regional papers and limited circulation magazines exist, but by far the most dominant print media is the free, government owned and provided daily, the Daily News, which given government's reluctance to guarantee access to state information must play the role of stifling alternative views. This apparent danger has been a concern for private publishers.

39 http://www.botswanapower.com/
40 Milne, D., C. Palmer and J. Yeabsley. 2000. Focusing investment in innovation. On the co-ordination and rationalisation of science and technology and research and development in Botswana. Report for the Min. of Finance and Development Planning. New Zealand Science and Technology Consortium. Wellington. 182 pp

41 Transparency International. 2001. Global corruption report 2001. Southern Africa. www.globalcorruptionreport.org
42 Botswana implements ASYCUDA. http://www.asycuda.org/

Botswana's Information Communication Technology - Asset Base

Telecommunications Infrastructure and Data Communication Services

Infrastructure is a prerequisite for ICT deployment. Botswana has fully digital telecommunications infrastructure that is deployed along a circular transportation corridor that links the major population centres with spurs leading to other rural centres off this central corridor. The Eastern portion of this telecommunications backbone is based on fibre optic cabling and with the rest of the network based on high-speed microwave. The microwave network, which is in the process of being replaced by fibre optic cabling, is one of the most extensive in Africa, linking 50 automatic exchanges and providing connections to South Africa, Zambia and Zimbabwe[43]. However, the core national network comprising telephone exchanges and transmissions systems has not been upgraded in recent years and is performing sub-optimally[44]. This prompted an on going upgrade by BTC starting with Gaborone, which will also allow for deployment of ISDN.

This infrastructure, which belongs to the BTC, serves BTC's telephony and data communications services to its clients. The two national Cellular phone operators (Orange and Mascom) use the infrastructure of BTC to deliver their services across the country (See Figure 5.8). The BTC network provides telecommunications data services with rates of up to 2 Million bits per second (Mbps) to internet service providers (ISPs). For users accessing the internet over telephone lines, the telephone network allows for log on rates close to 56 Kbps for dial-up access. The BTC also provides leased lines with data throughputs available at 64,128 and 256 Kbps. A more recent innovation is the wireless connection with rates of 128 Kbps.

Botswana has a sound telecommunications infrastructure

Leased lines are the most popular mode of data transmission and internet access for corporate entities, whilst analogue dial-up is more popular amongst small business and home users. Alternative technologies such as Very Small Aperture Terminal (VSAT) have proved relatively unpopular so far, but BTC is planning a rollout of VSAT offering up to 2 Mbps of data, voice and video by the end of October 2004.

More recently, corporate and home users can use Integrated Services Digital Network (ISDN) technology operating at 64 Kbps via dial-up. The service providers do however allow sharing of bandwidth at minimum 'chunks' of 16 Kbps. Frame-relay services are also available.

43 Jensen, M. 1999. AISI-connect national ICT profile Botswana http://www2.sn.apc.org/africa/countdet.CFM?countries__ISO_Code=BW
44 Government Data Network. 2002
45 Short for wireless fidelity and is meant to be used generically when referring of any type of 802.11 network, whether 802.11b, 802.11a, dual-band, etc

High speed internet on ramp technologies such as Asymmetric Digital Subscriber Line (ADSL) and cable Internet that are popular elsewhere are not yet available in Botswana. The promotion and diffusion of broadband or high-speed access to the Internet is considered a hallmark of e-enabled jurisdictions because it opens up a whole range of online products and services. ADSL uses existing copper telephone lines and cable Internet takes advantage of co-axial cable connections. At present, there is no cable television provider in Botswana. The BTC is currently testing broadband access which will herald an even better network readiness in the future. Botsnet, BTC's ISP subsidiary, is currently testing and piloting WIFI[45] access using a service provider at a local hotel.

The BTC's customer base for fixed line telephony has increased from 80,000 in 1997 to 150,000 in 2002. BTC introduced new services including voice-mail, paging, toll-free calling, global pre-paid calling, as well as various value added services. The BTC, in keeping with the GoB's commitment to providing basic services across the country, completed projects in the Barolong, Bobirwa and Tswapong sub-districts covering a total of 48 villages. A further 132 villages were connected by the end of 2002.

Telecommunications Regulation and Liberalisation

The telecommunications sector has been liberalised following the set-up of the sector regular, BTA in 1996 through the Telecommunications Act of 1996. A year lator, the national carrier (BTC) faced competition in all fields, with the exception of fixed line telephony, with the awarding of GSM licences to Mascom and Vista (now Orange). One international satellite service provider offering international connectivity for data communication, Africa Telecommunication PTY, forms part of the competition. UUNet, one of the 15 ISPs in Botswana also offering leased lines services which until a ruling of the BTA, was considered the exclusive domain of the BTC.

The brief history of the BTA has shown it to be a successful and forward looking regulator. The International Telecommunications Union (ITU[46]) attributes this to Botswana's post-independence history of good governance, democracy, intolerance of corruption and respect for legal processes. Some of its successes include fixed-line network more than doubling in size from 1997 to 2002, and the mobile network growing from zero to well over 330000 subscribers over the same period. These outcomes are due to the fact that the the BTA enjoys complete freedom in the functions of licensing operators and in establishing and financing its own budget (of which 90% derives from operating licenses and spectrum fees). In addition:

- It has developed policy through consultative processes, including a series of open meetings held in all major cities.
- It has moved relatively quickly, for instance converting the telecommunications policy into an Act within a year, and completing the process of awarding GSM cellular licenses, to Vista and Mascom, within just nine months.
- It has not been afraid to take controversial decisions, most notably by not awarding a mobile license to the incumbent fixed-line operator, BTC.
- It has consistently invested in human resources development and gender equality.
- BTA has established through an act, rules on numbering, property access, radio communication equipment and testing and type approval of telecommunications equipment.

Broadcasting Services

Botswana[47] has two private commercial radio stations operating exclusively in Gaborone. Radio Botswana includes the non-commercial Radio Botswana One, which plays no advertising, and the commercial station, Radio Botswana Two. Both broadcast nationwide. The national television broadcaster, Botswana Television (BTV), is a non-commercial station that is part of the Department of Information and Broadcasting with

46 : International Telecommunication Union. 2002. World telecommunication development report 2002. Reinventing telecoms. Geneva. 188 pp.
47 Botswana Telecommunications Authority. http://www.bta.org.bw/broadcasting.html

Radio Botswana. Botswana Television started broadcasting in July 2000. There is no commercial television station in Botswana and no cable TV (CATV). A pay satellite service, MultiChoice (DSTV), headquartered in South Africa, broadcasts commercial stations from Botswana's southern neighbour. Gaborone Broadcasting Corporation (GBC) is a television re-broadcaster.

Radio is the most important ICT in Botswana, with about 68% of households owning a radio. In Africa as a whole, one in every four people or 25% own a radio[48]. Radio Botswana transmitter coverage offers medium wave and FM coverage around the main towns in the country where most people are located[49]. There does not appear to be any Botswana radio stations or other Botswana based or focused operators streaming sound programming over the internet[50].

BTV broadcasts eleven hours a day during the week and twelve hours on weekends in English and Setswana[51], with the rest of the hours covered through the monitoring of the BBC World broadcast. BTV broadcasts using terrestrial transmitters and also via commercial satellite transmitters. Terrestrial transmission is greatest near the main towns and more transmitters are being installed to reach communities throughout the country. Several other independent providers of telecommunications services have made available telecommunications infrastructure that is used by independent service providers. VSAT terminals are operated independently of BTC, which is also on the verge of launching its own VSAT network.

A National Broadcasting Board established through the National Broadcasting Act of 1998 has been busy preparing the ground for a policy shift towards allowing community radio stations. Nothing much has been done in that direction, but with the expected policy, communities will be able to run small radio stations dedicated to their needs. There is equally talk of merging the two regulators to form a unified communications regulator, a scenario that might help streamline some of the processes and perhaps allow an integrated approach to universal access provision.

Botswana's InfoState and Technology Achievement

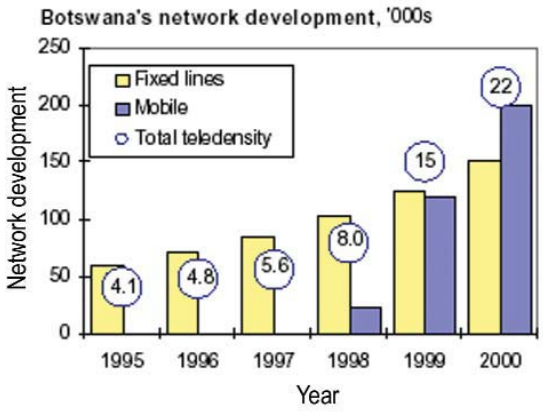
Measured on a per capita basis compared to other countries in Africa, Botswana has one of the highest nominal levels of bandwidth, finishing ninth overall in Africa on a bandwidth (measured as bits) per capita basis. Orbicom[52] has developed a new index, the InfoState, that measures the (relative) digital divide between and among countries. This is in addition to the 2001 UNDP Human Development Report Technology Achievement Index (TAI) that measures the "performance of countries in creating and diffusing technology and in building a human skills base".[53]

Information Communication Technology diffusion and the InfoState for Botswana

Telephones and the impact of mobile telephony

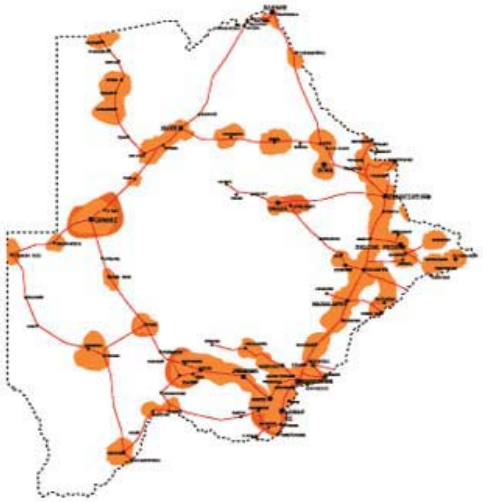
In common with many other African countries, uptake of the mobile phone in Botswana has been a great success, and now far exceeding the capacity and reach of the fixed-line. From virtually no subscribers in 1997, there are now more than 367,000[54] subscribers and with one of the two local operators claiming its subscribers exchange over 100,000 SMS messages daily.

Figure 5.7: Development of the telephone network in Botswana



Source: Summarised from the ITU case study of effective regulation in Botswana, available at: http://www.itu.int/ITU-D/treg/Case_Studies/Index.html .

Figure 5.8: Map of cellular phone availability across Botswana



(a) Orange Botswana

48 Jensen, M. 2002. The African Internet – a status report. July 2002. http://www3.sn.apc.org/africa/afstat.htm
49 Government of Botswana. 2001. Botswana National Atlas. Dept. of Surveys and Mapping. Table 22.9 Radio Botswana transmitter coverage contours. And figure showing radio transmitter coverage.
50 TVRadio World. 2002. Botswana. http://www.tvradioworld.com/region3/bot/
51 http://www.btv.gov.bw/btv/programme_lineup.html
52 Orbicom, 2003,Monitoring the digital divide and beyond, http://www.orbicom.uqam.ca, 2003.
53 United Nations Development Programme. 2001. Human Development Report: Making new technologies work for human development,NY
54 Botswana Information Technology Society. Annual conference. 2002.

(b) Mascom Wireless

As figure 5.8 shows, the cellular operators have expanded coverage to virtually all the inhabited parts of Botswana, following the major transportation routes. The expansion will go on as part of universal access obligations that the regulator imposes on all major operators including the BTC.

PCs and the Internet

The data showing ICT diffusion in Botswana as a whole and in households is presented in the annexes. According to the ITU, there were over 65,000 PCs in Botswana in 2001. In 2000, the Central Statistics Office (CSO), reported 15,795 PCs in households across the country, of which 66% were located in households in urban centres. The Government Computer Bureau reports between 10-15,000 PCs in the civil service. According to Network Wizards[55] the number of internet hosts under the .bw domain were 1,920 in January 2004. This number however is an estimate and does not take into consideration Botswana based or registered servers listed under other domains, of which .com, .net. .int, or .org are possible examples and private servers located behind corporate firewalls. Most internet hosts are located in urban areas where network and support services are most likely to be found.

The total iInternet bandwidth to Botswana is about 14 Mbps[56], of which 10.5 Mbps is used by the national carrier, BTC. These channels link to the global internet backbone via service providers located in the following countries:

- 8 Mbps asymmetrical (8 Mbps downlink, 2 Mbps uplink) to Canada
- 2 Mbps duplex fibre-link to South Africa
- 512 Kbps duplex to USA via France

Points of presence (POPs) and virtual points of presence affording Internet access across the country are available in Gaborone, Francistown, Lobatse, Selebi-Phikwe, and Maun which altogether have a population of 392,344 people. Factoring in Greater Gaborone, which includes Mogoditshane and Tlokweng, brings the total population to 446,320. The CSO data further shows that 22% of the population has access to 44% of the fixed lines and 66% of the home-owned personal computers. Clearly there is an information divide between rural and urban areas. It is possible that these figures understate the digital divide because many people access the internet at work and in urban areas predominantly where companies with internet access and LANs are more likely to be located. Similarly, virtually all cyber-cafes are located in urban areas.

About 27% of the population has a choice from a number of local internet points of presence to access the internet. Botsnet, the public owned service provider is the only ISP to provide a national telephone number for dial-up access at local telephone call rates from across Botswana. As a result, a further 60% of the population could potentially access the internet using a dial-up connection.

Factors limiting access to PCs include the high cost of PCs relative to average wages and the ability to use a PC. As a result, most users access the internet at work or in cyber-cafés that typically charge P10.00 per hour. Cyber-cafés, of which there are about fifteen in Botswana, are usually located in urban areas, further underlining the digital divide. Nevertheless, cybercafes are the predominant form of public access to the internet. There are no community based public access centres to the internet or to PCs and there are no telecentres.

An assessment of computer use in rural areas undertaken by BOTEC, the Study on Community User Information System, revealed that 91.5% of the sample population of 1,000 people had never used a computer yet 70.5% of the same sample had a desire to learn about computers. The sampled communities rated telephones as their most important communication tool ahead of post mail. These figures indicate that Batswana as a whole are keen to exploit ICTs but are unfortunately unable to do so.

The market for the provision of internet services has been liberalized in Botswana. There is competition between the ten registered ISPs in Botswana. The total number of users was estimated to be around 40,000 at the end of December 2001, compared with 10,000 users in 1999.

There are also four licensed private network telecommunication service providers and six data gateway service providers. The majority of these are found in the business entities, institutions, and Government organizations.

BTC's backbone data and telephone network is 100% digital. Recently, fixed wireless loop technology was introduced to reduce connection-waiting times. BTC's advanced telecommunications infrastructure means high-speed or broadband access to the Internet is a possibility throughout much of the country. Some operators are making use of satellite telecommunications services with six operators already using VSAT to provide both national and international data services.

State of the Internet in Botswana

On the basis of the total bandwidth per capita, i.e. close to 15 Mbps / 1.7 million people, Botswana has one of the highest measures of internet use in all of Africa[57]. Internet access costs are relatively modest compared to the rest of Africa. In Botswana, the cost of 30 hours of internet access permonth was about USD 28.30, in 2001 or about 0.12% of GDP per capita. The cost per capita for 90 minutes per month of mobile phone use in 2001 was estimated at 0.16% of GDP per capita. This compares favourably to the averages for these figures in Africa as a whole, i.e. 2.50% and 1.14% respectively[58]. However for most of the population and especially those living in rural areas, these figures are still relatively high. As a result, PCs and the internet remain largely inaccessible.

Botswana's internet space has been estimated to include over 7,240 unique Web pages associated with about 122 main Web hosts under the .bw domain (109 using the 2004 survey by Network Wizards) (see Table A.3 in Annex). Over 5,790 (80%) of these pages are estimated to be in the English language. It was not possible to establish the number of pages in Setswana. Other languages listed under the .bw domain include Chinese

55 Network Wizards. January 2004. http://www.isc.org/ds/reports/2004-01/dist-bynum.php
56 International Development Research Centre. 2002. The Internet: out of Africa. http://www.idrc.ca/acacia/divide/
57 International Development Research Centre. 2002. The Internet: out of Africa. http://www.idrc.ca/acacia/divide/
58 International Telecommunication Union. 2002. Internet for a mobile generation. International Telecommunication Union Report 2002. Geneva.

(245 or 3.4%), and German (206 or 2.8%). A German domiciled site is also located under the .bw domain (Baden Wurtenberg).

The majority of government web sites are of the "brochure" type with information presented in linear form, with little opportunity for interactivity. A government procurement site also exists which provides access to information in the form of downloadable bid documents and requires online registration. Some sites such as the BTA site do allow for downloading application and tender forms online, but they must be printed out and completed manually before being delivered by post or in person.

The Technology Achievement Index (TAI)

The TAI measures achievements in four areas: technology creation as measured by the number of patents granted to residents and by receipts of royalties and license fees from abroad, diffusion of recent innovations as measured by the number of internet hosts per capita, diffusion of old innovations (telephones per capita, electricity consumption per capita) and human skills as measured by mean years of schooling and the gross tertiary science enrolment ratio.

The calculation of the TAI for Botswana appears in the Appendix in a Box A.1 entitled Calculating the TAI for Botswana. According to currently available data, the TAI for Botswana is estimated to be 0.377. The UNDP Human Development Report 2001 calculated the TAI for 72 countries for which data was available. At the time of the preparation of the Human Development Report 2001, data for Botswana was not readily available. Using the currently available data for calculating the TAI, a score of 0.377 places Botswana among the potential leaders in terms of technology achievement, roughly in 35th place at 2001 figures, thus assuming all the other countries have remained static, which is extremely unlikely. Finland had a top score of 0.744 and Mozambique had the lowest score at 0.066.

This means that Botswana is situated in a group made up of nineteen countries including South Africa, Spain, Italy, Malaysia, Mexico, Argentina and Costa Rica assuming these are static at 2001 figures which is certainly not reflective of current realities. So in fact Botswana is more likely much further back than this computed figure, misaligned in time with other countries' statistics, seems to suggest. These potential leaders are characterized by having invested in high levels of human skills. They have diffused old technologies widely but innovate little. Each country in this group tends to rank low in one or two dimensions, such as diffusion of recent innovations or of old inventions. Most countries in this group have skills comparable to those in the top group of technology leaders.

Because of the lack of data in rural areas, it has not been possible to compute the TAI or its component indicators on a per district basis.

It is to be noted that this comparison suffers somewhat because the data used for the calculation of the TAI reported in the UNDP Human Development Report 2001 was derived in 2001 or before, whilst the data presented here in the calculation of the TAI for Botswana is based on data from 2000 to 2004. Botswana has made great strides in the diffusion of mobile telephony that would have meant a lower score in 2001 when the TAI was first introduced. A more revealing index would be the country's InfoState relative to the rest of the world as developed by Orbicom.

Structure and use of Information and Communication Technologies: An InfoState[59] for Botswana

The Information Communication Technology Market and Structure

The ICT market in Botswana has grown rapidly in the last decade. As at August 2004[60], the total value of the ICT market in Botswana is estimated to be between Pula 700 million and Pula 1 billion. The value of the ICT market in 2005 is estimated to be higher, with predictions that the market is close to Pula 1 billion. This, places Botswana among one of the most technologically advanced countries in Africa.

Traditionally, the government has been the largest single operator in Botswana and is by far the greatest purchaser of ICT goods and services. In 2002, it was responsible for an estimated 65-68% of the market value, with the private sector responsible for a paltry 7.5% of ICT market purchases. Total public sector spending on ICTs in 2004 is estimated to be about Pula 250 million, of which Pula 160 million was hardware expenditure and Pula 1 million software expenditure. Contrary to past acquisition behaviour as at August 2004 there appears to be a decisive shift towards acquisition of hardware as opposed to software and services. It is interesting to note that the ICT expenditure outside the government sector is now as high as 600 to 700 million Pula per annum. This is a clear indication that the private sector is has taken over from the Government and requires more attention and support in its efforts in the ICT sector.

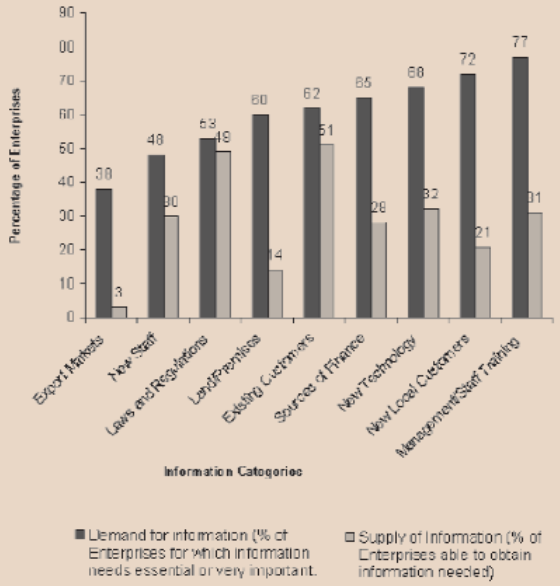
Government expenditure on services has over the years been declining and in 2004 was estimated to be at approximately Pula 975,838 as compared to close to Pula 3 million in 2003. This is a clear indication of the increased number of qualified local IT specialists and is also an indication that Botswana's market for ICT specialists and managers has matured. Outsourcing of maintenance and support of government computers to the private sector is increasing in line with government objectives to strengthen the capacity of the private sector and to lessen the role of government in the economy.

The value of ICT spending in Botswana is a likely reflection of the computerization of the workplace throughout the country. Consequently, the ICT market may stabilize in the future, but this is unlikely to take place in the near future given the increased diffusion of the internet and new access technologies including wireless access technologies.[61]

The US Commercial Service estimates the size of the market for computers (hardware, parts, accessories and software) in Botswana at USD 28 million or about Pula 168 million[62]. In the PC market, Microsoft products dominate, with the Government of Botswana tenders for PCs requiring Microsoft operating systems. The use of Open Source software such as Linux does not appear to be significant.

59 Infostate is the measure of relative digital divide as proposed by Orbicom. It combines both infodensity and info-use.
60 Government of Botswana 2004, National E-Readiness Assessment: ICT Sector Survey, Gaborone. This assessment is an input towards development of Maitlamo Botswana's National ICT Policy.
61 Government of Botswana 2004, National E-Readiness Assessment: ICT Sector Survey, Gaborone. This assessment is an input towards development of Maitlamo Botswana's National ICT Policy.
62 US Commercial Service. 2002. Botswana country commercial guide FY2002. http://www.usatrade.gov/Website/CCG.nsf/CCGurl/CCG-BOTSWANA2002-CH-5:-005CDCA0.

Figure 5.9: The information needs gap



Clearly, there is an unsatisfied need for information among business enterprises in Botswana. This same survey established that:

- Most companies in Botswana stored their records on paper;
- 70% of surveyed service enterprises stored accounts on computers and;
- 9% of non-exporting manufacturers stored accounts on computers.

Information Communication Technology use in Government

The Government data network (GDN) has expanded to 99 towns and villages and now reaches over 7,000 civil servants. Departments typically connect to the network at data rates ranging from 32-128 Kbps using a variety of technologies. These rates are very low on a comparative basis and maybe insufficient to sustain access to network resources.

A skills development scheme has been initiated where 6 civil servants are sent on long term IT training and 24 others for short term training yearly, which has not been enough to build adequate skills into the civil service cadre. A recent study undertaken by Price Waterhouse on IT use in government showed that several, sometimes key, Government procedures and data registers are still operated and maintained manually[63]. For example, there is no document management system in government and all archiving is done using microfiche, a cumbersome and inefficient process. Citing some of these use examples can only be anecdotal, to get a clearer picture of where Botswana stands vis-à-vis the digital divide, an extract from the Orbicom[64] report using data ranging from 1996 to 2001, to map the relative InfoState for the country is made.

Botswana's Infostate[65]

As discussed previously, the Infostate is a new index proposed to indicate the relative digital divide between and among countries. It has two elements, a country's relative infodensity and info-use. Infodensity is in turn decomposed into networks, which are made up of eight other sub-components, and skills that include adult literacy and the trio of gross enrolment ratios. Info-use is on the other hand a composite of two elements, info uptake (decomposed into 4 sub-elements) and intensity of use of ICTs with its three sub-elements (see Text Box 5.6 for the sub-elements and the Appendix for its calculation).

Tables 5.2-5.3 and Chart 5.1 below summarise the major findings of the Orbicom report. As indicated, Botswana falls below the world average (given the name Hypothetica) in all measured elements and subcomponents, coming close only in terms of enrolment (Chart 5.2). What table 5.2 shows is that the leading countries score four times on a scale as Botswana and Namibia. Even against the best performing African countries, Mauritius and South Africa, the number one country Sweden scores upwards of twice as much on all the indices. Table 5.3 and Chart 5.1 indicate the evolution of the infostates and the closing of the gap by the poorer countries over the period 1996-2001.

Box 5.6:
Components of Orbicom's Infostate Index for the Digital Divide

INFOSTATE

Infodensity

Networks

Main telephone lines per 100 inhabitants
Waiting lines/mainlines
Digital lines/mainline
Cell phones per 100 inhabitants
Cable TV subscription per 100 households
Internet hosts per 1000 inhabitants
Secure servers/Internet hosts
International bandwidth (Kbs per inhabitant)

Skills

Adult literacy rates
Gross enrolment ratios
Primary education
Secondary education
Tertiary education

Info-use

Uptake

TV equipped households per 100 households
Residential phone lines per 100 households
PCs per 100 inhabitants
Internet users per 100 inhabitants

Intensity

Broadband users/Internet users
International outgoing telephone traffic minutes per capita
International incoming telephone traffic minutes per capita

Source: Orbicom 2003. Monitoring the Digital Divide and Beyond

As is apparent from Chart A.1, the average infostate for the world (Hypothetica) has been steadily rising over the study period. However, whilst Botswana's has risen upwards as well, it has not kept pace with the rapid global trend. Only during a brief period between 1997 and 1999 has Botswana's growth rate been above average, having managed to overtake Namibia between 1998 and 1999. But beyond 1999, the growth rate has slowed so much that Namibia went ahead just before 2000. The explanation for the rapid growth is in part due to the rapid growth of the cellular phone network, starting from virtually zero up until then. While this growth has continued it has not kept pace with other developments in other countries such as the use of the deployed infodensity.

63 Government Computer Bureau. 2002.
64 Orbicom 2003. Monitoring the Digital Divide and Beyond
65 This part has extracted from the Orbicom study, Monitoring the digital divide and beyond

From Table 5.2 one would have expected that compared to Namibia which only has an infodensity of 58.1 (ranking 75 in the world), Botswana's infodensity of 60.6 (rank 72) would have translated into a higher info-use index. However on use, Namibia leads at 49.6 (rank 80) compared with Botswana's 41.8 (rank 88). What is instructive from this is that a way must be found for ensuring that Batswana use the deployed ICT infrastructure, particularly the Internet where despite the country's high bandwidth per capita, it still ranks very low in terms of use. The same is reflected in Chart 5.2 showing the relative component infostates of both countries.

Table 5.2: Infostates and Rankings, 2001

	Infostate		Infodensity		Info-use	
	Index	Rank	Index	Rank	Index	Rank
Sweden	230.5	1	228.2	2	232.8	6
Netherlands	224.2	4	232.6	1	216.1	9
Hypothetica	100	-	100	-	100	-
Mauritius	92.5	47	79.7	55	107.4	41
Costa Rica	86.0	55	71.1	61	103.9	44
South Africa	74.5	59	81.8	53	67.9	64
Namibia	53.7	77	58.1	75	49.6	80
Botswana	50.3	81	60.7	72	41.8	88
Ethiopia	6.1	138	7.4	137	5.1	138
Chad	5.2	139	7.3	138	3.7	139

Chart A.1:
The Evolution of Infostates in Select Countries

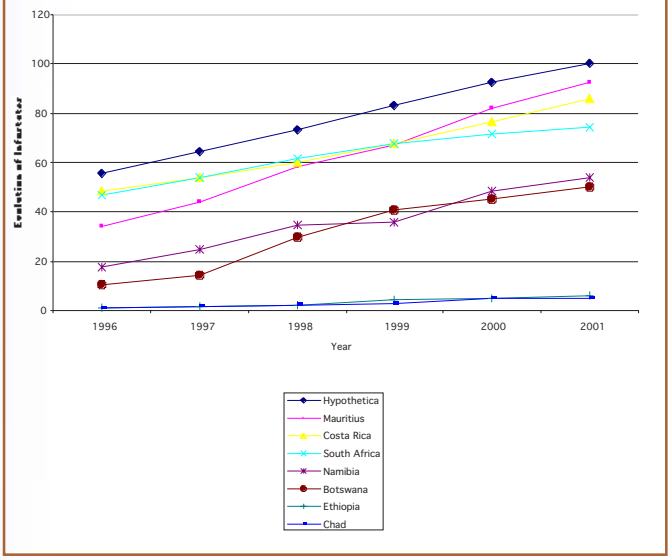
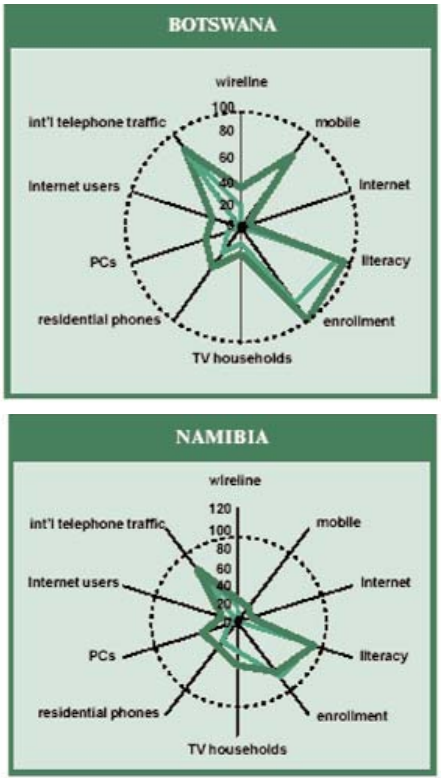


Chart A.2:
Chart showing evolution of component infostates for Botswana and Namibia[66]



An Information Society for Botswana: Challenges, Prospects and Solutions

The GoB recognises the need to diversify its economy as the country inevitably integrates into the global economy. The critical issues that the Government faces in doing so are: unemployment in general and the lack of trained specialists, business managers and especially entrepreneurs willing and able to take advantage of ICTs in Botswana. Other issues of direct relevance to the private sector are: poverty, economic diversification and public sector reform. Since NDP 8, the following critical issues have also emerged: HIV/AIDS, financial discipline, citizen economic empowerment and recurrent and maintenance costs[67].

The challenges and proffered solutions are presented in tabular form in tables 5.6 and 5.7. The tables respectively capture the challenges and prospects in general as they relate specifically to the GoB. The third column in each table contains running commentary on likely successes or failures, or where no solution has been thought of, a hazarded solution route is thrown in as a challenge to the country if it desires to do better than it has already.

The GoB has recognized that it needs to look outward to achieve the objectives of economic diversification. Two projects illustrate this more than any other, namely IFSC concept that is captured in text box 5.6, which is moderately successful. The other project is a case of missed opportunity, but one that can be salvaged in the form of developing the textile industry to take advantage of the AGOA (Text Box 5.7). Both of these are respectively actual and potential sources of FDI flows and points of presence for Botswana in the global village.

66 As per the Orbicom Report
67 Miinistry of Finance and Development Planning. 2000. Mid-term review of NDP 8. Government Printer, Gaborone

Table 5.4: Challenges and Prospects for an Information Society for Botswana

Challenges	Tried/Proffered solutions	Commentary
Optimal management of .bw domain, plus quality of operation of Internet network given available bandwidth		Need for an independent audit to pinpoint where problems are and offer solutions.
Citizen (corporate and individual) participation and ownership of ICT stake given SMME status	30% local reservation scheme Government subsidised credit schemes, e.g. CEDA[68]	Government not enforcing (better enforcement – but offers a temporary solution). No guarantee recipients would be in the ICT sector or get the reserved allocation.
Build ICT capacities and skills	Uncoordinated training at the UB and other private training institutions	Carry out a skills audit, and then project the kind and quantity of required skills in the next 5-10 years.
Increasing specialist skills such as IP network engineers, managers and analysts	MSCE training being offered by some private companies	Not enough uptake and the level of training not high enough, however the prospective establishment of Cisco academy perhaps in collaboration with the University of Botswana might go a long way in addressing some of these.
A globally competitive Botswana	Some formative success in some areas, e.g. IFSC (see Box 5.7)	No strategic focus on ICTs as guarantors of a competitive edge.
Economic diversification	International Financial Services Centre initiative (see Text Box 5.7) Attracting FDI flows (BEDIA plus IFSC) Government incentive schemes: CEDA, local procurement and reservation policies.	Some positive outcomes so far, but not enough nor diverse to sustainably be relied upon (more engines of growth needed). FDI flows have dwindled over the time whilst the expenditure on attracting them has ballooned (BEDIA[69]).
Retaining the skills in the economy		A reversal of a skills drain needed, since government is failing to compete both with (local) industry, but more critically, globally (South Africa, USA and Europe).
Security of e-business plus recognition of electronic signatures		Develop EDI and EFI beyond just Customs. Legislate for e-commerce in general and recognise digital signatures/ contracts. Deploy secure socket servers (SSL).
Innovation of use of existing platforms, such as mobile phone		Deploy SMS as an information engine/discussion forum; e.g. health hotline or news breaker; traffic information etc.
Build new business models for public access centres (teleaccess)		M-commerce (mobile commerce) applications using the local language compatibility of the SMS should be adopted to take advantage of the explosive growth of mobile phones. A business model along the lines of cyber cafes or the Senegalese teleaccess centres would go a long way in allowing service in the remotest of areas.

68 Citizen Entrepreneurship Development Agency, which charges below market interest on loans up to a maximum P2 million
69 Botswana Export Development and Investment Agency Annual Report 2003

Table 5.5: Information Society for Botswana: Challenges for the Government of Botswana

Challenges	Tried/Proffered solutions	Commentary
Civil service reform and service delivery	General computerisation of functions in government, e.g. Asycuda (customs), driver registration etc.	By working in real time, a mindset change might be instilled into service providers, and as shown in the text box 5.11, Government must learn to do more with less.
E-governance and providing access to public information	Some intention on the part of the MCST to provide access to all citizens.	Lack of Access to Information Act (AIA) will remain a hindrance and a sore issue where the Government's commitment to the public's right to access to information is concerned. AIA must be enacted as a matter of urgency.
Decentralisation	Councils have been given power to decide and generate some of their revenues.	Devolution of (decision making) powers to people at the front desk. Economic (and legal) empowerment of districts/local authorities to drive own agendas. Remuneration in local Government must be competitive and comparable with those in central government for the same skills set.
Building and sustaining niche areas of excellence	The MCST dreams of Botswana being the ICT hub for the SADC region.	Words need to be translated into action. Intentions should be backed up by deliberate policy initiatives and implementation to make them a reality (see a potential in the textile industry, Text Box 5.8).
Turning information into knowledge	On going schools computerisation program Computer awareness classes at the junior certificate level.	Develop innovative, project based computer use in schools for all pupils. Will only happen through use (see below for specific suggestions).
Capacitating (e-enabling) the SMME sector		Develop model business and technology incubators, as well as information/resource centres that are accessible to all.
The ultimate challenge: moving away from the paradigm of universal access to universal service	Government through its utility parastatals (power, telecomms, water etc.) has laid infrastructure that is (potentially) accessible to 90% of the population.	Providing facilities has not translated into actual service, meaning the purported policy of universal access is not enough to guarantee use; and it is through use that the greater benefits will accrue to the citizenry and the SMME sector. Policy should shift to universal service, which presupposes demand on the part of potential users, meaning their economic well being must be such that they can pay. Thus the impressive per capita economic performance must translate into actual money in the pockets of the greater majority of Batswana, a situation that still eludes more than half of the population.

Box 5.7:

FDI flows – the case of the International Financial Services Centre

The GoB has developed IFSC[70] with the objective of creating sustainable employment opportunities, enhancing the skills base of the Botswana workforce, diversifying the revenue base of the country and fostering the deployment of modern financial services technology in Botswana. Much of this will depend on the successful and strategic use of ICTs and of the internet especially.

The IFSC will attract foreign capital and strengthen the capacity of Botswana to serve the financial services needs of the region and of the world. However, to fully take advantage of new technologies and management practices, and especially ICTs, Botswana will need to help the private sector grow, use and apply these technologies and practices.

The GoB continues to focus on the development of the financial services sector as part of its policy of economic diversification. According to the Economist, *"the IFSC will act as a conduit for funds from South Africa and the rest of the world… and some banks are relocating from central Johannesburg … the outlook for some success is positive"*. The IFSC is based on a legal jurisdiction rather than a physical location and attracts companies based on Botswana's international reputation which has recently been enhanced by its high sovereign credit rating[71].

The IFSC is an innovative project that builds on sound business intelligence and marketing and on the strengths of Botswana. To nurture this opportunity into one that can significantly transform the business landscape in Botswana and contribute in a real and significant way to economic diversification, much more will need to be done.

Further success of this project will require sustained use of ICTs to allow for services (electronic data interchange (EDI) and electronic funds transfer (EFT) services) in real time. This thus calls for the development of higher skills and more secure servers. EFTs are an essential component of B2B and of e-commerce in general. They are the financial transactions that underpin e-commerce in all its forms through the intermediation of the global banking system[72]. However, for this to happen *"banking and payment systems need to be able to process transactions in real time, both domestically and in multiple currencies on international markets"*[73]. One way to achieve this would be for the IFSC to encourage international firms that already have this capacity to participate in the local economy and transfer technology and knowledge to the domestic market.

Box 5.8: FDI flow potential through the Textile sector

Under the Africa Growth and Opportunity Act, a US law), some countries in Africa, including Botswana are allowed to produce and sell their products in the USA without tariffs. Local producers in Africa are scrambling to build supply chain networks of producers of locally spun yarn and woven fabric, that for example, can be cut and sewn in local factories and then exported to the multi-billion dollar ready-made garment industry in the USA. Simply finding the location of and communicating with suppliers in a region like Southern Africa requires quite a bit or work[74].

Perhaps ICTs can be used to help build and sustain these supply chains and help enhance trade with US based suppliers and markets. The establishment of public or community based access centres combined with business incubators could be undertaken to build the capacity of the Botswana textile industry along with other sectors and businesses to exploit this and related opportunities. In Botswana, there are about 16,500 listed textile companies presently operating[75]. Of these, manufacturing establishments contributed 7.7% to the total operating establishments. The Clothing and Other Wearing Apparel industry was the leading contributor to manufacturing with 221 establishments. Clearly there are a sufficient and probably larger number of enterprises in place to consider establishing such a supply chain in Botswana.

Another useful application is based on using the internet to scope market opportunities. In Mauritania, work undertaken by the World Bank to explore market opportunities for niche agricultural products has determined that high value melons for example are in great demand at certain times of the year in Europe. Certain melon varieties sell for close to USD 10,000 per hectare. Using the internet and agricultural data from the Eurostat[76] statistical database, which logs all exports and imports of agricultural products by country in the European Union, it is possible to accurately monitor and predict the peaks and troughs of demand for agricultural produce and to plan cultivation accordingly[77].

Given the incredible growth in the number of cellular phones and in the use of related applications such as SMS, the potential of mobile or M-commerce should not be underestimated. Several countries are experimenting with mobile voice and SMS based applications. In Botswana two examples exist of where enterprises have tried to add value by using the availability and reach of the mobile phone, First National Bank (FNB) have recently started an SMS (or email) notification to customers who opt for it, every time there is a transaction on their accounts through their InContact service; equally a local radio station (Gabzfm) and one of the two mobile operators (Mascom) have an arrangement where Mascom subscribers can call a number and access news and other programming of the radio station[78]. Cellular phones can and have been put to other uses as shown in box 5.9 below.

70 International Financial Services Centre. 2002. http://www.ifsc.co.bw/welcome.htm
71 The Economist Intelligence Unit. 2002. Country profile 2002. Botswana Lesotho. London
72 DeMaio, H. 2001. B2B and beyond. New business models built on trust. Deloitte & Touche. Wiley. NY
73 Mann, C.L., Eckert, S., Cleeland Knight, S. 2000. Global electronic commerce. A policy primer. Institute for International Economics. Washington. D.C.
74 Cochrane, J. 2002. USAID Bureau for Economic Growth, Agriculture, and Trade, Washington, D.C. Excerpted from electronic message posted to the AFRIK-IT public mailing list ("African Network of IT Experts and Professionals (ANITEP) List" <AFRIK-IT@LISTSERV.HEANET.IE), Sep. 18, 2002. jcochrane@usaid.gov
75 Central Statistics Office. From CSO Web page under Industrial Statistics
76 Eurostat. http://europa.eu.int/comm/eurostat/Public/datashop/print-catalogue/EN?catalogue=Eurostat
77 Gouvernement de la Mauritanie. Programme de developpement integre de l'agriculture irriguee en Mauritanie. http://pdiaim-div.org/archives/Nouvelles%20janvier%202002.htm
78 Sebusang, S.E.M. and Masupe, S. (2003) ICT development in Botswana: Connectivity for rural communities The Southern African Journal of Information and Communications, Issue No. 4

Box 5.9: Select mobile voice and SMS messaging applications

What kind of information can be exchanged using mobile phone technologies?

Commercial and financial information
- Exchange rates
- Commodity, agricultural market prices and movements
- Stock market prices and alerts (e-ticker)
- Access to individual and business accounts with banks, utilities and other services
- Funds transfers, e-cash
- Targeted news: technologies, markets, practices, contacts, etc.
- Advertisements

Other information
- Instant messaging, simplified chat
- E-mail alerts linked to main e-mail box or other needs
- Government info. On policies, speeches, etc.
- Weather info.
- Emergency information
- Personal information

E-government for Botswana: Challenges, Priorities and Benefits.

Government, like any other business, stands to benefit from the productivity gains afforded by increased use of ICTs. But what specifically can these tools bring to people and how can they benefit human development (see Box 5.10).

To start with, ICTs can transform the business of government by increasing the effectiveness of information storage, retrieval and management. Many business processes in the GoB are still operated manually. Given the size and operational budget of the Government, there is clearly room for improvement.

Box 5.10: E-government - benefits and outcomes

Key benefits
- More accessible government information and services
- Faster, smoother transactions with government agencies
- Increased access to government decision makers and to parliamentarians
- More local (distributed) access – greater ubiquity
- Increased participation in government by all Batswana
- Increased efficiency in government operations
- Enhanced opportunities for smart partnerships with civil society and the private sector

Principal outcomes
- Service expectations of the public increase and increasingly satisfied
- Increase in the efficiency and effectiveness of government
- Greater access to and availability of public information: less need to travel and queue
- Automation of most government services and transactions
- Increased participation in government
- Increased public satisfaction with government
- Increased trust in government
- Decentralization and strengthening of district and local government

The further development of the information economy clearly depends on putting in place a culture of information that will attract and retain talent, the most important of which is home - i.e. Botswana - grown and financed at a significant cost to the GoB. The loss of this talent either because it is unavailable or under utilised is a loss for the country.

E-government Priorities

A number of priorities set or needed to be set by government, where a strategic use of ICTs could yield excellent results are crucial. Table A.1, in the annex summarises the current and proposed ICT applications in government. Three of the critical ones are covered below as Text Boxes 5.11-5.13, namely civil service reform, decentralisation and access to public information in that order.

Box 5.11: Civil service reform

The public sector in Botswana accounts for 47% of formal employment and dominates the economy and society. Compared to Malawi, a country with six times the population of Botswana, the number of staff in the central GoB in 1998 was approximately 82,000[79] while employment in the central government of Malawi was estimated at about 99,000 staff.

According to the World Economic Forum, Botswana "is overburdened with institutional structures to the point where delivery of services has become lethargic[80]". Similarly, the poor quality of service provision is regularly blamed for lower than expected social indicators in Botswana. The lagging performance of the civil service has been noted in the Vision 2016 statement and is recognized by government.

79 Proceedings of the Sixth National Business Conference. 2000. Botswana Confederation of Commerce, Industry and Manpower

80 World Economic Forum. 2000. The Africa competitiveness report 2000/2001. Oxford University Press. NY. London

81 United Nations Development Programme. 2001. Common Country Assessment. Botswana: towards national prosperity. Gaborone

Box 5.12: Decentralisation

The GoB has embarked on a decentralization programme to boost capacity at district level by providing more technical and managerial staff, together with a devolution of financial and administrative powers. Decentralization with devolution of financial and administrative decision making to the district and local levels is one objective[81].

However, the interface between local, district and central government decision makers needs to be improved. Strong professional links between central and local government are needed to ensure that staff and programmes at local level receive adequate technical back-up and support. Similarly, there is a great need to ensure that government works more closely with the private sector and with local NGOs and with civil society in general. Government in Botswana, as elsewhere, cannot and should not do it all.

How can ICTs help this come about?

The current drive to further enhance government performance and facilitate decentralization can greatly benefit from the development of the GDN and from greater use of ICTs and especially of the internet. ICTs can bring the usual efficiencies and increases in productivity, but the real benefits accrue as a result of facilitating greater access to public information and to basic government services across the country, and especially in the rural areas. Instead of travelling long distances to Gaborone, Francistown or Maun, individuals can go to a closer location.

Appropriate and community based models of public access to the internet need to be developed. Community PC and internet access centres or telecentres need to be experimented with. Along with the general public, there are several target groups that could benefit from public access facilities.

Box 5.12 continued

Among these, the private sector as resellers of ICTs and related services and possibly as operators of these facilities, as per the example in other countries such as Senegal (See reference to telecentres in Senegal cited previously). SMEs and SMMEs may need assistance with new methods of doing business and district based business incubators may be a vehicle for helping small business operators learn how to use ICTs to market their products and services, and to be informed about market opportunities and conditions.

Box 5.13: Access to public information – the example of health

It is important that researchers, planners and policy makers are able to access the most recent information about the science of HIV, currently viable options for both prevention and care, and the current status of the HIV/AIDS epidemic in the country. At present, it is not straightforward to access all of the relevant information from the MoH, ACHAP, BOTUSA, the Botswana - Harvard Aids Institute for HIV Research and Education, and others. Although some of the organisations involved in HIV/AIDS work maintain websites, there is no central location where a researcher can obtain an overview about what is happening with regard to HIV/AIDS in the country.

The function of information coordination is part of the mandate for the NACA, which is the obvious location for a centralized information service per database. A starting point for an information system would be to establish a regularly maintained website for NACA, where a user could obtain up-to-date information about HIV/AIDS in Botswana, and information about the different organizations that are active, and the projects that they are undertaking. This would include reports and analyses from the sentinel surveillance system, and from the VCT centres. It is clear that NACA will require capacity for this function in the near future. It is probable that the process of obtaining and disseminating test results and diagnoses could be greatly facilitated by the use of ICT. Information supplied by NACA should also be more readily available to assist with counselling.

Although greater use of ICTs would facilitate the process of information dissemination in the health sector, and for HIV/AIDS in particular, it must be stressed that the HIV/AIDS epidemic is not primarily fuelled by lack of information. Wherever it has been measured (for example within the UB student body), the state of knowledge about how to prevent HIV has been found to be reasonably high.

Similarly, in many sectors of society, increased knowledge has not led to a change in risk behaviour – primarily because many people are constrained by poverty or social attitudes, and are unable to exercise their rights to reproductive health. Effective interventions to halt the further spread of HIV will have to address these fundamental underlying causes. There is a continuing need to conduct research to identify these causes, and to design strategies to counter them.

One definite need is to increase the efficiency and effectiveness of the clinical trials by improving data collection. The manually repetitive work associated with health maintenance and the monitoring and follow-up of patients receiving treatment for HIV-AIDS is demanding and cumbersome, involving entering data repetitively and manually. For an already overburdened health system, increased efficiency in day to day operations is desperately needed. One application of ICTs is in the anti-retroviral treatment (ARV) programme. ARV treatment has brought new hope to people living with HIV/AIDS. However, treatment using combination therapies involving multiple drugs with many different side effects, plus the fact that ARV treatment is for life, means that patient treatment and follow-up can be a taxing information and logistics management task.

An e-learning steering committee which brings together representatives of initiatives that are fostering ICT use and access, including ACHAP, the MoE (the Educational Network – EDN), the GDN, BTC, and others, has been formed.

Monitoring follow-up in ARV treatments is essential. Patients who do not follow their prescriptions have to be reminded and called up for follow-up otherwise they risk not only a relapse but also the possibility of drug resistance. Contact lists and scheduling has to be computerized to help the health system cope. Otherwise, only a far fewer number of people can be treated using strictly manual techniques. A simple ARV follow-up database programme is being developed by ACHAP.

Simple computerized applications, usually databases listing patients and their status and the drugs used to tread them, along with the responses and side effects noted are required. Systems to monitor the availability of drugs are likewise needed and are being implemented by the MoH. Eventually, and much sooner than later, integrated systems bringing this functionality together in a seamless and user friendly way will be needed. The MoH is currently negotiating for an integrated health information management system to this effect.

Appendix 1

Table A.1: Current and proposed ICT applications in government

Objective	Implementation Status	Remarks
Botswana a regional leader in exploitation and the use of IT in achievement of national objectives	There is an increase in the use of information communications through the Intranet and internet.	The establishment of the Information and Communication Technology Policy Taskforce will enhance the Government Computer Bureau's role in facilitating the utilisation of IT in the country.
Quality IT Systems	Systems have been put in place in important sectors like vehicle registration, income tax and state land management.	
Well Trained IT Workforce	6 and 24 persons per annum go on long-term and short-term training respectively.	
Data communication Infrastructure	Implementation of data communication infrastructure has been achieved.	The IT industry is dynamic, it is crucial to keep pace with the dynamism e.g. through provision of high bandwidth.
Common IT system across all Ministries	Common systems in Ministries, e.g. Human Resource, National Registration, National Libraries and accounts have been provided.	
Each ministry to develop and generate it's own information database	Ministries such as Minerals, Energy and Water Affairs (Water Affairs) MoA (Livestock Identification and Trace Back System) have developed and generated their own relevant information databases and also have control of their own IT systems.	
Each Ministry responsibly run its own IT systems	Most Ministries are able to run their IT systems in close consultation with Government Computer Bureau (GCB).	In view of the shortage of IT personnel GCB service to other ministries could improve.
Government and local authorities to exchange information electronically	Local authority computerisation has just been initiated and is still at its infancy stage.	Some information is currently being interchanged electronically with Insurance companies and banks.
Less paper work	The implementation of mail servers in ministries and use of electronic mail has reduced the amount of paper work within the workplace.	Due to the absence of a legal acceptability of electronic documents, formal communication is still done on paper. A legal framework is necessary to recognise the validity of electronically transferred documents.
Botswana GIS Centre	Work in progress towards establishing a GIS centre	
Government to promote private IT service and industry	In progress	

Table A.2 : Aggregate Information & Electricity Statistics for Botswana

	1998	2002	Per 1000	Source
Telephone Mainlines	85,590	150, 068	89	BTA
Cellular subscribers	32,644	332,314	198	BTA
ISP's		10		BTA
Internet Hosts		1,605	1	NW[82]
Internet users (estimated)[83]	10,000	40,000	24	BTA
Internet Cafés		15		UUNET
Average monthly cost of Internet account	P100.00	P100.00	n/a	BTA
Cost of a six minute local call	P0.23	P0.23	n/a	BTC
Cost of a six minute zone call	P2.07	P2.07	n/a	BTC
Cost of a six minute inter-zone call	P5.52	P5.52	n/a	BTC
Waiting list for mainlines	10,600	14,800	9	BTA
Electricity – accounts		98,958	59	BPC
Per capita kilowatt hours electricity consumption	900	1100		BPC
Newspapers printed (Private)		160,000	95	Publishers
Highest Newspaper readership (Private)		27,000	16	Mmegi
Television sets (household)		101,718	61	CSO
Satellite TV accounts				DSTV
Radio's (household)		273,380	162	CSO
PC's (household)		15,000	9	CSO
PC's per 1000 Civil servants (central Govt)				GCB
PC's per 1000 Employees (Local Govt)				GCB
PC's per 1000 junior secondary students				MoE
PC's per 1000 senior secondary school students				MoE
PC's per 1000 university students				MoE
PC seats / schools for ongoing studies (IT)				BOTA

Table A.3: Estimate of the number of Web pages and hosts under .bw

No. of Web pages (total)	7,241
No. of main Web hosts	122
Distribution of Web pages by language	
Pages in English	5,792 (80%)
Chinese	245 (3.4%)
German	206 (2.8%)
French	22 (< 1%)
Other European languages	21 (< 1%)

Source and comments: Data computed 2002/11/19 using the AltaVista search engine, advanced function (http://www.altavista.com/web/adv). Data are estimates because the AltaVista engine, like all search engines, only indexes or sees part of the global Internet and is usually not up to date as updates to the index of the search engine can take several days or weeks. Sites that are behind firewalls are not visible and are not counted.

82 Network Wizards. July 2002. http://www.isc.org/ds/WWW-200207/dist-byname.html
83 BTA. 2002.

Table A.4: ICT diffusion in households (2001)

	Radio	T.V.	Computer	Phone	Total	Population	Per Capita
Gaborone	44538	28409	7375	34138	114460	186007	0.62
Francistown	17852	8639	1260	10783	38534	83023	0.46
Lobatse	6390	3318	411	3695	13814	29689	0.47
Selibe-Phikwe	11130	5078	529	6352	23089	49849	0.46
Orapa	2035	1786	322	1693	5836	9151	0.64
Jwaneng	3459	2120	394	2572	8545	15179	0.56
Sowa Town	771	606	101	602	2080	2879	0.72
Southern	15691	3948	359	6241	26239	113704	0.23
Barolong	6176	2018	102	1772	10068	47477	0.21
Ngwaketse West	1121	95	9	404	1629	10471	0.16
South East	11148	5671	928	7307	25054	60623	0.41
Kweneng East	30520	9852	1107	12590	54069	189773	0.28
Kweneng West	3977	924	81	1136	6118	40462	0.15
Kgatleng	12512	4576	411	6042	23541	73507	0.32
Serowe Palapye	22152	5929	512	8574	37167	153035	0.24
Central Mahalapye	15389	4233	331	5437	25390	109811	0.23
Central Bobonong	9782	1730	142	3199	14853	66964	0.22
Central Boteti	6532	1346	97	2468	10443	48057	0.22
Central Tutume	16214	2881	289	5426	24810	123514	0.20
North East	7064	1722	163	2811	11760	49399	0.24
Ngamiland East	10949	2978	468	5238	19633	72382	0.27
Ngamiland West	4677	536	51	1350	6614	49642	0.13
Chobe	3266	1059	125	1645	6095	18258	0.33
Ngamiland Delta	302	13	3	19	337	2688	0.13
Ghanzi	4226	1025	120	1756	7127	32481	0.22
C.Kgalagadi G Reserve	48	3	0	6	57	689	0.08
Kgalagadi South	3229	782	57	1178	5246	25938	0.20
Kgalagadi North	2230	441	48	1105	3824	16111	0.24
	273380	101718	15795	135539	526432	1680763	0.32
%of Total ICT Terminals	52%	19%	3%	26%			

Urban Population	375777	22%
Urban Terminals	206358	39%
Urban Radios	86175	32%
Urban Phones	59835	44%
Urban TV's	49956	49%
Urban PC's	10392	66%

NB: South east & Kweneng east figures are influenced by Mogoditshane & Tlokweng which use Gaborone's infrastructure

The TAI applied to Botswana

Technical note - Calculating the Technology Achievement Index

The technology achievement index (TAI) is a composite index designed to capture the performance of countries in creating and diffusing technology and in building a human skills base. The index measures achievements in four dimensions:

- Technology creation, as measured by the number of patents granted to residents per capita and by receipts of royalties and license fees from abroad per capita.
- Diffusion of recent innovations, as measured by the number of Internet hosts per capita and the share of high- and medium-technology exports in total goods exports.
- Diffusion of old innovations, as measured by telephones (mainline and cellular) per capita and electricity consumption per capita.
- Human skills, as measured by mean years of schooling in the population aged fifteen and above and the gross tertiary science enrolment ratio. For each of the indicators in these dimensions the observed minimum and maximum values (among all countries with data) are chosen as "goalposts". Performance in each indicator is expressed as a value between zero and one by applying the following general formula:

$$\text{Indicator index} = \frac{\text{Actual value} - \text{Minimum observed value}}{\text{Observed maximum value} - \text{Observed minimum value}}$$

Values obtained for Botswana:

The index for each dimension is then calculated as the simple average of the indicator indices in that dimension. The TAI, in turn, is the simple average of these four dimension indices.

Table A.5: Indictor Indices For Botswana

Indicator	Observed maximum value	Observed minimum value	Values for Botswana
Patents granted to residents / million people	994	0	7[84]
Royalties and license fees received (USD / 1,000 people)	272.6	0	0[85]
Internet hosts / 1,000 people	232.4	0	1.61[86]
High and medium technology exports (as % of total goods exports)	80.8	0	Minimal[87]
Telephones (mainline and cellular / 1,000 people)	901[88]	1	304[89]
Electricity consumption (kilowatt-hours / capita)	6,969	22	1,100[90]
Mean years of schooling (age 15 and above)	12.0	0.8	6.3[91]
Gross tertiary science enrolment (%)	27.4	0.1	37[92]

Box A.1: Calculating the TAI for Botswana

1. Calculating the technology creation index

Patents and receipts of royalties and license fees are used to approximate the level of technology creation. Indices for the two indicators are calculated according to the general formula.

Patent index = (7– 0) /(994 – 0) = 0.007

Royalty and license fee index = (0.0 – 0.0) /(272.6 – 0.0) = 0

The technology creation index is the simple average of these two indices:

Technology creation index = (0.007+ 0.0) / 2 = 0.004

2. Calculating the diffusion of recent innovations index

Using Internet hosts and the share of high- and medium-technology exports in total goods exports, the same formula is applied to calculate the diffusion of recent innovations index.

Internet host index = (1 – 0.0) / (232.4 – 0.0) = 0.004

High- and medium-technology export index = (0.0 – 0.0) / (80.8 – 0.0) = 0

Diffusion of recent innovations index = (0.004 + 0.0) / 2 = 0.002

3. Calculating the diffusion of old innovations index

The two indicators used to represent the diffusion of old innovations are telephones (mainline and cellular) and electricity consumption per capita. For these, the indices are calculated using the logarithm of the value, and the upper goalpost is the OECD average.

Telephony index = (log (304) – log (1)) / (log (901) – log (1)) = 0.834

Electricity index = (log (1,100) – log (22)) / (log (6,969) – log (22)) = 0.679

Diffusion of old innovations index = (0.834 + 0.679) / 2 = 0.756

4. Calculating the human skills index

The human skills index is calculated according to the general formula, using mean years of schooling and the gross tertiary science enrolment ratio.

Mean years of schooling index = (6.3 – 0.8) / (12.0 – 0.8) = 0.491

Gross tertiary science enrolment index = (27.4 – 0.1) / (27.4 – 0.1) = 1

Human skills index = (0.491 + 1) / 2 = 0.746

5. Calculating the technology achievement index

A simple average of the four dimension indices gives us the technology achievement index.
TAI = (0.004 + 0.002 + 0.756 + 0.746) / 4 = 0.377

84 World Bank. 2001. World Development Indicators 2001. Based on data for 1998. Data for 2000 = 0 patents according to Botswana Patent office, but 1 patent according to World Intellectual Property Organisation database
85 World Bank. 2001. Idem
86 Netcraft. 2002. http://www.isc.org/ds/WWW-200207/dist-byname.html for July 2002
87 United States Department of Commerce. 2002
88 Organisation for Economic Cooperation and Development average
89 Botswana Telecommunication Authority
90 Botswana Power Corporation. 2002.
91 World Bank. 2001. World Development Indicators 2001
92 World Bank. 2001. World Development Indicators 2001

Box A.2: **Calculating the Infostate**

Starting from the raw data indicators are constructed with the appropriate denominators. Then the smoothing adjustment for outlier values was applied, using the following rule:

$$\text{for } 1.5 < CV < 3, \max = \bar{x} + 3std$$
$$\text{for } CV < 1.5, \max = \bar{x} + 4std$$
$$\text{for } CV > 3, \max = x + 2std$$

with CV being the series' coefficient of variation, its mean and its standard deviation.

While many indicators are used individually, some others are combined to form composite indicators. These indicators (and the associated indices) are arrived at as follows:

For the fixed telecommunications network;

$$I^{fixed} = \frac{\text{mainlines} \times 100}{\left(1 + \frac{\text{waiting lists}}{mainlines}\right) + \left(2 - \frac{\text{digital lines}}{mainlines}\right) \times \text{population}}$$

Fort the Internet;

$$I^{Internet} = \frac{1 + \left(\frac{\text{secure servers}}{\text{Internet hosts}}\right) \times 100}{\text{population}}$$

The gross enrolment indicator;

$$I^{gross\ enrollment} = (\text{primary} + 2 \times \text{secondary} + 3 \times \text{tertiary})/6$$

The traffic indicator;

$$I^{traffic} = (\text{int'l outgoing} + \text{int'l incoming})/2$$

Some indicators were subject to the monotonic transformations discussed earlier. These are the linear type, with a scalar. Again, rather than arbitrarily selected, the scalars were arrived at through a simple and systematically applied rule based on statistical; analysis of each individual series. Specifically,

$$\text{for } CV < 1.5, \text{scalar} = 4\bar{x}$$
$$\text{for } 1.5 < CV < 3, \text{scalar} = 3\bar{x}$$
$$\text{for } CV > 3, \text{scalar} = 2\bar{x}$$

Each indicator is converted to an index regardless of its original unit of measurement. During the conversion, a reference country (Hypothetica) and a reference year (2001) were specified, to allow comparison both across and within countries over time. This is done at the level of each and every indicator, country and year.

Thus for the reference country © we get:

$$It^{i,c} = (Vt^{i,c} / Vt_0^{i,c}) \times 100$$

where I stands for the value of the index, i refers to individual indicators, V to raw values of indicators, to refers to the reference year and t to any other year.

Using the notation j for all other countries we have:

$$It^{i,j} = (Vt^{i,j} / Vt_0^{i,c}) \times 100$$

This normalisation allows immediate comparisons between other countries and the reference country, and for any country over time.

Once each indicator has been expressed in index form, we proceed to aggregate across each component. Indexes are obtained as:

$$\hat{It}^{i,j(c)} = \sqrt[n]{\prod_{i=1}^{n} I_{n,t}^{i,j(c)}}$$

with _ denoting product and n the number of each component's individual indices. In 2001, for networks, n=5 (fixed, mobile, cable, Internet and bandwidth), for skills, n=2 (literacy and gross enrolment) and for uptake n=4 (television, residential lines, PCs, Internet users).

We continue likewise for the subsequent level of aggregation. Networks and skills are combined into the Infodensity index as:

1. Calculating the Infodensity

Infodensity = $\sqrt[k]{\prod_{i=1}^{k} I_{n,t}^{i,j(c)}}$

With k = 2.

2. Calculating Info-use

While no index is computed for intensity of use, Info-use is arrived at as:

Info-use = $\sqrt[z]{\prod_{i=1}^{z} I_{n,t}^{i,j(c)}}$

Where z = 6, that is all the four uptake indices plus broadband users and combined international traffic.

Finally, when we have both Infodensity and Info-use, we arrive at the highest level of aggregation, a country's infostate, simply as:

3. Calculating Infostate

Infostate = $\sqrt[2]{(\text{infodensity} \times \text{info - use})}$

Clearly, once indicator have been constructed, what follows is an unweighted average, indifferent to each individual ICT good or service, as we have no knowledge basis to do otherwise. The choice of a geometric rather than an arithmetic mean represents a value judgement that favours symmetrical rather than lopsided development across indicators of interest.

Table A.6: ICT Indicators for Botswana's Global Position (ITU 2002)

	Total tel. subscribers /100	PCs/100	Hosts / 10,000	Internet Users /10,000	Internet Tariffs % GDP /caput	Mobile tariffs % GDP /caput	2G	3G	Broadband subs. /100 Testing	ISDN / 100	Bandwidth (Mbps) (2003)[93]
Botswana	21.35	3.87	7.57	297	0.12	0.16	-	-	-	-	16.08
Africa	5.56	1.06	3.38	85	2.50	1.14	1	-	1.28	0.05	
High income	120.48	41.77	1,486	3993	0.03	0.03	29	2	0.61	2.74	151779.7
World	32.42	8.44	230	820	1.18	0.54	47	5	-	0.80	
Costa Rica	30.54	17.02	20.79	934	0.33	0.26	-	-	0.02	0.04	154.13
Malaysia	49.86	12.61	31.10	2,395	0.09	0.10	Yes	-	-	0.15	798.9
Mauritius	50.56	10.83	26.05	1,317	0.15	0.03	-	-	-	0.12	
Namibia	12.16	3.64	25.91	252	-	0.21	-	-	-	0.12	16.18
Tunisia	14.90	2.37	0.22	412	0.25	0.20	-	-	-	0.01	
South Africa	32.35	6.85	54.45	701	0.25	0.21	Testing	-		0.06	1063.96

93 World Bank www.infodev.org/projects/internet/375pyramid

Chapter 6

An agenda for the future

'Without science (and technology), rich countries could never have achieved economic growth. Their failure to invest in research in developing countries is undermining efforts to fight poverty, disease and environmental destruction'

Jeffrey Sachs

What should science and technology deliver for Botswana?

In Botswana, the benefits of S&T are felt largely by those who live above the poverty line. The poor, who mostly live in under resourced rural areas as well as female headed households, are at risk. The large numbers of households stricken by HIV/AIDS are coping with great difficulty. Thus in mapping the future, a response must be sought to the following questions: "How can science and technology help deliver opportunities for all Batswana, and especially for the poor, underprivileged and the sick around the country? How can this be achieved while at the same time supporting the 16,000 operating SMMEs out of 44,000 registered companies, which are potential drivers of the local economy? How can this be done while contributing to national development and to the realisation of Vision 2016?"

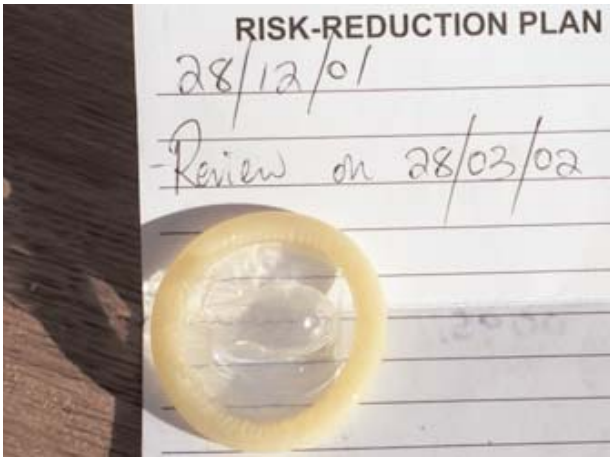
A number of suggestions for tackling some of the challenges discussed in this Report and specifically the harnessing of S&T to achieve development goals including the MDGs, the Vision 2016 objectives and the NDP have been compiled over the years. The BOSHASTED 2000 symposium identified four challenges which are:

- Tackle the crisis in the health sector, especially the HIV/AIDS epidemic.
- Provide people with better ways of sustenance.
- Continually improve Botswana's human resource base.
- Add value to Botswana's natural resources in the quest to eliminate poverty and unemployment.

The magnitude of the challenge facing Botswana can only be appreciated if some of the present efforts are evaluated before the way forward is outlined. Areas of importance include, but are not limited to fighting HIV/AIDS, econmic diversification and private sector development, enhancing opportunities for women, filling the skills gap, enhancing entrepreneurship, building the capacity of SMMEs to use ICTs, modernising the civil service as well as developing a research and innovations capacity. In charting the way forward, our effort will be limited to the major challenges that the country must tackle if it is to prosper. Answers to these challenges will form part of the effort to creat the "educated and informed nation; prosperous, productive and innovative nation" as envisaged in the national vision, components which must combine together in the formation of an information society for Botswana.

Fighting HIV/AIDS and the Health Crisis

The World Summit on Sustainable Development in Johannesburg espoused the view that a country in crisis should lead other nations in providing solutions. As one of the countries with the highest HIV/AIDS prevalence in the world, Botswana is at the forefront of the fight against the disease. There is a significant commitment to raise public awareness that starts from the top. The President and all of his cabinet have been vocal and have spread word of the epidemic at every occasion. As much as the HIV/AIDS issue is very sensitive because of the amount of human suffering, and ethics to be addressed, it is also a potential money-spinner for those who will find a cure and reduce human suffering. In recognition of this, the GoB is collaborating with several international organisations such as, the Gates Foundation, Merck, Bristol Myers, Harvard AIDS Institute and the CDC of the USA on obtaining a cure for the disesase.



The HIV/AIDS issue is very sensitive

HIV/AIDS has to be fought on two fronts. On one front, education to enhance public awareness as well as research to understand the disease and consequently find a cure is needed. Public awareness campaigns have adopted and harnessed ICTs in the fight against HIV/AIDS. The message on prevention; improvements in the delivery of healthcare; improvements in surveying and data collection; the diagnosis, management and analysis as well as education, training and sharing of medical knowledge all depend to a large extent on the use of ICT. Radio dramatisations are broadcast in Setswana and reach out to

most of the country. Satellite TV broadcasts on the disease are beamed to all schools through UNDP, Brazil - Botswana teacher training project. However, effective use of ICTs is required in delivery of medical services. With the Government's recent moves to recognise traditional medicine as complimentary to modern medicine, ICTs should be exploited in capturing and documenting indigenous knowledge systems (IKS) and picking cure regimes that can prove complimentary in the fight against HIV/AIDS.

The challenge for Botswana is therefore:

- to maintain the awareness campaign and find innovative ways of carrying the message to all population groups;
- having moved from voluntary testing to the current routine testing for HIV/AIDS, government should explore the possibility of compulsory testing should the current campaigns not bear fruits—AIDS is a medical emergency, and in an emergency compulsion is not incompatible with the best human rights practices.

The greatest failure in this country vis-à-vis the HIV/AIDS fight, has been in knowledge transfer and capacitation of citizens be able to deal with the epidemic at research and development level. For Botswana, the epidemic will also need to be tackled from the perspective of developing local research and innovation capabilities. The fact that the scientific response is led and bankrolled by external partners has allowed a certain fatalistic mentality to creep in: ask no questions, just accept the goodwill of the benefactors. Going back to the understanding from the World Summit on Sustainable Development – that those most affected must lead the world in fighting an emergency/epidemic, Botswana should be locating the skills sets, the intellectual property and database on test regimes and protocols within and not allowing their flight to sponsor nations at the trials and public phase of the HIV/AIDS response. The challenge for the country as it anticipates forming a medical faculty at the national university is thus:

- To generate a core group of citizen epidemiologists, molecular biologists, geneticists, medical statisticians and modellers, together with a well developed medical technician class by specifying this as an outcome of the collaboration with current international partners such as the Harvard AIDS Institute.
- To sustain the research and development work that well equipped HIV/AIDS laboratories are currently engaged in, Botswana must ensure that current research does not depend on the life of projects such as the Harvards AIDS or BOTUSA projects. Research competencies should rather be based on attaining the core skills and personnel in the country.

The worst possible scenario would be failure to respond to this challenge, particularly in view of the potential benefits that could accrue to the country in future in terms of developing highly specialised medical research skills; spin-offs from the pharmarceutical industry, and possible economic outcomes as the country diversifies on the basis of deepened research and development expertise in S&T. Botswana must tap into HIV/AIDS knowledge skills and have something to show for having been the most ravaged by the epidemic.

Economic Diversification and Private Sector Development

Past efforts to diversify the economy have not been fully successful to the extent that Botswana's economy is still heavily dependent on the mining sector. Consequently, for Botswana, two fundamental issues need to be acknowledged, i.e.;

- Botswana does not have a well developed private sector and;
- Economic diversification away from the diamond sector is a necessity.

The Government has begun to address both of these problems. It has over the last three development plans (spanning a period of more than ten years) focussed on developing the capacity of the private sector to "become the main engine of economic growth". As recently as 2002, the Government put in place the Public Enterprises Evaluation and Privatisation Agency (PEEPA) as the body responsible for the orderly privatisation of public parastatals. PEEPA is currently working on a draft masterplan that will prioritise corporations to be privatised and the different forms they will take. The process will start with outright sale, and then progress to selling shares in the stock exchange, to developing public-private partnerships in the provision of services, outsourcing and commercialisation. Alonside developing a robust private sector, the Government has been struggling with economic diversification through a number of schemes such as FAPs, SMMEs, currently CEDA (finance/support schemes). Earlier focus on developing a manufacturing base, followed recently by development of the services sector, particularly tourism and the concept of the IFSC, all point to the Governments efforts in recognition of the need for diversification.

Diversification of Botswana's' economy requires that an enterprise culture be developed and nurtured; the human resources with the requisite ICT and other technical skills are developed and in substantial numbers; all citizens are empowered, women, rural communities and the SMME sector in particular; and finally the country must fight and win in the battle of attracting FDI flows both regionally and globally. A related issue to this is the need to enhance human freedoms, an aspect that will be discussed in more detail later in this chapter.

Enhancing the Human Resource Base

Education is the cornerstone of any knowledge society and information economy. It is therefore, imperative that the UB and all training institutions, from primary to tertiary level, be set up in such a way that they address the skills gaps that exist in the economy, specifically in the

Training - a means to closing the existing skills gap

area of S&T, and in particular the ICTs. With the current education education system in Botswana, training institutions depend on government for everything from staff salaries to tuition and maintenance allowances for students etc. This system will need to be re-evaluated and a more effecient one put in place that effects sel-sustainability among these institutions.

To facilitate this, the Government will need to institutionalise the concept of human resources/skills requirements evaluations on a regular basis to better project the available human resources and the skills combinations necessary to drive the economy over a certain period of time, say five years. The health sector is an area with a great need for local skills; currently 90% of the doctors are of foreign origin[1]. Recently the Government has taken steps towards the establishment of a medical school in an attempt to address to the situation. A regular needs assessment exercise will help with long term planning; this coupled with foresight or scenario planning will perhaps allow the country to accumulate skills before they are critically needed.

By introducing ICT infrastructure in schools, a larger pool of people will develop basic ICT skills before joining the job market, and enhance the efficiency with which businesses and government offer services to the public. Equally, the provision of ICTs in schools particularly in the rural areas should be structured as public resource centres or access centres to be used by the larger community as part of life-long learning platform or by the business community as business resource and services centres.

The concept of life long learning, enabled as a result of the widespread diffusion of ICTs, is now an essential component of any professional life. Countries that do not participate will miss out and will continue to lose their best and brightest to jurisdictions that do provide these opportunities and resources, further exacerbating the continous fight against the brain drain from the developing to the developed world.

- But more than anything else, the whole education system must be re-structured such that all students, no matter where they come off the conveyor, will have basic maths and science skills necessary for further education and training. The country should join global indices that measure achievements in maths (reading) and science skills throughout all levels of education so as to have a yardstick to measure its relative performance, and hence rectify mistakes before they become problems. The mooted second public university which is meant to have a S&T bias might perhaps be part of the answer.

Building an entrepreneurial culture

Entrepreneurs are necessary to power innovation and economic development[2]. There is no reason to believe that Botswana does not have its fair share of entrepreneurs evenly distributed in the population at large. Some Batswana entrepreneurs are well established and fairly well known locally. However, in general, self-employment is a new idea in Botswana and efforts to increase the number of Batswana entrepreneurs will require changing mentalities and behaviour.

Entrepreneurs do respond to opportunities. ICTs can extend the knowledge and intelligence, usually market intelligence that entrepreneurs need to seize an opportunity and turn it around into an investment, jobs and profit. In an increasingly global market place, opportunities are many fold. Botswana needs to facilitate access to local, regional and international markets for local entrepreneurs and investors in general by ensuring high speed access to the Internet at reasonable prices. As part of this effort, Botswana will need to overcome what was until recently a major problem, a lack of investment capital[3].

1 Africa Recovery. 2002. An African test case for wide distribution of life prolonging medicines. http://allafrica.com/stories/200210230001.html
2 Global Entrepreneurship Monitor. 2002. 2001 Executive Report.. http://www.gemconsortium.org/

For this to take place:

- The country must gear its education and training programs throughout the curricula to cover and increase awareness on entrepreneurship as an option, not as a last resort if one fails to get a job.
- Entrepreneurship support programs, including technology incubations, financial and management support in the formative years must be fostered.
- Technology, particularly ICT, must be availed to all those who need it (with proper financing by both government and the private sector), as a lever for growth.
- Botswana must join the global entrepreneurship monitor (GEM) or similar programmes to better appreciate where it goes wrong and avail opportunities to correct and continue along the enterprise path.

Empowering Small, Medium and Micro Enterprises through Information and Communication Technologies

One of the biggest challenges facing Botswana as it implements Vision 2016 will be how to develop the capacity of small, mostly female operated, and often rural based enterprises. Micro credit schemes are considered of limited utility at this time because of high interest rates.

ICT opens up access to opportunities for entrepreneurship

The greatest constraints faced by businesses generally are: access to capital, a shortage of adequately trained personnel and a lack of business management expertise or business models. Introducing ICTs per se will not change anything, indeed it might make things worse especially if ICTs are unknown to the potential beneficiaries. However in many countries, Botswana is no exception, encouraging entrepreneurship and building the capacity of the private sector to use ICTs as part of a general effort at capacity building may be the place to start. In this case, the first place to start may be in the communities themselves in order to achieve economies of scale, because it is not feasible to reach out to all households and registered companies in Botswana.

Assessing the e-readiness of people and communities can be a first

3 World Economic Forum. 2000. The Africa competitiveness report 2000/2001. Oxford University Press. NY. London

step in understanding the information sharing needs and behaviour of people and organisations and the eventual role that the private sector and perhaps ICTs can be called upon to play in meeting the needs of the local market. The Maitlamo project (draft ICT policy) has just completed one such assessment that shows the huge information divide between urban and rural communities.

While the experience of diffusing ICTs into poorer and/or largely rural areas is still relatively new, a community based approach mediated by local or community based organizations, or NGOs and associations of business people such as BOCCIM, and any local chambers of commerce, and that involves the local telecommunications operator may be a logical place to start in enhancing the capacity of local businesses. Botswana already has the basis for such understanding due to the BOTEC Community User Information Survey.

Community based resource centres that offer business incubator services, and at the same time also try to meet community development needs in general may be the solution. These centres, sometimes known as community access centres, multipurpose community telecentres or just telecentres may be useful for introducing change and new ways of doing things. They may be located in a post office, a local store, a local government office, in a school or in the offices of a small enterprise. In a regional capital of Benin, far removed from the capital, a community access centre was located in the offices of a travel agent. Other centres were located in agricultural training centres.

In Senegal, telecentres are small single owner enterprises that offer telephone, fax and related services and operate in collaboration with the national telecommunications operator. These telecentres are part of the business model of the national operator which leases telephone services to the small enterprise operators in exchange for a percentage (a large percentage) of the revenue generated. The income left over once the telecommunications operator has taken its cut is largely sufficient for the telecentre operator[4].

Multipurpose community centres are ideal for people to interface with S&T

In China, the Government of Hunan province implemented a pilot agricultural information network to share information about agricultural technologies and management practices as well as markets among farmers in the villages of the province. A computer operator was linked by telephone to the internet and to other operators located throughout the province and throughout China and beyond (Taiwan, Hong Kong and via some Chinese intermediaries, with markets in Japan as well as some other Asian countries). The farmers themselves did not have computers. In fact many were not literate. However, when a farmer had a question about a technology or was interested in learning who could be interested in buying his or her cash crops, that information was transferred to the local village party chief who would ensure that the information was phoned in, or sent by post to the computer operator who would dispatch the information to an expert if that is what was required or post it to the market place Web page for others to consider the sales offer or purchase request that was being made.

Whether a similar approach could be useful in Botswana would have to be seen. The point is that there are options to be considered. However, in order to consider which option would be most appropriate in the context of Botswana, the recently completed e-readiness assessment may help to better understand the level of development and various other needs of beneficiaries and the role, if any, that ICTs could play in helping private sector operators better take advantage of modern management practices and technologies. There is, in addition to the e-readiness exercise undertaken by the then Government Computer Bureau[5], an Africa-wide e-access and usage index study that the UB is carrying out in 2004 for Botswana as part of the Research ICT African (RIA) network[6], the results of which might be instructive for the country.

Enhancing Opportunities for Women

This will need to take place at different levels. First through the education and training system which must vigorously orient itself to attracting girls and young women into the sciences. At yet another level, it must be about building a profile of female achievers in all spheres of life, to play the part of role models to debunk the idea women are not capable and thus encourage the girl child to aim for the stars. At the third level it must be about putting in place skills and technology equipping programs for women entrepreneurs to break the divide that has always held then back from realising their true potential and has thus relegated them from being active participants in the economic life of the country.

In the higher echelons of power, women have not done too badly in recent times. There are currently at least four cabinet Ministers; the Governor of the Bank of Botswana, the immediate former Dean of the Faculty of Science of UB, several Permanent Secretaries including the one for MIST are al women. Despite this profile of women leaders, generally women in Botswana head a larger percentage of poor households and are paid lower salaries in a male dominated formal sector. Women have limited access to productive resources, particularly cattle, land, cash, labour and credit, whilst they own and run three-quarters of informal sector enterprises.

There is clearly a need to create more opportunities to empower women through S&T. There are many examples of women working through local and community self-help groups to strengthen their economic reach and to better make them heard. ICTs especially, at the local and community level, can be useful. There are several examples and many networks linking women with various resources and with other like-minded organizations who work to empower women and to forge collaboration and action around issues of common concern. Certainly science and technology could be used to enhance all these objectives in order to benefit the majority of women.
Government must find ways in which technology can generally and in

4 Fuchs, R. 1998. Little engines that did. Case histories from the global telecentre movement. International Development Research Centre. Acacia project. http://www.futureworks.ca/engine/eng_2.htm
5 The Computer Bureau is now known as the Department of Information Technology within the Ministry of Communications, Science and Technology
6 Research ICT Africa Network, www.researchICTafrica.net

certain circumstances, be specifically targeted at this grouping to empower them, and hence improve the country's gender empowerment index to rank amongst that of leading nations.

Developing a Research, Development and Innovations System for Botswana

Botswana must embark upon an ambitious training and re-tooling exercise in terms of both human resources in S&T 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 post-graduate training programs first in collaboration with external institutions, by tapping into established government or institutional networks such as USHEPiA[7], Southern and Eastern Africa Network for Analytical Chemists (SEANAC), National Urban Forestry Unit (NUFU) and Danish Cooperation for Environment and Development (DANCED), but ultimately wholly within. 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 programs deliberately tailored to address the country's specific needs. The current policy of sending all postgraduate students abroad is not only counter productive, it actually contributes to the mismatch in the skills requirements in the local economy and the actual skills acquired by the few who get this level of training.

- If Botswana is desirous of reaping benefits from intellectual property, then it it may want to consider building an impressive research and development capacity; going beyond just doctoral training, but placing its leading researchers in leading global centres of excellence as both guest researchers and postdoctoral fellows on structured exchange programs, so as to develop specific research strengths not yet available locally.
- It could prove favourable for MoE as well as the training arm of government, the Directorate of Public Service Management to adopt a proactive approach to post-graduate training for in-service public servants, where at least 60% are sent to the local training institutions.
- If no capacity exists, then government has, through the grant system, the option of building that capacity over an optional period of perhaps five years.
- It would be beneficial to the Government to speed-up the process of restructuring its' research institutions and also to move away from input funding to funding based on delivery of agreed outcomes.
- Encouraging the private sector to invest in research and development through tax and other fiscal incentives, will enhance their sustainability and ultimately their own survival.
- Botswana should consider building a centre of excellence for HIV/AIDS research by focussing funds towards such a designate centre. Since a significant amount of research is already carried out on HIV/AIDS, such a centre need not be created de novo. Centres of excellence can exist on their own, they can be part of institutions, or they can be a result of partnerships amongst different interested parties.

The Intellectual Property Rights Regime

The IPR regime requires streamlining to make it easier for innovators/creators to register and protect their intellectual property. In addition, Botswana must move with some haste to enact implementation legislation for the Botswana Copyright and Neighbouring Rights Law of 2000. This will enhance further protections given owners of intellectual property. A designers' or innovators' guild must be formed with the objective beyond facilitating a meeting of minds, but to encourage and reward innovation, thus serve as a pull factor in the future innovations process in the country. Specific incentives could be placed in critical areas of innovation and invention, encompassing ICTs.

The Information Communication Tecnology Framework

A view of a nation's ICT landscape can have one of two hues: at one end (and a fact captured in the UNDP's Technology Achievement Index (TAI)) would be the level and worth of innovations (patents and royalties) produced within – which emphasises products and payments from the owning of intellectual property. The second hue, and one with which we wish to associate this report with, though without excluding the first, is where you measure the spread (accessibility) and depth of usage of the available ICTs – best illustrated by the composite InfoState index developed by Orbicom[8]. In particular the info-use divided into sub-components uptake and intensity of use. This latter view expresses the benefits (socio-economic) that can accrue to any nation or society which accesses and uses ICT tools even if it does not itself produce them. Thus we refer here to the internet, e-mail, telephone and other elements of ICT technologies as enablers and providers of human freedoms, and economic facilitators whether or not they are products of the community/nation exploiting them.

Information Communication Tecnology Policy

That a national Information Communication Technology Policy is required as of yesterday is not open to question, since to have a structured development of the sector or industry and its leveraging into the greater economy from schools to business, from government to households, must be guided by an overarching vision that such a document could give.

In order to entrench e-business, the policy must specify standards of practice that would enable security of use of the Internet for business purposes. In this light the Government must through the financial services sector, assure the security of the digital transactions and move ahead to recognising, legislatively, contracts concluded and signatures signed digitally.

Botswana as the SADC Information Communication Tecnology Hub

As part of the policy formulation process, and in consonance with the declared desire by government to make Botswana a SADC ICT hub, government must move speedily and aggressively ahead and invest in the hardware and people skills to turn this into reality.

Information Communication Tecnology Infrastructure and Closing the Digital Divide

Government needs to act on providing ICT infrastructure in schools, by first making it policy to provide every primary school with an electrical connection where the electricity grid exists, or provide stand alone solar power where girds do not reach. That way, the provisioning of ICT infrastructure would be made with the full potential for use by the schools and the communities around which the school is located. Schools and public libraries where they exist must be turned into community resource centres, a feather in reducing the urban-rural digital and information divide.

Enhancing Human Freedoms

Enhancing human freedoms must be the ultimate in human development. This goes beyond just provision of the basic needs of: good health, food and shelter, but encompass all things that add dignity to the human person. This presupposes access to facilities and information; opportunities to improve self and freedom from degradation and depravity of whatever form. It is only by enhancing

7 USHEPiA is a "south-south" initiative with the aim of human resource development through sustainable capacity-building in the general areas of science, engineering and the humanities.
8 Orbicom is an international network that links communications leaders from academic, media, corporate and government circles with a view to providing for the exchange of information and the development of shared projects.

these freedoms that Botswana can reach the information society pinnacle she needs to prosper and compete in the globalised world.

Access to Information

The first requirement of an information society is access to information by whoever needs it. Therefore, the GoB must enact and implement a Freedom of Information Act (FoIA) as a first step to legally recognising this right and the desire to build an informed and educated nation, and make the national vision not just talk but reality. If nothing tangible should be achieved of the national vision in the remaining twelve years of its life – and from evidence so far not much will be (full employment, no new HIV/AIDS infections etc) – the least it could and ought to achieve is transparency (in government processes) and access to government information. These two are not guaranteed unless and until the public's right to information is backed up by a FoIA; and they may well be the ingredients needed for each citizen to strive harder and commit to higher levels of productivity through a feeling of inclusion.

Access to ICT enhances human freedom

Universal Service vs Access

The declared policy goal of both the GoB, through MIST and BTA of universal access, needs to run its course if the country is to achieve the information society envisaged. To fulfil this, he policy goal must shift to universal service, where the infrastructure is not only deployed, but the average citizen can actually use it. This is however a much bigger task since it means the economic status of the average citizen must be such that they have demand for ICT services. Technology must be anchored such that it contributes to the economic wellbeing of the average Motswana to afford them the economic might to be a participant in the ICT worldscape.

Public Service Reform and Decentralisation of Government

The use of ICT and computerisation of government processes in addition to the current performance management system (PMS) have combined to force reform in the way public servants render services. ICTs should be further embedded in all the functions of governament and used to give middle management decision making tools, as a conscientious effort at decentralising government. Government efforts to decentralise decision making to the local authorities must continue and be backed by robust ICT infrastructure and a pool of skilled personnel to make governance closer and more relevant to the user. A knowledge base in terms of a database that provides online assistance to users, reflecting policy and procedures, necessary to assist customers, without having to resort to a higher authority for answers must be part and parcel of every civil servant's repertoire of tools. It is only through these that the level of service delivery can be enhanced, where those who serve the public are empowered to act, and not stifled by bureaucratic procedures.

Annex 1

CALCULATION OF THE BOTSWANA HUMAN DEVELOPMENT INDEX (1991-2000)

Human Development Index (HDI)

Year	GDP/Capita	Life Expectancy		Adult	Enrolment 2nd	Human Development Index	
	$PPP	CSO	UNDP	Literacy	level	CSO	UNDP
1991	4,690	65.3	65.3	54.0	35.3	0.63	0.63
1992	5,120	65.6	61.0	61.5	34.4	0.65	0.63
1993	5,220	65.9	56.6	68.9	35.7	0.67	0.62
1994	5,367	66.1	52.3	68.9	39.8	0.68	0.60
1995	5,611	66.4	51.7	70.7	45.3	0.69	0.61
1996	5,220	66.7	49.6	72.6	45.3	0.47	0.60
1997	7,690	67.0	47.4	74.4	45.3	0.72	0.61
1998	6,103	62.0	46.2	75.6	45.0	0.68	0.59
1999	6,872	62.0	41.9	76.4	45.0	0.69	0.58
2000	7,184	61.0	46.2	77.1	45.0	0.69	0.61
2001	7,820	65.3	40.3	78.1	45.0	0.66	0.58
2002	8,170	61.0	41.4	78.9	45.0	0.67	0.59

Table 2: BOTSWANA HUMAN DEVELOPMENT INDEX BY NATIONAL SETTLEMENT TYPE, 1991-2000

	Expectancy	Life Expectancy	Life Expectancy Index	Per capita Income (PPP$)	Adj. Per Cap. Income (PPP$)	Income Index	Literacy
1991							
National	56.50	65.30	0.67	4690.00	4690.00	0.64	54.00
Urban				10112.49	5261.32	0.77	68.90
Urban Village				3810.18	3810.18	0.61	71.50
Rural				2666.82	2666.82	0.55	50.00
Minimum	25.00	25.00	n/a	200.00	200.00	n/a	0
National average	n/a	N/a	n/a	5120.00	5120.00	n/a	n/a
Maximum	85.00	85.00	n/a	6154.00	6154.00	n/a	100.00
1992							
National	65.30	65.58	0.68	5120.00	5120.00	0.66	61.45
Urban				11039.65	5273.89	0.79	75.90
Urban Village				4159.51	4159.51	0.62	78.50
Rural				2911.33	2911.33	0.56	57.00
Minimum	25.00	25.00	n/a	100.00	100.00	N/a	0
National average	n/a	N/a	n/a	5120.00	5120.00	N/a	n/a
Maximum	85.00	85.00	n/a	6154.00	6154.00	N/a	100.00
1993							
National	65.60	65.86	0.68	5220.00	5220.00	0.66	68.90
Urban				11255.27	5375.37	0.79	83.00
Urban Village				4240.75	4240.75	0.63	85.60
Rural				2968.19	2968.19	0.57	64.10
Minimum	25.00	25.00	n/a	100.00	100.00	n/a	0
National average	n/a	N/a	n/a	5220.00	5220.00	n/a	n/a
Maximum	85.00	85.00	n/a	6154.00	6154.00	n/a	100.00
1994							
National	65.90	66.14	0.69	5367.00	5367.00	0.66	68.90
Urban				11572.23	5524.55	0.79	83.00
Urban Village				4360.18	4360.18	0.63	85.60
Rural				3051.78	3051.78	0.57	64.10
Minimum	25.00	25.00	n/a	100.00	100.00	n/a	0
National average	n/a	n/a	n/a	5367.00	5367.00	n/a	n/a
Maximum	85.00	85.00	n/a	6154	6154.00	n/a	100.00

Literacy Index	Enrolment 1st level	Enrolment 1st level Index	Enrolment 2nd level	Enrolment 2nd level Index	Schooling Index	Education Attainment Index	HDI
0.54	94.60	0.95	35.30	0.35	0.65	0.58	0.63
0.69	98.84	0.99	37.30	0.37	0.68	0.69	0.49
0.72	97.33	0.97	54.10	0.54	0.76	0.73	0.45
0.50	91.17	0.91	48.90	0.49	0.70	0.57	0.37
n/a	0	n/a	0	n/a	n/a	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a	100.00	n/a	100.00	n/a	n/a	n/a	n/a
0.61	94.70	0.95	34.40	0.34	0.65	0.62	0.65
0.76	96.20	0.96	39.50	0.40	0.68	0.73	0.51
0.79	97.21	0.97	58.78	0.59	0.78	0.78	0.47
0.57	91.18	0.91	53.20	0.53	0.72	0.62	0.39
n/a	0	n/a	0	n/a	n/a	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a	100.00	n/a	100.00	n/a	n/a	n/a	n/a
0.69	95.10	0.95	35.70	0.36	0.65	0.68	0.67
0.83	93.27	0.93	42.65	0.43	0.68	0.78	0.52
0.86	96.71	0.97	65.10	0.65	0.81	0.84	0.49
0.64	91.00	0.91	59.10	0.59	0.75	0.68	0.41
n/a	0	n/a	0	n/a	n/a	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a	100.00	n/a	100.00	n/a	n/a	n/a	n/a
0.69	95.90	0.96	39.80	0.40	0.68	0.69	0.68
0.83	90.00	0.90	41.25	0.41	0.66	0.77	0.52
0.856	95.75	0.96	64.60	0.65	0.80	0.84	0.49
0.64	90.05	0.90	58.70	0.59	0.74	0.66	0.42
n/a	0	n/a	0	n/a	n/a	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a	100.00	n/a	100.00	n/a	n/a	n/a	n/a

1995							
National	66.10	66.42	0.69	5611.00	5611.00	0.67	70.73
Urban							
Urban Village							
Rural							
Minimum	25.00	25.00	n/a	100.00		n/a	0
National average	n/a	n/a	n/a			n/a	n/a
Maximum	85.00	85.00	n/a	40000.00		n/a	100.00
1996							
National	66.40	66.70	0.70	5220.00			72.57
Urban							
Urban Village							
Rural							
Minimum	25.00	25.00	n/a	100.00		n/a	0
National average	n/a	n/a	n/a			n/a	n/a
Maximum	85.00	85.00	n/a	40000.00		n/a	100.00
1997							
National	66.70	53.36	0.47	7690.00	7690.00	0.72	74.40
Urban							
Urban Village							
Rural							
Minimum	25.00	25.00	n/a	100.00		n/a	0
National average	n/a	n/a	n/a			n/a	n/a
Maximum	85.00	85.00	n/a	40000.00		n/a	100.00
1998							
National	53.40	62.00	0.62	6103.00	6103.00	0.69	75.60
Urban							
Urban Village							
Rural							
Minimum	25.00	25.00	n/a	100.00		n/a	0
National average	n/a	n/a	n/a			n/a	n/a
Maximum	85.00	85.00	n/a	40000.00		n/a	100
1999							
National	62.00	62.00	0.62	6872.00		0.71	76.4
Urban							
Urban Village							
Rural							
Minimum	25.00	25.00	n/a	100.00		n/a	0
National average	n/a	n/a	n/a			n/a	n/a
Maximum	85.00	85.00	n/a	40000.00		n/a	100

0.71	96.70	0.97	45.30	0.45	0.71	0.71	0.69
0		0		0	0	0	0
0		0		0	0	0	0
0		0		0	0	0	0
n/a	0	n/a	0	n/a	n/a	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a	100	n/a	100.00	n/a	n/a	n/a	n/a
0.73	97.90	0.98	45.30	0.45	0.72	0.72	0.47
0		0		0	0	0	0
0		0		0	0	0	0
0		0		0	0	0	0
n/a	0	n/a	0	n/a	n/a	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a	100.00	n/a	100.00	n/a	n/a	n/a	n/a
0.74	98.40	0.98	45.30	0.45	0.72	0.74	0.64
0		0		0	0		
0		0		0	0		
0		0		0	0		
n/a	0	n/a	0	n/a	n/a	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a	100.00	n/a	100.00	n/a	n/a	n/a	n/a
0.76	98.70	0.99	45.00	0.45	0.72	0.74	0.68
0		0		0	0		
0		0		0	0		
0		0		0	0		
n/a	0	n/a	0	n/a	n/a	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a	100.00	n/a	100	n/a	n/a	n/a	n/a
0.77	99.4	0.99	45.00	0.45	0.72	0.75	0.69
0		0		0	0		
0		0		0	0		
0		0		0	0		
n/a	0	n/a	0	n/a	n/a	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a	100.00	n/a	100.00	n/a	n/a	n/a	n/a

2000							
National	62.00	61.00	0.60	7184.00		0.71	77.20
Urban							
Urban Village							
Rural							
Minimum	25.00	25.00	n/a	100.00		N/a	0
National average	n/a	n/a	n/a			N/a	n/a
Maximum	85.00	85.00	n/a	40000.00		N/a	100
2001							
National	61.00	55.70	0.51	7820.00		0.73	78.10
Urban							
Urban Village							
Rural							
Minimum	25.00	25.00	n/a	100.00		n/a	0
National average	n/a	n/a	n/a			n/a	n/a
Maximum	85.00	85.00	n/a	40000.00		n/a	100
2002							
National	55.70	55.70	0.51	8170.00		0.74	78.90
Urban							
Urban Village							
Rural							
Minimum	25.00	25.00	n/a	100.00		n/a	0
National average	n/a	n/a	n/a			n/a	n/a
Maximum	85.00	85.00	n/a	40000.00		n/a	100.00

Source: United Nations Development Programme. 2001. Common Country Assessment for Botswana: Towards National Prosperity, Gaborone

0.77	100.00	1.00	45.00	0.45	0.73	0.76	0.69
0		0		0	0		
0		0		0	0		
0		0		0	0		
n/a	0	n/a	0	n/a	n/a	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a	100	n/a	100	n/a	n/a	n/a	n/a
0.78	95.30	0.95	45.00	0.45	0.70	0.75	0.66
0		0		0	0		
0		0		0	0		
0		0		0	0		
n/a	0	n/a	0	n/a	n/a	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a	100.00	n/a	100.00	n/a	n/a	n/a	n/a
0.79	95.30	0.95	45.00	0.45	0.70	0.76	0.67
0		0		0	0		
0		0		0	0		
0		0		0	0		
n/a	0	n/a	0	n/a	n/a	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a	100.00	n/a	100.00	n/a	n/a	n/a	n/a

Annex 2

CALCULATION OF BOTSWANA HUMAN POVERTY INDEX

Table 1: National estimates of BHPI, 1971-2000

	% of children that die before age 5 a/	Percent adult illiteracy rate	% population without safe water	% population without access to health services	% of under fives who are moderately or severely underweight	Composite P Value	Human Poverty Index (HPI)
1971	15.10	..	..	..	..	..	..
1981	10.90	..	11.0	..	25.00	..	..
1991	5.60	46.00	7.00	15.00	14.30	12.10	46.30
1992	5.60	38.60	7.00	15.00	15.00	12.33	39.00
1993	5.60	31.10	7.00	15.00	14.50	12.17	31.77
1994	5.60	31.10	7.00	15.00	12.50	11.50	31.67
1995	5.60	29.30	7.00	15.00	12.80	11.60	29.93
1996	5.60	27.40	7.00	15.00	12.80	11.60	28.18
1997	4.50	25.60	7.00	12.00	18.50	12.50	26.60
1998	4.80	24.40	7.00	12.00	18.00	12.33	25.46
1999	5.90	23.60	5.00	12.00	13.00	10.00	24.30
2000	10.10	22.90	5.00	12.00	13.00	10.00	24.12
2001	11.00	21.90	5.00	12.00	13.00	10.00	23.41
2002	11.00	21.10	5.00	12.00	13.00	10.00	22.72

Estimates of HPI by settlement type, 1996 b/

Urban	4.7	16.7	0	0	7.5	2.5	16.8
Urban Village	4.7	16.7	0	0	12.8	4.3	16.9
Rural	7.6	37.8	23	15	13.3	17.1	39.0

Estimates of HPI by district, 1996

Selebi-Phikwe	4.0	16.5	0.0	0.0	6.8	2.3	16.6
Jwaneng	5.7	14.4	0.0	0.0	..	..	..
Orapa	4.7	14.4	0.0	0.0	..	..	..
Central	6.5	34.2	..	13.0	..	..	..
Kweneng	6.1	37.6	..	15.0	12.4	9.1	..
South East	4.5	27.4	..	0.0	14.0	4.7	..
North East	4.3	32.7	11.0	0.0	8.9	6.6	32.8
North West	5.9	39.5	19.0	20.0	13.3	17.4	40.6
Southern	6.6	37.7	12.0	15.0	5.1	10.7	38.1
Ghanzi	9.1	43.3	7.0	40.0	15.2	20.7	45.0
Chobe	8.3	39.5	..	15.0	13.7	9.6	..
Kgalagadi South	7.6	43.4	10.0	36.0	12.7	19.6	44.8
Kgalagadi North	13.5	43.4	10.0	36.0	..	..	..

a/ Per 100, not per 1,000.
b/ Existing NNSS data on under five malnutrition is not provided by settlement type. For the purpose of the BHDR, Gaborone data was used as a proxy for urban, at he national average was used for urban villages and the data for North West was used for rural.

Annex 3

Calculation of the Gender Related Development Index (GDI) and Gender Empowerment Measure (GEM) for Botswana 1991-2000

Table 1: Calculation of the Gender Related Development Index (GDI) Using CSO Expectation of Life at Birth, 1991 to 2000

Year	Life Expectancy at Birth****		Adult Literacy Rate*	Combined 1st &** Enrolment		GDP per Capita***	GDI
	Male	Female		Male	Female		
1991	63.3	67.1	56.2	74.5	77	4690	0.846
1992	63.6	67.4	56.2	76.5	79	5120	0.868
1993	63.9	67.6	70.3	79	80.5	5220	0.864
1994	64.2	67.9	70.3	80	80.5	5367	0.870
1995	64.5	68.1	70.3	84.5	84.5	5611	0.879
1996	64.8	68.4	70.3	85.5	86	5,892	0.894
1997	65.1	68.6	76.9	87.5	88	7690	0.994
1998	59.6	64.5	76.9	93	94	6,103	0.871
1999	-	-	-	-	-	-	-
2000	-	-	-	-	-	-	-

* Literacy rates are assumed to be constant for the years with no official estimates
** Combined enrolment is derived by indexing Primary Gross Enrolment plus Second Level gross enrolment. The second level gross enrolment uses population age 14-19 as the base
*** GDP (PPP$) is from from various Human Development Reports
****Life expectancy is based on Central Statistics Office estimates

Table 2: Calculation of the Gender Empowerment Measure(GEM) Using CSO Expectation of Life at Birth, 1991 to 2000

Year	% of children that die before age 5	Percent adult illiteracy rate	% population without safe water	% population without access to health services	% of under fives who are moderately or severely underweight	Composite P Value	Human Poverty Index (HPI)
1991	5.6	46.0	7.0	15.0	14.3	12.1	46.3
1992	5.6	38.6	7.0	15.0	15.0	12.3	39.0
1993	5.6	31.1	7.0	15.0	14.5	12.2	31.8
1994	5.6	31.1	7.0	15.0	12.5	11.5	31.7
1995	5.6	29.3	7.0	15.0	12.8	11.6	29.9
1996	5.6	27.4	7.0	15.0	12.8	11.6	28.2
1997	4.5	25.6	7.0	12.0	18.5	12.5	26.6
1998	4.8	24.4	7.0	12.0	18.0	12.3	25.5
1999	5.9	23.6	5.0	12.0	13.0	10.0	24.3
2000	10.1	22.9	5.0	12.0	13.0	10.0	24.1
2001	11.0	21.9	5.0	12.0	13.0	10.0	23.4
2002	11.0	21.1	5.0	12.0	13.0	10.0	22.7

Annex 4

Calculating the Capability Poverty Measure (CPM) for Botswana 1991-2000

Table 1: The Capability Poverty Measure (CPM) for Botswana 1991-2000

Year	% Female * Illiteracy Rate	% Under-5 Children Malnourished	% Unattended Births	CPM
1991	43.80	14.30	10.90	23.000
1992	33.90	15.00	8.00	18.967
1993	29.70	14.50	5.10	16.433
1994	29.70	12.50	5.00	15.733
1995	29.70	12.80	5.00	15.833
1996	29.70	12.80	5.00	15.833
1997	29.70	18.50	6.30	18.167
1998	29.70	18.00	3.88	17.193
1999	29.70	12.90	1.46	14.687
2000	29.70	10.10	1.46	13.753

Annex 5

Botswana Human Development Database

Table 1: Time Seiies Data

Indicator	Years a/							
	1971	1981	1991	1992	1993	1994	1995	1996
1. Overall status of human development								
Life expectancy at birth (CSO)	55.5	56.5	65.3	65.6	65.9	66.1	66.4	66.7
Life expectancy at birth (UNDP)	. .	. .	. .	64.9	65.2	52.3	51.7	49.6
Adult literacy (1998 from HDR,2000) x/	. .	34.0	54.0	68.9	68.9	68.9	70.3	71.7
Net enrolment rate, 1st level	42.0	86.0	94.6	94.7	95.1	95.9	96.7	97.9
Male	. .	. .	48.6	48.9	49.3	49.6	49.9	50.1
Female	. .	. .	51.4	51.1	50.7	50.4	50.1	49.9
Net enrolment rate, 2nd level:Schools	7.3	11.9	35.3	34.4	35.7	39.8	45.3	. .
Male	. .	. .	46.2	46.3	46.5	47.3	46.7	46.8
Female	. .	. .	53.8	53.7	53.5	52.7	53.3	53.2
Net enrolment rate, 2nd level:Senior	0.5	4.2	13.8	14.1	15.2	16.0	19.9	. .
Combined 1st and 2nd levels	37.2	57.6	67.7	67.4	67.8	68.6	70.5	
Real GDP per capita (1993/94 constant prices Pula)	. .	. .	7,858	7,658	7,781	7,844	8,073	8,313
GDP per capita in Current Prices			6,190	6,581	7,781	8,439	9,532	11,615
GDP per capita in Current Prices?			3,068	3,086	3,217	3,147	3,439	3,518
Pula/US$ annual average exchange rates	0.7	0.8	2.0	2.1	2.4	2.7	2.8	3.3
Real GDP per capita in PPP$ w/?	. .	. .	4,690	5,120	5,220	5,367	5,611	5,892
GDP per capita PPP$ (Male)/u?			2,627	2,868	2,924	3,006	3,142	
GDP per capita PPP$ (Female)/u?			2,063	2,252	2,296	2,361	2,469	
Botswana's international HDI ranking	. .	. .	95	74	71	97	74	71
Botswana Human Development Index (BHDI)?	. .	. .	0.63	0.65	0.67	0.68	0.69	0.47
Global GDP Rank-HDI Rank?								
2. Poverty and Inequality								
Adult illiteracy rate	. .	66.0	46.0	31.1	31.1	31.1	29.7	28.3
Population without access to health services			14.6				12.0	. .
Population without access to safe water			10.0		23.0		. .	. .
Under five malnutrition rate	. .	25.0	14.3	15.0	14.5	12.5	12.8	12.8
Rate of income poverty	. .	59.0	. .	. .	47.0	. .	. .	. .
Rate of unattended births c/ (by trained person)	. .	34.3	10.9	8.0	7.6	7.2	6.8	6.8

1997	1998	1999	2000	2001	2002	2003	Source	Unit
53.4	62.0	62.0	61.0	55.7	55.7	. .	CSO 2001 Census. BMIS, DS	Years
47.4	46.2	41.9	46.2	40.3	41.4	. .	UNDP (HDRs)	Years
74.4	75.6	76.4	77.2	78.1	78.9	. .	Census; MOE; Lit. Surv,UNDP	% of adults
98.4	98.7	99.4	100.0	95.3	. .	. .	MOE; Census; CSO	% of age group
50.1	50.3	50.3	50.3	50.5	. .	. .	CSO 2001 Stats, 2002	% of age group
49.9	49.7	49.7	49.7	49.5	. .	. .	CSO 2001 Stats, 2002	% of age group
. .	. .	. .	. .	. .	. .	. .	MOE; Census; CSO	% of age group
47.0	47.1	47.5	47.8	48.1	. .	. .	CSO 2001 Stats, 2002	% of age group
53.0	52.9	52.5	52.2	51.9	. .	. .	CSO 2001 Stats, 2002	% of age group
. .	. .	. .	. .	. .	. .	. .	MOE; Census; CSO	% of age group
. .	. .	. .	. .	. .	. .	. .	MOE; Census; CSO	% of age group
8,769	8,909	9,394	9,996	10058.0	10,610	. .	Statistical Bulletin, 1999	Pula in 1993/94 prices
12,879	13,413	15,420	17,396				BOB Annual Report, 1999	Pula in Current Prices
3,530	3,192						Calculated	US$
3.6	4.2	4.6	5.1	5.8			IMF Statistical Yearbook, 2000	Exchange Rate of Pula/US$
7,690	6,103	6,872	7,184	7820.0	8170.0	. .	2000 HDR UNDP	PPP$
4,306	8,550	. .	. .	. .	. .	. .	2000 HDR UNDP	PPP$
3,384	3,747	. .	. .	. .	. .	. .	2000 HDR UNDP	PPP$
97	97	122	122	114	126	125.0	UNDP HDRs	Rank (descending order)
0.64	0.68	0.69	0.69	. .	. .	. .	Calculated	Composite Index
				. .	. .	. .		
				. .	. .	. .		
25.6	24.4	23.6	22.8	21.9	21.1	. .	Literacy survey report	% of people
. .	. .	. .		. .	. .	. .	NDP 8	% of people
. .	23.0	. .	2.3	. .	. .	. .	MMRWA/MFDP	% of people
18.5	18.0	12.9	10.1	. .	. .	. .	NNSS	% of under fives
. .	. .	. .		. .	. .	. .	Poverty study	% of people below poverty line
6.8	6.8	2.0	2.0	. .	. .	. .	MOH, BMIS, BFHS	% of births

Female illiteracy	. .	64.0	43.8	33.9	29.7	29.7	29.7	29.7
Number of registered destitutes/d	. .	5,000	. .	. .	13,597	14,870	15,597	15,292
Poverty line for HH size 6 in HIES area A and B in US$					. .	. .		
Poverty headcount ratio(% population <1US$/Day)	. .	. .	. .	. .	23.6	23.6	. .	. .
Poverty Gap (1993/94) million Pula per month ze/	. .	. .	. .	. .	28.1	28.1	. .	. .
Poverty Gap Ratio zf/	. .	. .	. .	. .	56.3	56.3	. .	. .
Income of poorest 20% of population	. .	. .	. .	. .	4.0	4.0	. .	. .
Income of poorest 40% of population	. .	. .	. .	. .	#REF!	#REF!	. .	. .
Income of the richest 20% of population	. .	. .	. .	. .	59.3	59.3	. .	. .
% of the household income spent on food poorest fifth quintile	. .	. .	. .	. .	. .	. .	. .	. .
a) Very Poor Male Headed Households	. .	. .	. .	. .	52.0	52.0	. .	. .
b) Very Poor Female Headed Households	. .	. .	. .	. .	58.0	58.0	. .	. .
Gini Coefficient	. .	. .	0.6	0.6	0.6	0.6	0.6	. .
Botswana Human Poverty Index (BHPI)			46.3	39.0	31.8	31.7	29.9	28.2

1992 literacy rate is 1993 rate. For 1995 and 1996 an annual growth in literacy of 2% is assumed using the apparent growth between 1997 and 1998.

1996 GDP in PPP$ is derived by applying the 5% growth between 1994 and 1995

Assumed a leveling off of unattended by 0.4 % between 1992 and 1996, 1996 is BFHS data while 1999 and 2000 is BMIS, 2000 results.

Data is for registered destitutes and refers to district totals for all years except 1995/96, which uses the national total.

Poverty gap is the weighted total of amounts by which poor Households fall below their Household PDL

Poverty gap ratio is the income amount by which poor households fall below their household PDLs expressed as a percentage of total expected household income necessary to bring them u

3. Survival and health								
3.1 Indicators of Health (World Health Report, 2000)								
3.1.1 Health Attainment (Index)								
level								
Disability-adjusted life expectancy (DALE)	. .	. .	. .	. .	. .	. .	. .	. .
Male	. .	. .	. .	. .	. .	. .	. .	. .
Female	. .	. .	. .	. .	. .	. .	. .	. .
Expectation of Disability at Birth	. .	. .	. .	. .	. .	. .	. .	. .
Male	. .	. .	. .	. .	. .	. .	. .	. .
Female	. .	. .	. .	. .	. .	. .	. .	. .
Lifespan Lived with Disability	. .	. .	. .	. .	. .	. .	. .	. .
Male	. .	. .	. .	. .	. .	. .	. .	. .
Female	. .	. .	. .	. .	. .	. .	. .	. .
Distribution								
Measure of equality of Child Survival(Index)	. .	. .	. .	. .	. .	. .	. .	. .
3.2 Responsiveness of Health System								
level(WHO index, 2000)	. .	. .	. .	. .	. .	. .	. .	. .
Distribution (WHO Index 2000)	. .	. .	. .	. .	. .	. .	. .	. .
3.2.1 Respect for Persons								
Dignity	. .	. .	. .	. .	. .	. .	. .	. .
Confidentiality	. .	. .	. .	. .	. .	. .	. .	. .
Autonomy	. .	. .	. .	. .	. .	. .	. .	. .
3.2.2 Client orientation	. .	. .	. .	. .	. .	. .	. .	. .
Prompt attention	. .	. .	. .	. .	. .	. .	. .	. .

. .	. .	. .	. .	. .	. .	. .	Literacy survey report	% of adult females
15,880	17,678	17,554	. .	. .	. .	. .	MLG	Number
			. .	. .	. .	. .	HIES, 93/94	Household PDL
. .	. .	. .	. .	. .	. .	. .	HIES, 93/94	% pop. <1US$/day
. .	. .	. .	. .				HIES, 93/94	Pula per month
. .	. .	. .	. .	. .	. .	. .	HIES, 93/94	% hhds < own PDL
. .	. .	. .	. .				HIES, 93/94	% of Total Income
. .	. .	. .	. .	. .	. .	. .	HIES, 93/94	% of Total Income
. .	. .	. .	. .				HIES, 93/94	% of Total Income
. .	. .	. .	. .	. .	. .	. .	HIES, 93/94 (poverty study)	% of household Income
. .	. .	. .	. .	. .	. .	. .	HIES, 93/94 (poverty study)	% of household Income
. .	. .	. .	. .	. .	. .	. .	HIES, 93/94 (poverty study)	% of household Income
. .	. .	. .	. .	. .	. .	. .	HIES, BoB Annual report	Index
26.6	25.5	. .	. .	. .	. .	. .		Index

p to the household PDL

				. .	. .	. .	2000, World Health Report	
				. .	. .	. .	2000, World Health Report	
				. .	. .	. .	2000, World Health Report	
32.3	. .	32.3	. .	. .	. .	. .	2000, World Health Report	
32.3	. .	32.3	. .	. .	. .	. .	2000, World Health Report	Years
32.2	. .	32.2	. .	. .	. .	. .	2000, World Health Report	Years
	. .		. .	. .	. .	. .	2000, World Health Report	Years
7.2	. .	7.2	. .	. .	. .	. .	2000, World Health Report	Years
7.1	. .	7.1	. .	. .	. .	. .	2000, World Health Report	Years
				. .	. .	. .	2000, World Health Report	Years
18.2	. .	18.2	. .				2000, World Health Report	Years
18.0	. .	18.0	. .	. .	. .	. .	2000, World Health Report	Years
			. .	. .	. .	. .	2000, World Health Report	Years
. .	0.624	0.624	. .	. .	. .	. .	2000, World Health Report	
				. .	. .	. .	2000, World Health Report	
. .	. .	5.3	5.3	. .	. .	. .	2000, World Health Report	
. .	. .	0.905	0.905	. .	. .	. .	2000, World Health Report	
				. .	. .	. .	2000, World Health Report	
. .	. .	. .	. .	. .	. .	. .	2000, World Health Report	
. .	. .	. .	. .	. .	. .	. .	2000, World Health Report	qualitative
. .	. .	. .	. .	. .	. .	. .	2000, World Health Report	qualitative
. .	. .	. .	. .	. .	. .	. .	2000, World Health Report	qualitative
. .	. .	. .	. .	. .	. .	. .	2000, World Health Report	

Access to social support Networks	. .	. .	. .	. .	. .	. .	. .	. .
Quality of basic amenities	. .	. .	. .	. .	. .	. .	. .	. .
Choice of provider	. .	. .	. .	. .	. .	. .	. .	. .
3.3. Fairness of financial contribution	. .	. .	. .	. .	. .	. .	. .	. .
Distribution (WHO Index 2000)	. .	. .	. .	. .	. .	. .	. .	. .
3.3.1 Health Financing	. .	. .	. .	. .	. .	. .	. .	. .
Health Peformance Ranking (overall)	. .	. .	. .	. .	. .	. .	. .	. .
Under five mortality rate	151	109	63	63	63	63	63	63
Infant mortality rate	100	71	48	48	48	48	48	48
Maternal mortality rate	. .	. .	326	. .	. .	. .	. .	. .
Underweight births	. .	8.9	9.9	10.0	11.0	10.1	10.6	11.0
Adult HIV prevalence (seropositivity)	. .	. .	. .	19.3	18.2	23.8	32.3	31.7
New reported cases of AIDS	. .	. .	270	534	876	968	535	. .
HIV Seroprevalence in Age-Group 15-19 years	. .	. .	. .	16.4	21.8	20.7	32.4	27.2
AIDS Discharges -Inpatient (Morbidity Statistics)	. .	. .	. .	277.0	. .	591.0	1148.0	1235.0
AIDS Deaths Inpatient (Mortality Statistics)			64	. .	. .	302	472	537.0
Mother-to-child transmission of HIV (MTCT)	n/a	n/a	n/a	. .	. .			
Pregnant women presenting with HIV/AIDS	. .	. .	. .	18.1	22.5	25.4	32.4	33.2
(Sample Size)				1936.0	2714.0	3349.0	2624.0	3857.0
Births attended by trained health personnel g/	. .	65.7	89.1	92.0	94.9	95.0	95.0	95.0
Diarrhoea episodes	. .	. .	1792	2125	1970	1950	2701	2804
Malaria (Cases)			1945	. .	. .	5164	2209	24192
Measles (Cases)	. .	58.0	81.0	46.0	880.0	2435	443	1056
Poliomyelitis (Cases) z/	. .	5.0	2.0	. .	. .	. .	. .	. .
AFP (Acute Flaccid Paralysis) Cases zi/	. .	. .	. .	. .	. .	. .	2.0	4.0
Tuberculosis (Cases)	. .	. .	3274.0	4179.0	4654.0	4756	5655	6636
Tuberculosis Rate			247.0	299.0	327.0	318	387	444
Whooping Cough (Cases) z/	. .	137.0	11.0	5.0	17.0	19	15	38
RTI/STD (Cases)	. .	. .	. .	199.0	. .	136.0	146.0	112.0
Used the reciprocal of % unattended births. Assumes rate of decrease at 2.2% between 1997 and 1998 zi/ Acute Flaccid Paralysis data reflects reliability of the sentinel surveillance and h								
There has not be any confirmed polio case since 1991. Whooping cough cases have declined steadily to 0 in 2000 and after'								
Oral rehydration Therapy Use Rate	. .	. .	43	43	43	43	43	43
Access to health services	. .	. .	85.4	. .	. .	. .	88.0	. .
Access to safe water	29.0	55.0	90.0	. .	77	. .	. .	. .
Health centres with water supply	. .	. .	. .	. .	. .	. .	. .	. .
Schools with water supply	. .	. .	. .	. .	. .	. .	. .	. .
Access to safe sanitation	. .	. .	55	. .	. .	. .	. .	. .
Health centres with latrines	. .	. .	. .	. .	. .	. .	. .	. .
Schools with latrines	. .	. .	. .	. .	. .	. .	. .	. .
Population per doctor	15460.0	7,022	4,608	3,959	3,832	3,580	3,712	3,807
Population per nurse	1250.0	794	495	444	423	425	397	407
Number of hospital beds			3,218	3,216	3,299	3,245	3,353	3,425
Number of baby-friendly facilities	. .	. .	. .	. .	. .	. .	. .	. .
Number of BFHI with VCCT	. .	. .	. .	. .	. .	. .	. .	. .
People with disabilities	. .	. .	2.2	. .	. .	. .	. .	. .

. .	. .	. .	. .	. .	. .	. .	2000, World Health Report	qualitative
. .	. .	. .	. .	. .	. .	. .	2000, World Health Report	% with access
. .	. .	. .	. .	. .	. .	. .	2000, World Health Report	qualitative
. .	. .	. .	. .	. .	. .	. .	2000, World Health Report	qualitative
. .	. .	. .	0.9	. .	. .	. .	2000, World Health Report	
. .	. .	. .	. .	. .	. .	. .	2000, World Health Report	
. .	. .	. .	0.3	. .	. .	. .	2000, World Health Report	
63	67	. .	77.0	. .	. .	. .	1991 census;1998 DS, BMIS	Deaths per 1,000 live births
48	51	51	58	. .	. .	. .	1991 census;1998 DS, BMIS	Deaths per 1,000 live births
. .	330.0	. .	. .	. .	. .	. .	CSO 1991 census data,HDR	Deaths per 100,000 live births
14.0	. .		. .	. .	. .	. .	Health statistics	% of births below 2.5kg
31.0	29.0	29.0	. .	. .	. .	. .	AIDS/STD Unit/NACP	% of sexually active population
. .	. .	. .		29.7	. .	. .	AIDS/STD Unit/NACP	Number
28.0	28.6	21.5	26.7		. .	. .	AIDS/STD Unit/NACP	% seroprevalent in sample
1508.0	3509.0		. .	24.1	. .	. .	Health statistics	Discharges
761.0	1201.0		. .	. .	. .	. .	Health statistics	Inpatient Deaths due to AIDS
			. .	. .	. .	. .		Rate of MTCT
35.2	33.5	35.0	. .	. .	. .	. .	Sentinel Surveillance Reports	% women in sample
2893.0	4194.0	2586.0	. .	. .	. .	. .	(AIDS/STD Unit)	Number of women
93.7	96	98.5	98.5	. .	. .	. .	Health statistics	% of births
2886	2950	2756	. .	. .	. .	. .	BFH statistics	# of cases/10000 children
17848	17879	11932	. .	. .	. .	. .	Statistical Bulletin Sept 1999	Number of cases
5032	931	185	. .	. .	. .	. .	Statistical Bulletin Sept 1999, EPI	Number of cases (unconfirmed)
. .	. .	. .	. .	. .	. .	. .	MOH EPI data	Number of cases
4.0	5.0	11.0	7.0	. .	. .	. .	MOH EPI data	Number of cases
7287	7960	8649		. .	. .	. .	National TB Control Prog. 1999	Number of cases
476	506	537		. .	. .	. .	National TB Control Prog. 1999	TB Cases per 100 000 pop.
14	12	1					Statistical Bulletin Sept 1999	Number of cases
93.0	117.0	. .	. .	. .	. .	. .		Number of cases

hence the steady rise in confirmed cases. WHO estimates that there occurs 1 case of AFP for every 100 000 children 15 and below

43	43	. .		. .	. .	. .	Health statistics, BFHS, 2000 HDR	% of diarrhoea cases
. .	. .	. .		. .	. .	. .	NDP 8	% of population within 15km
. .	77.0	97.7	97.7	. .	. .	. .	1991 Census data, BMIS	% with access
. .	. .	. .	100.0	. .	. .	. .		% with access
. .	. .	. .	100.0	. .	. .	. .		% with access
. .	55.0	83.6	83.6	. .	. .	. .	1991 Census data, BMIS	% with access
. .	. .	. .	100.0	. .	. .	. .		% with access
. .	. .	. .	100.0	. .	. .	. .		% with access
3,616	3,999	3891.3	. .	. .	. .	. .	CSO/ Health Statistics	Number of persons
371	369	377.7	. .	. .	. .	. .	NDP 8, Health Statistics	Number of persons
3,583	3,583	3583.0	. .	. .	. .	. .	Statistical Bulletin, Sept 1999	Number
6.0	7.0	7.0	7.0	. .	. .	. .	Number of health facilities	Number
. .	. .	. .	. .	. .	. .	. .	Number of health facilities	Number
. .	. .	. .	. .	. .	. .	. .	1991 census	% of population

Full immunisation	. .	36	67	. .	. .	57	. .	. .
DPT3 immunisation		71	92	. .	. .	78	76	83
Polio3 immunisation		46	89	. .	. .	78	76	81
B.C.G (TB) immunisation	. .	92.0	92.0	. .	. .	81.3	58.0	67.0
Measles immunisation	. .	63.0	87.0	. .	. .	71.3	68.0	82.0
Tetenus toxoid at leats two doses (1996, BFHS)	n/a	n/a	n/a	n/a	n/a	n/a	89.9	89.9
Hepatitis B 3 Immunisation							73.0	62.0
Modern contraceptive prevalence		23.5	48.0	48.0	48.0	48.0	48.0	47.6
Average interval before birth	. .	. .	. .	. .	. .	. .		
Children whose mothers seek care for ARI	. .	. .	. .	. .	. .	. .	61.1	61.1
Children whose mothers seek care for diarrhoea	. .	. .	. .	. .	. .	. .	. .	. .
Children whose mothers offer more fluids and continued	. .	. .	. .	. .	. .	. .	78.0	78.0
feeding during ARI	. .	. .	. .	. .	. .	. .	. .	
Low birth weight	. .	. .	. .	. .	. .	. .	. .	28.9
Stunting	. .	. .	. .	. .	15		. .	17.2
Underweight	. .	. .	. .	. .			. .	11.3
Wasting	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Use of colostrum	. .	. .	. .	. .	. .	. .	. .	. .
Exclusive breastfeeding rate	. .	. .	. .	. .	. .	. .	. .	. .
Continued breastfeeding rate at one year	. .	. .	. .	. .	. .	. .	. .	. .
Continued breastfeeding rate at two years	. .	. .	. .	. .	. .	. .	. .	. .
Timely complimentary feeding rate	. .	. .	. .	. .	. .	. .	. .	. .
Feeding frequency	. .	. .	. .	. .	. .	. .	. .	. .
Calories available per capita per day	. .	. .	. .	. .	. .	. .	. .	. .
Calories available per capita per day for HH below PDL	. .	. .	. .	. .	25.0	25.0	. .	. .
Household expenditure on food	. .	. .	. .	. .	. .	. .	16.5	16.5
Total Goitre Rate	. .	. .	. .	. .	. .	. .		
Urinary Iodine excretion (none found in survey)	. .	. .	. .	. .	. .	. .	41.3	41.3
Use of iodised salts	. .	. .	. .	. .	. .	. .		
Salt iodisation	. .	. .	. .	. .	. .	. .	33.0	33.0
Prevalence of anaemia in women	. .	. .	. .	. .	. .	. .	38.0	38.0
Prevalence of anaemia in children	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Pregnancy suplementation with iron/folic acid tablets								
Vitamin A capsule supplementation, twice a year (new)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Nightblindness in children (n/a)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Nightblindness in pregrant women (n/a)	. .	. .	. .	. .	. .	. .	34.7	34.7
Serum retinol	. .	. .	. .	. .	. .	. .	. .	. .
Access to basic Essential Obstetric Care (EOC) facilities	. .	. .	. .	. .	. .	. .	. .	. .
Access to comprehensive (EOC) facilities	. .	. .	. .	. .	. .	. .	94.1	94.1
Antenatal care coverage	. .	. .	. .	. .	. .	. .	19.0	19.0
Average age at first birth(median age, 1996 bfhs)	. .	. .	. .	4	. .	5	6	6
Ceasarian sections per total births at (EOC) facilities	. .	. .	. .	. .	. .	. .	. .	. .
Case fatality rate at EOC facilities	. .	. .	. .	7	. .	9	10	10
Proportion of women estimate to have complications sa/	. .	. .	. .	. .	. .	. .	. .	. .
who are treated at EOC facilities	. .	. .	. .	. .	. .	. .	. .	. .

. .	. .	. .	. .	. .	. .	. .	MOH EPI data	% of under-twos
76	82	85	. .	. .	. .	. .	MOH EPI data (NIS, 1980-94)	% children
80	73	82	. .	. .	. .	. .	MOH EPI data (NIS, 1980-94)	% children
59.0	66.0	67.0	. .	. .	. .	. .	MOH EPI data	% of under-ones
79.0	80.0	74.0	. .	. .	. .	. .	MOH EPI data	% of under-ones
. .	. .	. .	. .	. .	. .	. .	BFHS, 1996	% pregnant women
61.0	69.0	70.0	. .	. .	. .	. .	% children immunised	
48.0	48.0	48.0	. .	. .	. .	. .	BFHS, 1988, 1996, BMIS	% women using a method
. .	. .	. .	. .	. .	. .	. .	2000HDR	Number of years
. .	. .	. .	. .	. .	. .	. .	CSO, BFH, Dem Survey	% children
. .	. .	. .	. .	. .	. .	. .	BFHS, 1988, 1996, BMIS	% children
. .	. .	. .	. .	. .	. .	. .	2000HDR	% children
. .	. .	. .	. .	. .	. .	. .	BFHS, 1988, 1996, BMIS	% children
. .	. .	23.1	23.1	. .	. .	. .	2000HDR	% children
. .	. .	12.5	12.5	. .	. .	. .	BFHS, 1988, 1996, BMIS	% children
. .	. .	5.0	5.0	. .	. .	. .	2000HDR	% children
n/a	n/a			. .	. .	. .	BFHS, 1988, 1996, BMIS	% children
. .	. .	29.1	29.1	. .	. .	. .	BFHS, 1988, 1996, BMIS	% women
. .	. .	53.4	53.4	. .	. .	. .	BFHS, 1988, 1996, BMIS	% women
. .	. .	10.7	10.7	. .	. .	. .	BFHS III, BMIS	% women
. .	. .	57.0	57.0	. .	. .	. .		% women
. .	. .	. .	. .	. .	. .	. .	BFHS III, BMIS	% women
. .	. .	. .	. .	. .	. .	. .	BFHS III, BMIS	Calories
. .	. .	. .	. .	. .	. .	. .	BFHS III, BMIS	Calories
. .	. .	. .	. .	. .	. .	. .	BFHS III, BMIS	% cons exp per household
. .	. .	. .	. .	. .	. .	. .	BFHS III, BMIS	% examined
. .	. .	. .	. .	. .	. .	. .		% surveyed
. .	. .	. .	. .	. .	. .	. .		% households surveyed
. .	. .	. .	. .	. .	. .	. .	HIES, 1993/94	% households surveyed
. .	. .	. .	. .	. .	. .	. .	Micronutrients Survey, 1996	% women in survey
. .	. .	. .	. .	. .	. .	. .	Micronutrients Survey, 1996	% children in survey
n/a	n/a	n/a	n/a	. .	. .	. .	Micronutrients Survey, 1996	% women in survey
				. .	. .	. .	Micronutrients Survey, 1996	% women in survey
n/a	n/a	n/a	n/a	. .	. .	. .	Micronurtients Survey, 1996	% of children
n/a	n/a	n/a	n/a	. .	. .	. .	Micronurtients Survey, 1996	% of women
. .	. .	. .	. .	. .	. .	. .		% women in survey
. .	. .	. .	. .	. .	. .	. .		% of women
. .	. .	. .	. .	. .	. .	. .		% of women
. .	. .	. .	. .	. .	. .	. .		% of women
. .	. .	. .	. .	. .	. .	. .	Micronurtients Survey, 1996	median age at 1st birth
6	6	. .	. .	. .	. .	. .		% of total births
. .	. .	. .	. .	. .	. .	. .		Death rate
10	10	. .	. .	. .	. .	. .	BFHS, 1996	% of total births
. .	. .	. .	. .	. .	. .	. .	Health Statistics, '92-98	% women delivering
. .	. .	. .	. .	. .	. .	. .		

Perinatal Mortality rate								
4. Educational attainment	. .	. .	. .	. .	. .	. .	. .	. .
ECCD gross enrolment	. .	. .	. .	. .	. .	. .	. .	. .
Grade 1 pupils who attended ECCD	. .	. .	. .	. .	. .	. .	. .	. .
Programme	. .	. .	292	301	305	310	313	319
Total Primary School Enrolment (thousands)	. .	. .	120	128	125	128	132	132
Primary Apparent (gross) intake rate	. .	. .	121	130	128	131	135	135
Male	. .	. .	119	126	122	124	129	129
Female	. .	. .	. .	57	56	48	60	. .
Primary net intake rate	. .	. .	. .	56	55	46	59	. .
Male	. .	. .	. .	58	56	48	61	. .
Female	42.0	86.0	93.7	90.8	95.1	95.9	96.7	97.9
Primary net enrolment ratio	38.0	80.0	92.7	93.0	93.8	94.7	95.7	. .
Male	46.0	92.0	96.5	96.3	96.4	97.1	97.7	. .
Female	. .	. .	112.0	113.0	114.0	115.2	116.2	117.4
Primary gross enrolment ratio (7-13 years)	. .	. .	110.0	112.0	113.0	115.0	116.0	118.0
Male	. .	. .	113.0	114.0	114.0	115.0	115.0	117.0
Female	. .	. .	40.0	42.0	46.0	46.0	54.0	54.0
Tertiary Level Gross Enrolment Ratio (14-19 years)	. .	. .	39.0	41.0	45.0	45.0	53.0	53.0
Male	. .	. .	380.0	485.0	610.0	708.0	827.0	1101.0
Public expenditure on education (million pula)	. .	. .	. .	. .	. .	. .	. .	. .
Primary Education expenditure per pupil per GNP per capita	. .	. .	28	25	25	24	21	21
Primary Education expenditure as % of total public education	. .	. .	1258.0	1567.0	1879.0	2034.0	758.0	2373.0
expenditure	. .	. .	83330.0	8842.0	9311.0	9697.0	10034.0	10409.0
Number of Untrained Primary School Teachers	. .	. .	30.5	29.0	27.3	26.4	29.1	24.9
Primary School Teachers who are certified by national	. .	. .	89	89	89	90	90	88
standards	. .	. .	. .	. .	. .	. .	. .	. .
Primary School Pupil-teacher ratio	. .	. .	. .	. .	. .	. .	. .	. .
Survival rate to grade 5	. .	. .	. .	. .	90	. .	. .	. .
Primary school Coefficiency of efficiency	. .	. .	. .	. .	. .	. .	. .	. .
Learning acheivement	. .	. .	366	409	495	552	565	724
Literacy rate of 15-24 year olds xx/	. .	. .	107	123	151	171	177	231
Primary education Quality of learning outcomes	. .	. .	137	164	201	245	263	391
Unit cost of Primary education sb/	7.3	11.9	35.3	34.4	35.7	39.8	45.3	. .
Public expenditure on primary education (million pula) sc/	6.3	10.1	29.1	28.5	31.2	34.3	39.2	. .
Expenditure on teacher's salaries sd/	8.1	13.3	41.1	40.1	40.1	45.2	51.1	. .
Junior secondary net enrolment rate s/	0.5	4.2	13.8	14.1	15.2	16.0	19.9	. .
Male	0.6	4.8	15.1	14.7	15.3	16.2	19.6	. .
Female	0.5	3.7	12.7	13.6	15.2	15.9	20.2	. .
Senior secondary	. .	. .	73.1	76.8	80.4	75.3	77.8	78
Male	. .	. .	65.6	68.5	72.8	70.2	71.5	73.3
Female	. .	. .	80.5	85.0	88.1	80.2	84.0	82.7
Progression rate: standard 1 to form 1								
Male								
Female								

				. .	. .	. .	Health Statistics, '92-98	
				. .	. .	. .		
. .	. .	. .	. .	. .	. .	. .		Number of children enroled
. .	. .	. .	. .	. .	. .	. .		Number of children in
322	321	322	324	. .	. .	. .		grade 1 who attended ECCD
134.8	126	122	118	329				Number of pupils
139.6	. .	. .	. .	125	. .	. .		Number of new entrants
133.5	. .	. .	. .	. .	. .	. .	MOE, Education Stats	into grade one as % of
62.4	. .	. .	. .	. .	. .	. .	MOE, Education Stats	age-group population
61.7	. .	. .	. .	. .	. .	. .	MOE, Education Stats	Number of new entrants
63.1	. .	. .	. .	. .	. .	. .	MOE, Education Stats	into grade one as % of
98.4	98.7	100.1	100.1	. .	. .	. .	MOE, Education Stats	official age-entrace population
97.5	. .	. .	. .	95.3	. .	. .	MOE, Education Stats	% of age group enrolled
99.2	. .	. .	. .	. .	. .	. .	MOE, Education Stats	% of age group enrolled
118.3	117.4	118	118	. .	. .	. .	MOE, Census, CSO	% of age group enrolled
119.0	119.0	. .	. .	111	. .	. .	MOE, Census, CSO	Number of children enroled
117.0	117.0	. .	. .	. .	. .	. .	MOE, Census, CSO	whether or not they are
57.0	69.0	. .	. .	. .	. .	. .	MOE, Education Stats, 1997	relevant age-group
56.0	67.0	. .	. .	. .	. .	. .	MOE, Education Stats	% of group enrolled
1200.0	1517.0	1641	2458	. .	. .	. .	MOE, Education Stats	% of group enrolled
. .	. .	. .	. .	2866	. .	. .	MOE, Education Stats	Million Pula
23	22	22	. .	. .	. .	. .	MOE, Education Stats	expenditure per pupil as % of
768.0	952	1166	1316	. .	. .	. .	MOE, MLG (LAFU)	GNP
10686.0	10702	10784	10819	1301	. .	. .		current public expenditure
28.1	. .	. .	. .	11069	. .	. .	MOE, MLG (LAFU)	Number
89	87	85	86	. .	26	25	MOE, Education Stats	Number
. .	. .	. .	. .	84	. .	. .	MOE, Education Stats	Av. No. of pupils/ teacher
. .	. .	. .	. .	. .	. .	. .	MOE, Education Stats	% of a cohort enroled
. .	. .	. .	. .	. .	. .	. .	MOE, Education Stats	
. .	. .	. .	. .	. .	. .	. .		Pup.mastered basic learning
845	1040	1124	. .	. .	. .	. .		% of age 15-24
272	334	362	. .	. .	. .	. .	2000 HDR, UNDP	
359	426	551	612	. .	. .	. .		expe./enrolment
. .	. .	. .	. .	. .	. .	. .	MOE, MLG (LAFU) (derived)	Million Pula
. .	. .	. .	. .	. .	. .	. .	MOE, MLG (LAFU) (derived)	Million Pula
. .	. .	. .	. .	. .	. .	. .	MOE, MLG (LAFU) (derived)	% of age group enrolled
. .	. .	. .	. .	. .	. .	. .	MOE, Census, CSO	% of age group enrolled
. .	. .	. .	. .	. .	. .	. .	MOE, Census, CSO	% of age group enrolled
. .	. .	. .	. .	. .	. .	. .	MOE, Census, CSO	% of age group enrolled
82.1	81	79	80	. .	. .	. .	MOE, Census, CSO	% of age group enrolled
77.7	76	75	76	78	. .	. .	MOE, Census, CSO	% of age group enrolled
87.1	86	83	85	74	. .	. .	MOE, Census, CSO	% of standard 1 entrants
				83	. .	. .	MOE	% of standard 1 entrants
							MOE	% of standard 1 entrants
							MOE	

1997 change over from the 7-2-3 to 7-3-2 education system xx/ Derived from 1993 literacy Survey. A big number of 15-24 year olds are school graduates who are employed or unemployed

Combines Breech, Vacuum Extraction, Caeserian and Forces sc/ Public expenditure on education includes Local Government and Ministry of Education expenditure

This is calculated by dividing exepnditure on primary education by the number of pupils enroled in primary schools sd/ It is estimated that 99% of expenditure on basic salaries by TSM goes

Progression rate: standard 1 to form 4	. .	. .	22.5	23.7	22.9	22.0	29.9	30.1
Male	. .	. .	22.6	24.1	22.9	22.1	28.5	28.6
Female	. .	. .	22.4	23.4	22.9	21.9	31.2	31.6
PSLE pass rate	84.0	67.6	71.6	71.0	71.7	72.2	70.9	71.0
Male	86.0	. .	. .	. .	. .	. .	. .	. .
Female	83.0	. .	. .	. .	. .	. .	. .	. .
JC pass rate q/	67.0	68.0	80.1	79.3	77.9	76.9	76.5	76.4
Male	72.0	. .	. .	. .	. .	. .	. .	. .
Female	62.0	. .	. .	. .	. .	. .	. .	. .
Cambridge pass rate	68.0	53.0	69.9	64.1	64.6	72.0	75.5	71.5
Male	68.0	53.8	. .	. .	. .	. .	. .	. .
Female	69.0	52.1	. .	. .	. .	. .	. .	. .
Number of students at tertiary level	. .	. .	4895.0	5370.0	5914.0	6566.0	9158.0	7371.0
Male	. .	. .	2650.0	2915.0	3458.0	4083.0	5822.0	4671.0
Female	. .	. .	2245.0	2455.0	2456.0	2483.0	3336.0	2700.0
Number of students in University	. .	. .	3567.0	3976.0	4466.0	5056.0	5501.0	7297.0
Male	. .	. .	1962.0	2030.0	2238.0	2828.0	2609.0	3812.0
Female	. .	. .	1605.0	1946.0	2228.0	2228.0	2892.0	3485.0
Number of University Teachers		144.0	300.0	376.0		507.0		
University student-teacher ratio	. .	. .	11.9	10.6	. .	10.0	. .	. .
University Annual Expenditure (million Pula)			43.3	66.2	82.2	96.4	121.0	144.1
Unit cost of university education (thousands)	. .	. .	12.1	16.6	18.4	19.1	22.0	19.7
5. Incomes and employment								
Size of labour force	163,791	315,475	441,203	458,488	476915	496576	517571	544 561
Employment share of formal sector	31.4	30.9	53.3	51.3	49.4	47.4	45.5	46.1
Formal sector employment	51,408	97,400	222,800	227,500	226,300	231,324	231,400	235,400
Employment share of trad. agriculture	22.5	47.2	33.8	32.5	31.2	30.0	28.8	. .
Employment share of public sector	. .	10.3	15.5	15.7	16.9	16.5	16.5	11.6
Employment share of private sector	. .	20.5	32.3	31.1	29.9	28.7	27.5	31.6
Fornal Sector employees in Agriculture	. .	. .	6700.0	6100.0	5900.0	5300.0	4500.0	4523.0
Compensation as % of wage bill (current prices)	. .	. .	5.7	4.5	4.5	4.4	4.4	4.4
Fornal Sector employees in Mining	. .	. .	7800.0	7600.0	8400.0	7900.0	8400.0	8300.0
Compensation as % of wage bill (current prices)	. .	. .	9.3	7.7	11.3	8.7	8.6	8.5
Fornal Sector employees in Manufacturing	. .	. .	26000.0	25500.0	22100.0	21700.0	23400.0	23683.0
Compensation as % of wage bill (current prices)	. .	. .	6.6	8.1	7.4	7.3	7.4	7.4
Fornal Sector employees in Water and Electricity	. .	. .	2500.0	2600.0	2600.0	2500.0	2600.0	2700.0
Compensation as % of wage bill (current prices)	. .	. .	4.0	1.8	2.4	2.4	2.4	2.5
Fornal Sector employees in Construction	. .	. .	33800.0	33800.0	28300.0	26700.0	22100.0	22600.0
Compensation as % of wage bill (current prices)	. .	. .	10.2	14.0	11.7	11.1	11.1	11.0
Fornal Sector employees in Trade, Hotels and Restaurants	. .	. .	41000.0	40900.0	40700.0	45900.0	44900.0	45700.0
Compensation as % of wage bill (current prices)	. .	. .	7.5	8.3	7.9	9.6	9.6	9.7
Fornal Sector employees in Transport and Communication	. .	. .	9100.0	10200.0	9800.0	9000.0	9000.0	8800.0

to teachers salaries								
31.6	38	39	41	41	. .	. .	MOE, Education Stats	% of standard 1 entrants
30.3	34	37	38	37	. .	. .	MOE, Education Stats	% of standard 1 entrants
32.8	41	41	44	45	. .	. .	MOE, Education Stats	% of standard 1 entrants
78.1	99	. .	. .	78	. .	. .	MOE, Education Stats	% of persons taking exam
. .	. .	. .	. .	. .	. .	. .	MOE, Education Stats	% of persons taking exam
. .	. .	. .	. .	. .	. .	. .	MOE, Education Stats	% of persons taking exam
. .	77	. .	. .	. .	. .	. .	MOE, Education Stats	% of persons taking exam
. .	. .	. .	. .	. .	. .	. .	MOE, Education Stats	% of persons taking exam
. .	. .	. .	. .	. .	. .	. .	MOE, Education Stats	% of persons taking exam
78.0	70	. .	. .	. .	. .	. .	MOE, Education Stats	% of persons taking exam
. .	. .	. .	. .	. .	. .	. .	MOE, Education Stats	% of persons taking exam
. .	. .	. .	. .	. .	. .	. .	MOE, Education Stats	% of persons taking exam
9826.0	10995.0	. .	. .	. .	. .	. .	MOE, Education Stats	Number of students
5938.0	6665.0	. .	. .	. .	. .	. .	MOE, Education Stats	Number of students
3888.0	4330.0	. .	. .	. .	. .	. .	MOE, Education Stats	Number of students
8007.0	8598.0	. .	. .	. .	. .	. .	Education Stats, 1997	Number of students
4128.0	4534.0	. .	. .	. .	. .	. .	Education Stats, 1997	Number of students
3879.0	4064.0	. .	. .	. .	. .	. .	Education Stats, 1997	Number of students
								Number
. .	. .	. .	. .	. .	. .	. .		Ratio
149.0	242.2	235.1	313.0				UB, Finance Unit/ annual	Million Pula
18.6	28.2	. .	. .	. .	. .	. .	financial statetments	Pula/Student
				. .	. .	. .		
. .	556891	556990	. .	558753	. .	. .	BoB	Number of persons
	. .	. .			. .	. .	Emp. Stats. L Force Surv.	% of labour force
226,859	241,662	244,449	250,456	256,280	274,782	281,990	CSO/MFDP, BOB	Number of persons
. .	. .	. .	. .	. .	. .	. .	Emp. Stats. L Force Surv.	% of labour force
. .	. .	. .	. .	. .	. .	. .	Emp. Stats. L Force Surv.	% of labour force
. .	. .	. .	. .	. .	. .	. .	Emp. Stats. L Force Surv.	% of labour force
4482.0	4000.0	4018.0	5805.0	6279.0	6273.0	6464.0	BOB Annual Report, 2004	Number of employees
4.2	3.9		. .	. .	. .	. .	BOB Annual Report, 2004	% of total compensation
8600.0	8700.0	8417.0	8090.0	6812.0	7410.0	7961.0	BOB Annual Report, 2004	Number of employees
8.4	8.4		. .	. .	. .	. .	BOB Annual Report, 2004	% of total compensation
23983.0	24038.0	23191.0	29305.0	27951.0	29707.0	30164.0	BOB Annual Report, 2004	Number of employees
7.2	7.2		. .	. .	. .	. .	BOB Annual Report, 2004	% of total compensation
2500.0	2700.0	2634.0	2559.0	2763.0	2857.0	2839.0	BOB Annual Report, 2004	Number of employees
2.5	2.5		. .	. .	. .	. .	BOB Annual Report, 2004	% of total compensation
22700.0	22500.0	25537.0	28066.0	28417.0	28750.0	29023	BOB Annual Report, 2004	Number of employees
10.9	10.5		. .	. .	. .	. .	BOB Annual Report, 2004	% of total compensation
40100.0	43100.0	43195.0	44766.0	49419.0	53287.0	54951.0	BOB Annual Report, 2004	Number of employees
9.5	9.8		. .	. .	. .	. .	BOB Annual Report, 2004	% of total compensation
8700.0	9000.0	8586.0	9143.0	10219.0	10099.0	10141.0	BOB Annual Report, 2004	Number of employees

Compensation as % of wage bill (current prices)	. .	. .	6.5	5.0	4.9	4.2	4.3	4.2
Fornal Sector employees in Banks, Insurance and Business Services	. .	. .	16100.0	17600.0	16800.0	17600.0	17500.0	17600.0
Compensation as % of wage bill (current prices)	. .	. .	11.1	11.0	9.2	9.5	9.7	9.8
Fornal Sector employees in General Government	. .	. .	68500.0	72200.0	80700.0	81800	85300	86300
Compensation as % of wage bill (current prices)	. .	. .	32.5	31.6	33.1	35.2	35.1	35.2
Fornal Sector employees in Social and Personal Sciences	. .	. .	8600.0	8500.0	8200.0	9600.0	10100.0	9800.0
Compensation as % of wage bill (current prices)	. .	. .	6.6	8.1	7.6	7.2	7.4	7.4
Minimum hourly wage rates for Building, construction, exploration, quarry	. .	. .	103.0	115.0	125.0	125.0	135.0	145.0
Minimum hourly wage rates for Manufacturing, Service and Repair	. .	. .	103.0	115.0	125.0	125.0	135.0	145.0
Minimum hourly wage rates for Wholesale Distributive Trades	. .	. .	97.0	109.0	119.0	119.0	129.0	139.0
Minimum hourly wage rates for Retail Distributive Trades	. .	. .	91.0	102.0	112.0	112.0	121.0	131.0
Data for 1997 absent due to changeover from 2 to 3 yr JC.								
Minimum hourly wage rates for Hotel, Catering and Entertainment trades	. .	. .	103.0	115.0	125.0	125.0	135.0	145.0
Minimum hourly wage rates for Garage, Motor Trade and Transport	. .	. .	103.0	115.0	125.0	125.0	135.0	145.0
Minimum hourly wage rates for Retail and Wholesale Nightwatchment	. .	. .	81.0	94.0	104.0	104.0	113.0	123.0
Minimum hourly wage rates for Nightwatchment (excluding above)	. .	. .	81.0	94.0	104.0	104.0	113.0	123.0
Labour force unionisation	. .	. .	4.1	. .	. .	. .	. .	. .
Unemployment rate	. .	10.2	13.9	. .	20.9	21.2	22.2	21.5
Total number employees of public work programmes.	. .	. .	. .	142,624	80,214	75,200	61,693	. .
Income distribution	7.6	10.7	. .	. .	11.7	. .	. .	. .
6. Agriculture								
Total Production of Sorghum, Maize, Millet and Pulses (Cereals)	84.0	55.0	54.9	15.9	16.7	. .	152.0	90.0
Traditional Area Planted (Cereals)	. .	274.0	. .	. .	271.0	. .	289.0	372.0
Traditional Area Harvested (Cereals)	. .	210.0	. .	. .	108.0	. .	143.0	298.0
Planted area for crops	258	290	189	84	264	. .	508	160
Rainfall	434.2	338.8	214.0	675.8	414.2	. .	. .	. .
Whether declared drought year	. .	Yes	Yes	Yes	Yes	Yes	Yes	No
Cattle ownership	. .	32	38	. .	47	. .	49	. .
7. Gender								
Female share of population	54.3	51.7	52.2	52.2	52.0	52.0	51.9	51.9
Male share of population	45.7	48.3	47.8	47.8	48.0	48.0	48.1	48.1
Female life expectancy (CSO)	58.6	59.7	67.1	67.4	67.6	67.9	68.1	68.4
Male life expectancy (CSO)	52.5	52.3	63.3	63.6	63.9	64.2	64.5	64.8
Female adult literacy	. .	36.0	56.2	56.2	70.3	70.3	70.3	70.3
Male adult literacy	. .	32.2	53.2	53.2	66.9	66.9	66.9	66.9
Literacy Gender Parity Index		111.8	105.6	105.6	105.1	105.1	105.1	105.1
Female net enrolment rate, 1st level	46.0	92.0	96.5	96.3	96.4	97.1	97.7	. .

4.1	4.0		. .	. .	. .	. .	BOB Annual Report, 2004	% of total compensation
17000.0	16900.0	19092.0	17747.0	18171.0	18227.0	18987.0	BOB Annual Report, 2004	Number of employees
9.6	8.7		. .	. .	. .	. .	BOB Annual Report, 2004	% of total compensation
93100	100000	103870	104023	105618	106375	108812	BOB Annual Report, 2004	Number of employees
36.4	37.8		. .	. .	. .	. .	BOB Annual Report, 2004	% of total compensation
3600.0	3900.0	3900.0	4100.0	4576.0	5145.0	5609.0	BOB Annual Report, 2004	Number of employees
7.2	7.2		. .	. .	. .	. .	BOB Annual Report, 2004	% of total compensation
159.0	175.0	190.0	205.0	225.0	240.0	260.0	BOB Annual Report, 2004	Thebe per hour
159.0	175.0	190.0	205.0	225.0	240.0	260.0	BOB Annual Report, 2004	Thebe per hour
152.0	165.0	180.0	205.0	225.0	240.0	260.0	BOB Annual Report, 2004	Thebe per hour
143.0	155.0	170.0	185.0	205.0	215.0	230.0	BOB Annual Report, 2004	Thebe per hour
159.0	175.0	190.0	205.0	225.0	240.0	260.0	BOB Annual Report, 2004	Thebe per hour
159.0	175.0	190.0	205.0	225.0	240.0	260.0	BOB Annual Report, 2004	Thebe per hour
135.0	150.0	165.0	180.0	200.0	210.0	220.0	BOB Annual Report, 2004	Thebe per hour
135.0	150.0	165.0	180.0	200.0	210.0	220.0	BOB Annual Report, 2004	Thebe per hour
. .	. .	. .		. .	. .	. .	BFTU	% unionised
. .	19.6	20.8		19.6	. .	. .	Emp. Stats. L Force Surv.	% of labour force
				. .	. .	. .	MFDP/ MLG	Total full or part time
. .	. .	. .		. .	. .	. .	HIES	Share of lowest 40%
				. .	. .	. .		
. .	. .	. .	. .	. .	. .	. .	Agricultural Statistics, 1996	Metric Tonnes
. .	. .	. .	. .	. .	. .	. .		Hectares'000s
. .	. .	. .	. .	. .	. .	. .	Agricultural Statistics, 1996	Thousand Hectares
44	. .	. .		. .	. .	. .	MOA	Hectares'000s
. .	. .	. .		. .	. .	. .	CSO/ MOA	mm
yes	Yes	Yes		. .	. .	. .	MFDP	Yes/no
. .	. .	. .		. .	. .	. .	CSO	% farming HH without cattle
				. .	. .	. .		
51.8	51.7	51.6	51.6	51.6	. .	. .	Pop. projections, Census	% of population
48.2	48.3	48.4	48.4	48.4	. .	. .	Pop. projections, Census	% of population
68.6	64.5	64.5		. .	. .	. .	Census, Stats Brief, CSO, 1999	Years
65.1	59.6	59.6		. .	. .	. .	Census, Stats Brief, CSO, 1999	Years
76.9	76.9	76.9	76.9	. .	. .	. .	Literacy Survey	% of male adults
66.9	73.1	73.1	73.1	. .	. .	. .	Literacy Survey	% of female adults
114.9	105.2	105.2	105.2	. .	. .	. .	Calculated	ratio of female to male literacy
87.0	. .	. .	. .	. .	. .	. .	MOE, CSO population projs.	% of age group

2nd level: Junior	8.1	13.3	41.1	40.1	40.1	45.2	51.1	. .
2nd level: Senior	0.5	3.7	12.7	13.6	15.2	15.9	20.2	. .
Combined 1st and 2nd levels	39.3	60.5	69.2	68.8	68.9	69.9	71.9	. .
Male net enrolment rate 1st level	38.0	80.0	92.7	93.0	93.8	94.7	95.7	. .
2nd level: Junior	6.3	10.1	29.1	28.5	31.2	34.3	39.2	. .
2nd level: Senior	0.6	4.8	15.1	14.7	15.3	16.2	19.6	. .
Combined 1st and 2nd levels	35.0	54.5	66.2	65.9	66.6	67.3	69.1	
Male % share of econ. Active population/t	. .	. .	61.5	62.3	63.1	63.9	64.7	65.5
Female % share of econ. Active population/t	. .	. .	48.5	47.7	46.9	46.1	45.3	44.5
Ratio of female non-agric wages to male non-agric wages			79.4	79.4	79.4	79.4	79.4	79.4
Female share of earned income	. .	. .	. .	. .	. .	. .	. .	. .
Male share of earned income	. .	. .	. .	. .	. .	. .	. .	. .
Women in parliament	. .	2.9	2.6	2.6	2.6	9.1	9.1	9.1
Women councillors in local authorities	. .	. .	. .	. .	. .	14.2	14.2	14.2
Women in managerial positions v/	11.9	24.8	25.7	25.7	25.7	25.7	25.7	25.7
Women in professional/technical positions v/	47.9	57.4	50.6	50.6	50.6	50.6	50.6	50.6
Women's share of earned income	. .	. .	. .	. .	. .	. .	. .	. .
Women in clerical and sales positions	47.4	52.2	65.6	. .	. .	. .	. .	. .
Women's share of formal employment	24.0	38.9	34.1	36.0	36.4	38.1	39.0	. .
Women in service positions	51.7	60.6	38.6	. .	. .	. .	. .	. .
Female headship of households	. .	. .	47.0	. .	45.8	. .	. .	. .
Reported violence against women cases	. .	. .	. .	. .	. .	. .	. .	. .
Gender equality index (GEI)	. .	. .	. .	. .	. .	0.80	0.80	0.81
Gender Related Development Index (GDI)	. .	. .	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
Gender Empowerment Measure (GEM)	. .	. .	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
Uses 91 census,98 DS and Labour force survey. 1998 and 1999 data derived from the Wage Gap study. 1992 to 1997 assumes the share remains constant								
8. Demography and urbanisation								
Population (de facto)	596.9	941.0	1,326.8	1,357.9	1,390.9	1,425.4	1,461.1	1,496.0
Annual population growth rate	3.1	3.4	2.7	2.4	2.4	2.4	2.4	2.4
Population share of urban areas	9.5	17.7	45.7	46.2	46.7	47.2	47.7	48.2
Population share of rural areas	90.5	82.3	54.3	53.8	53.3	52.8	52.3	51.8
Annual growth in urban population	. .	8.0	4.6	4.6	4.6	4.6	4.6	4.4
Annual growth in rural population	. .	2.7	1.8	1.8	1.8	1.8	1.8	1.9
Total fertility rate	5.6	6.6	5.2	5.1	5.0	4.8	4.7	4.2
Condom distribution (PSI)	. .	. .	. .	. .	1.0	1.3	2.2	1.6
Condom distribution (Central Medical Stores)	. .	. .	. .	. .	. .	. .	. .	. .
Condom Purchases by Central Medical Stores			20.0	52.0	37.9	99.5	147.3	168.5
Dependency ratio	1.1	1.1	0.8	. .	. .	. .	. .	0.8
Crude birth rate	. .	48.7	39.3	38.6	37.7	36.9	33.7	32.4
Crude death rate	. .	13.9	11.5	11.3	11.2	11.1	11.0	10.9
Population density	. .	1.6	2.3	2.3	2.4	2.4	2.5	2.6
Average Household Size	. .	5.5	4.7	4.7	4.6	4.5	4.5	4.5
Population density in arable land	. .	. .	. .	. .	. .	. .	. .	. .
Squatter settlements	. .	. .	. .	. .	. .	. .	. .	. .

. .	. .	. .	. .	. .	. .	. .	MOE, CSO population projs.	% of age group
. .	. .	. .	. .	. .	. .	. .	MOE, CSO population projs.	% of age group
82.6			. .	. .	. .	. .	MOE, CSO population projs.	% of age group
. .	. .	. .	. .	. .	. .	. .	MOE, CSO population projs.	% of age group
. .	. .	. .	. .	. .	. .	. .	MOE, CSO population projs.	% of age group
. .	. .	. .	. .	. .	. .	. .	MOE, CSO population projs.	% of age group
. .	. .	. .	. .	. .	. .	. .	MOE, CSO population projs.	% of age group
66.3	67.0	. .	. .	. .	. .	. .	1991 Census/98 DS/Labour Stats	% distribution
43.7	43.0	. .	. .	. .	. .	. .	1991 Census/98 DS/Labour Stats	% distribution
79.4	79.4	79.4	79.4	. .	. .	. .	The wage gap (survey) CSO	mean femaleas % of male wage
..	..	..	. .	. .	. .	. .		% of earned income
..	..	..	. .	. .	. .	. .		% of earned income
9.1	9.1	18.2	. .	. .	. .	. .	Parliament	% of MPs
14.2	14.2	23.1	. .	. .	. .	. .	MLGLH	% of councillors
25.7	26.0	26.0	. .	. .	. .	. .	Census reports/wage gap	% of positions
50.6	65.0	65.0	. .	. .	. .	. .	Census reports/wage gap	% of positions
..	..	..	. .	. .	. .	. .		% of earned income
..	61.0	61.0	. .	. .	. .	. .	Census reports	% of positions
	39.7	40.9	42.4	41.7	. .	. .	Labour statistics, Census	% of positions
. .	. .	. .	. .	. .	. .	. .	Census reports	% of positions
. .	. .	. .	. .	. .	. .	. .	1991 Census; HIES	% of households
. .	. .	. .	. .	. .	. .	. .	Police	Number
0.81	0.81	0.88		. .	. .	. .	Calculated	Index
#REF!	#REF!	. .	. .	. .	. .	. .	Calculated	Index
#REF!	#REF!	. .	. .	. .	. .	. .	Calculated	Index
1,533.4	1,571.7	1,611.0	1,618.0	1,681.0	1,692.0	1,692.0	CSO, pop. projections	Thousands
2.5	2.4	2.3		2.2			CSO, pop. projections	% increase per annum
48.7	49.2	49.7	. .	54.2	. .	. .	CSO, pop. projections	% of people
51.3	50.8	50.3	. .	45.8	. .	. .	CSO, pop. projections	% of people
4.4	4.4	4.4	. .	. .	. .	. .	CSO, pop. projections	%
1.9	1.9	1.9	. .	. .	. .	. .	CSO, pop. projections	%
4.4	. .	. .	. .	3.3	. .	. .	CSO,1981census, NDP8	Chlidren per female
2.3	2.4	2.7	2.2	. .	. .	. .	PSI	million
81.2	118.8	103.3	122.9	. .	. .	. .	Central Medical Stores	Thousands
66.5	35.1	62.6	48.7	. .	. .	. .	Central Medical Stores	Thousands
0.8	0.8	0.7	. .	0.7	. .	. .	CSO	Per economically active pop.
. .	. .	. .	. .	28.8	. .	. .		Deaths per 1000 population
	10.1			12.4	. .	. .	Stats Brief/Bulletin,CSO,Various	Persons per sq km
. .	. .	. .	. .	2.9	. .	. .	Population Report, 1996	# of persons per household
. .	. .	. .	. .	. .	. .	. .		Persons per sq km
. .	. .	. .	. .	. .	. .	. .		Number
. .	. .	. .	. .	. .	. .	. .		

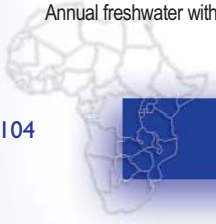
9. Participation and dependency								
Children immunised for measles	..	63.0	87.0	..	..	71.3	72.0	82.0
Avoidance of HIV	..	..	..	86.1	81.5	77.4	73.3	70.1
Youth in education and training	8.4	14.1	47.2	46.8	51.1	50.2	58.2	51.0
% of pre-schoolers at pre-school	. .	. .	. .	. .	. .	. .	. .	8.7
% of adults with formal sector job	31.4	30.9	53.3	51.3	49.4	47.4	45.5	43.2
Number of registered societies	. .	. .	0.792	0.844	1.024	. .	1.325	1.599
Private newspapers	. .	. .	. .	. .	. .	3.7	3.9	4.1
Circulation of daily newspapers								
Radio sets per 1 000 inhabitants	. .	. .	. .	. .	. .	. .	. .	. .
Radio Listenership	. .	. .	. .	. .	. .	. .	. .	. .
Percent of women who watch television	. .	. .	. .	. .	. .	. .	. .	. .
Mobile Telephone subscribers per 1 000 inhabitants	. .	. .	. .	. .	. .	. .	. .	15.0
Access to postal services	. .	. .	. .	. .	. .	. .	. .	. .
Satellite/cable TV access	. .	. .	. .	. .	. .	. .	. .	. .
Personal computer per person	. .	. .	. .	. .	. .	. .	. .	25.0
New business formation	. .	. .	2549.0	2162.0	1888.0	1795.0	. .	. .
Teenage girls becoming pregnant (1996 births by girls 15-19)	. .	. .	19.0	. .	. .	. .	. .	18.0
People Participation Index (PPI)	. .	. .	. .	. .	. .	. .	0.42	0.44
10. Social change and social stress								
Serious crimes	. .	706	1609	1638	1962	2118	2528	2563
Rape cases	. .	365	749	712	853	968	1056	1101
Children in prisons (under 16 years)	. .	. .	. .	. .	. .	. .	. .	. .
Orphans (Registered)	. .	. .	. .	. .	. .	. .	. .	. .
Children in juvenile courts	. .	. .	. .	. .	. .	. .	. .	. .
Children in institutional care arrangments	. .	. .	. .	. .	. .	. .	. .	. .
Child-headed households	. .	. .	. .	. .	. .	. .	. .	. .
Registration at birth	. .	. .	. .	. .	. .	. .	. .	. .
Number of working children	. .	. .	. .	. .	. .	. .	. .	. .
Internally displaced children (n/a)	. .	. .	. .	. .	. .	. .	. .	. .
Numbre of Refugees	. .	. .	1076.0	. .	. .	. .	. .	. .
Refugee children	. .	. .	. .		. .	. .	. .	. .
Unaccompanied children	. .	. .	. .	. .	. .	. .	. .	. .
Reported rapes of children 0-16 years (defilement)	. .	. .	. .	68	78	70	90	83
Number of street children	. .	. .	. .	. .	. .	. .	. .	. .
Landmine victims (n/a)	. .	. .	. .	. .	. .	. .	. .	. .
Child soldiers (n/a	. .	. .	. .	. .	. .	. .	. .	. .
School-going disabled children								
Divorces	. .	. .	. .	. .	. .	. .	. .	. .
Female genital mutilation (FGM) (n/a)	. .	. .	. .	. .	. .	. .	. .	. .
Domestic Violence (injury)	. .	. .	. .	. .	. .	. .	. .	. .
Domestic Violence (death)	. .	. .	. .	. .	. .	. .	. .	. .
Women incarceration rate (% women in jail)	. .	. .	. .	. .	. .	. .	. .	. .
Refugee women	. .	. .	. .	. .	. .	. .	. .	. .
Internally displaced women (n/a)	. .	. .	. .	. .	. .	. .	. .	. .

				..	..	..		
79.0	80.0	..		..	..	..	MOH	% of under-twos immunised
67.5	64.3	63.0		..	..	..	NACP	% sexually active population
53.8	..	..		..	..	..	CSO, MOE	% of 14-18 year olds (gross)
..	..	..		..	..	..	MOE	% of age group
				..	..	..	MFDP	% of labour force
1.809	2.047	2.385		..	..	..	Registrar of Societies	Number of registered societies
				..	..	..	Local newspapers	Weekly sales per 100 pop.
				..	..	..		Number
..	..	..	..	..	..	..		Number per 1000 population
..	..	..	..	..	..	..		Number of people
..	..	..	..	..	..	..		%
15.0	15.0		15.4	..	..	..	2000 HDR, UNDP	Per 1000 people
..	..	..		..	..	..		
..	..	..		..	..	..		
25.0	25.0			..	..	..	2000 HDR, UNDP	Per 1000 people
..	..	..		..	..	..	CSO	New businesses
	..	..		..	..	..	1991 census statistics,BFHS	% of teenage girls
0.44	0.45			..	..	..		Index
				..	..	..		
2579	2679	2871		..	..	..	Police annual reports	Reported adult cases
1183	1310	1345	1117	..	..	..	Police annual reports	Reported adult rape cases m/
..	237	..	..	..	..	..	Prisons Annual report, 1998	Number
..		..	37.0	85.0	..	..	UNAIDS (Estimates)	Number in Thousands
..	799	664	..	..	..	..	Police annual reports	Number
..	..	..	..	..	..	..		Number
..	..	..	..	..	..	..		% of households
..	..	59	59	..	..	..	BMIS, 2000	% births registered
..	..			..	..	..		Number
..	..	..	..	..	..	..		Number
281.0	2231.0	1487.0	1296.0				UNHCR annual Statistical Report	Number
..	..	..	888.0	..	..	..	UNHCR annual Statistical Report	Number
..	..	..	..	..	..	..		
100	137	143	184	..	..	..	Police annual reports	No.of 0-16 defiled
..	..	..	..	..	..	..		Number
..	..	..	..	..	..	..		Number
..	..	..	..	..	..	..		Number
				..	..	..		Number
..	..	..		..	..	..		Per 1,000 couples
..	..	..	..	..	..	..		Number of cases
..	..	..	..	..	..	..		Number of cases
..	..	..	..	..	..	..		Number of cases
..	10.0			..	..	..		% women
..	..	..	594.0	..	..	..	UNHCR annual Statistical Report	Number
..	..	..	..	..	..	..		Number of women

Registered vehicles		34.7	83.0	90.0	94.4	108.0	118.0	128.0
Road accidents	. .	1,715	8,381	9,017	9,169	9,420	9,536	10,338
Deaths caused by road accidents	. .	93	349	368	379	352	410	338
Injuries caused by road accidents	. .	940	4,871	4,909	5,136	5,171	5,247	5,457
Drug Analysis Cases	. .	. .	. .	. .	. .	0,900	0,798	0,930
Drugs Seized (Kg)	. .	. .	. .	. .	. .	. .	1,349	1,590
11. Technology and information								
Use of electricity for household lighting	. .	5.4	16.0	. .	11.5	. .	. .	. .
Electricity consumption % Residential		5.9	10.0	10.9	11.6			
Electricity consumption % Industry		83.4	77.5	63.3	59.0			
Household access to a radio y/	41.0	54.5	. .	. .	75.1	75.1	. .	. .
Household access to TV /y	. .	4.2	15.0	. .	15.0	15.0	. .	27.0
Connected telephone subscribers	. .	7,812	26,367	32,607	36,477	43,487	50,447	67,850
Telephone density	. .	. .	2.2	2.5	2.9	3.4	3.8	4.0
Cellphones		. .	. .	. .	. .	. .	. .	. .
Cell Teledensity		. .	. .	. .	. .	. .	. .	. .
Licenced Internet Service providers (ISPs)		. .	. .	. .	. .	. .	. .	. .
Internet users zb/	. .	. .	. .	. .	. .	. .	. .	644
Private Radio Transmitters	. .	. .	. .	. .	. .	. .	. .	. .
12. Democracy								
Voter registration	140.4	293.6	367.1	. .	. .	361.9	. .	. .
% voter turnout at national elections	54.7	77.6	68.2	. .	. .	76.7	. .	. .
% turnout of voting age population in national elections	37.5	54.2	47.9	. .	. .	44.6	. .	. .
% of opposition seats in national assembly	. .	. .	7.0	. .	. .	30.0	30.0	30.0
Total size of armed forces	. .	. .	8	. .	. .	. .	. .	. .
HIES Data 1985/86 and 1993/94								
Data for 1996 refers to IBIS customers only. Data for 2000 refers to estimated total number of Internet subscribers, all ISPs								
13. Economy								
GDP, constant prices (1985/86)...1991 onwards uses	. .	1,623.8	10,633.7	10,612.0	11,041.3	11,397.6	12,029.5	12703.7
1993/94 constant prices	. .	7.5	6.2	-0.2	4.0	3.2	5.5	5.6
Annual GDP growth rate	. .	38.7	37.0	35.5	35.8	34.2	33.9	33.9
Mining share of GDP	. .	61.3	65.1	66.7	66.4	65.8	66.1	66.1
Non-mining share of GDP	. .	9.9	4.6	4.6	4.2	4.0	4.1	3.6
Agriculture share of GDP	. .	7.7	4.9	4.7	3.9	4.7	4.8	4.7
Manufacturing share of GDP	. .	13.3	14.6	15.3	15.5	15.5	15.4	15.8
Government share of GDP	. .	27.0	23.6	27.9	27.6	28.6	28.3	29.0
Government share of consumption	. .	57.0	37.8	34.8	34.8	33.9	32.3	31.4
Private share of consumption	. .	14.0	36.9	37.0	33.3	29.6	28.3	29.3
Tax revenue share of GDP	. .	4.8	22.5	20.5	20.6	19.2	18.2	20.5
Mineral tax revenue share of GDP	4.0	16.3	11.8	16.1	14.4	10.6	10.5	10.1
Rate of inflation	1.3	1.1	0.5	0.4	0.4	0.4	0.4	0.3
Exchange rate	. .	. .	12.0	14.3	14.3	13.5	13.0	13.0
Bank of Botswana Lending Interest Rate	. .	. .	8.0	9.5	12.1	12.1	12.1	12.1
Government Public Debt Service Fund zc/?	. .	. .	12.5	14.5	15.0	14.5	14.5	14.5

99.2	114.0	133.6	. .	. .	. .	. .	RTA/CSO	Thousands
11,881	14,279	16,920	17,752	. .	. .	. .	Transp. & comms stats	Number
411	453	494	529	. .	. .	. .	Police annual reports	Number
5,956	6,887	8,061	11,500	. .	. .	. .	Police annual reports	Number
1,036	0,959	0,780	0,852	. .	. .	. .	Police annual reports	Number of drugs analysis
	1,187	1,224	. .	. .	. .	. .	Police annual reports	Number
				. .	. .	. .		
. .	. .	. .		. .	. .	. .	Census, 1993/94 HIES	% of households
				. .	. .	. .	Energy Statistics, MMRWA	% of consumers
							Energy Statistics, MMRWA	% of consumers
. .	. .	. .	66.7	67.6	. .	. .	CSO	% of households
27.0	27.0	. .	21.1	25.1	. .	. .	2000 HDR	per 1000 people
72,189	85,592	102,016	131,000	135,000	142,362	131,774	BTC	Connected telephones
4.7	5.5	6.7	8.7	8.0	8.4	7.8	BTC	Telephones per 100 persons
. .	15190	. .	159000		415000	470000	BTA, Vista, Mascom	Number of cellphones
. .	1.0	#VALUE!	10.6	0.0	24.5	27.8	BTC, Vista, Mascom	Cellsphones per 100 persons
. .	. .	. .	7.0	8.0	10.0	12.0	BTA	Number of ISPs
. .	10000.0	. .	20000.0	. .	60000.0	. .	Ibis Botswana, BTA	Number of subscriber
. .	3000.0	4500.0	8632.0				BTC	Number of private radios
				. .	. .	. .		
. .	. .	459.6	. .	. .	. .	. .	Election reports	number
. .	. .	77.1	. .	. .	. .	. .	Election reports	% of reg. voters that voted
. .	. .	37.7	. .	. .	. .	. .	Election reports	% of VAP that voted
30.0	30.0	16.0	16.0	16.0	16.0	16.0	Election reports	% of seats
8.5	. .	. .	. .	. .	. .	. .	SIPRI Yearbooks	Thousands
13728.6	14295.6	15238.8	16554.8	16905.8	18038.1	. .	BoB annual report/MFDP	P million
8.1	4.1	6.6	8.6	2.1	6.7	. .	BoB annual report/MFDP	% of GDP
34.4	32.1	33.4	36.5	34.7	35.9	. .	BoB annual report/MFDP	% of GDP
65.6	67.9	66.6	63.5	65.3	64.1	. .	BoB annual report/MFDP	% of GDP
3.5	3.1	2.7	2.7	2.6	2.4	. .	BoB annual report/MFDP	% of GDP
4.6	4.6	4.4	4.1	4.0	3.9	. .	BoB annual report/MFDP	% of GDP
16.0	16.3	16.1	15.6	16.9	16.4		BoB annual report/MFDP	% of GDP
28.9	29.3	29.5	. .	. .	. .	. .	BoB annual report/MFDP	% of GDP
32.2	31.7	30.6	. .	. .	. .	. .	BoB annual report/MFDP	% of GDP
33.6	26.2	39.2	41.1	. .	. .	. .	BoB annual report/MFDP	% of GDP
23.2	14.8	26.4	28.5	. .	. .	. .	BoB annual report/MFDP	% of GDP
8.9	6.5	7.8	8.5	6.6	. .	. .	BoB annual report/MFDP	%
0.3	0.2	0.2	0.2	0.2	. .	. .	BoB annual report/MFDP	$ per Pula, year end
12.5	12.5	13.3	14.3	14.3		. .	BoB annual report/MFDP	% interest rate per annum
12.1	12.1	12.1	. .			. .	BoB annual report/MFDP	% interest rate per annum
14.0	14.0	14.8	15.8	15.8			BoB annual report/MFDP	% interest rate per annum

Commercial Banks prime Lending Rate	. .		3.7	3.7	4.3	5.0	5.9	8.1
Exports	. .		3.9	4.0	4.3	4.4	5.3	5.7
Imports	. .	-171.2	612.0	417.0	1,035.0	402.0	938.0	1,049.0
Current account balance	31.8	132.8	787.8	965.8	1,096.2	1,267.8	1,377.7	1,439.9
Total external debt	. .	. .	3.9	2.9	3.9	4.2	3.4	3.1
Debt service ratio?	. .	. .	37.0	47.0	67.0	78.0	70.0	71.0
Net foreign direct investment		. .	26.3	28.0	25.4	24.0	24.0	23.6
Gross domestic investment?	. .	. .	18.8	19.3	18.0	18.0	17.2	16.7
Gross domestic savings?	. .	. .	. .	111.9	. .	. .	. .	. .
ODA inflow?	. .	. .	. .	3.0	. .	. .	. .	. .
ODA inflow as % of recipient GNP?								
14. Public expenditure								
Total Public Expenditure	. .		3,367.6	3,771.0	4,481.2	4,276.8	5,194.5	6,092.4
Public expenditure as % of GDP	. .	-5.0	40.2	41.4	40.6	34.9	36.6	34.3
Annual growth in real public expenditure r/?	. .	5.5	3.0	-5.3	4.3	-13.1	6.8	11.5
Overall budget surplus/ (deficit)?	. .		20.7	23.4	19.6	4.6	5.2	21.4
Health share of expenditure	. .		3.8	4.2	4.5	5.3	4.9	4.9
Education share of expenditure	0.0		16.8	17.3	18.2	21.9	22.5	24.9
Defence share of expenditure	. .		10.7	10.1	10.6	10.6	8.9	7.7
Ratio of defence to health/education expenditure			51.9	46.9	46.5	38.8	32.5	25.8
15. Environment								
Carbon Dioxide Emissions (metric tons per capita)	. .		. .	. .	. .	. .	1.5	1.4
Biodiversity: a) Land are protected	. .	. .	. .	. .	17.6	. .	. .	. .
b) Number of species under threat	. .	. .	. .	. .	. .	154.0	154.0	
c) Number of species exinct	. .	. .	. .	. .	. .	. .	. .	. .
d) Area of land desertified	. .	. .	. .	. .	. .	. .	. .	. .
GDP per unit of energy use -Unit of Energy=Terajoules	. .	0.00	0.18	0.20	0.23	. .	. .	. .
Arable land per capita		. .	. .	. .	. .	. .	. .	. .
Average annual rate of deforestation	. .	0.5	0.5	0.5	0.5	0.5	0.5	. .
Average annual rate of reforestation	. .	. .	. .	. .	. .	. .	. .	. .
% population relying on traditional fuels for energy use	. .	61.8	72.2	75.6	76.0	. .	. .	. .
Net energy supply from Electricity zd/	. .	6.5	4.6	4.9	5.2	5.6	5.8	11.0
Net energy supply from Petrolium zd/	. .	16.8	17.0	21.5	20.9	19.2	20.6	35.0
Net energy supply from Coal zd/	. .	11.8	8.3	5.6	5.5	5.8	4.3	10.0
Net energy supply from Wood zd/	. .	64.8	70.1	67.9	68.4	69.4	69.3	44.0
Net energy supply from Other Sources zd/		0.01	0.03	0.04	0.04	0.00	0.00	0.00
Renewable Energy as % of conventional energy	. .	64.8	70.1	67.9	68.4	69.4	69.3	44.0
Volume of solid waste disposed at landfill site (basis 1996)	. .	. .	. .	. .	325.0	325.0	325.0	325.0
% of solid waste managed well zg/	. .	. .	. .	. .	38.0	38.0	38.0	38.0
Freshwater recharge	. .	. .	. .	. .	. .	. .	. .	. .
Freshwater pollution	. .	. .	. .	. .	. .	. .	. .	. .
Annual freshwater withdrawals (% of water resources)	. .	. .	3.8	3.8	3.8	3.8	3.8	3.8
Annual freshwater withdrawals (cubic metres)		. .	81.0	81.0	81.0	81.0	81.0	81.0



10.4	8.9	. .	. .	. .	. .		BoB annual report/MFDP	% of GDP
8.3	9.5	10.2	10.6	. .	. .		BoB annual report/MFDP	% of GDP
1,899.0	-155.0	1,695.0	1,674.0	1,367.0	. .	. .	MFDP/BoB	
1,783.3	1,968.3	2,422.8	2,537.3	2,426.2	2,428.2	. .	BoB/CSO	P million
2.4	2.9	. .	2.3	1.7	. .	. .	BoB	P million
100.0	168.0	. .	. .	. .	. .	2,428.2	MFDP/BoB/UNCTAD	Debt service as % of exports
24.5	28.0	. .			. .	. .	MFDP/BoB	$ billion
18.6	26.6	. .	. .	. .	. .	. .	MFDP/BoB	% of GDP
. .	106.4	. .	. .	. .	. .	. .	2000 HDR, UNDP	% of GDP
. .	1.9	. .	. .	. .	. .	. .	2000 HDR, UNDP	US$ millions
				. .	. .	. .		% of GNP
				. .	. .	. .		
7,406.1	9,065.4	10,427.5	11,536.5	13,670.9	15,710.1	. .	MFDP/BoB	P million
36.7	42.1	41.1	39.3	42.8	43.2	. .	MFDP/BoB	% of GDP
5.5	. .	. .		. .	. .	16,206.7	MFDP/BoB	%
11.8	15.0	4.5		. .	. .		MFDP/BoB	% of expenditure
5.6	5.2	5.2	5.5	6.3		. .	MFDP/BoB	% of public expenditure
24.1	25.1	23.6	24.8	22.5	. .	. .	MFDP/BoB	% of public expenditure
8.4	9.0	8.2	8.8			. .	MFDP/BoB	% of public expenditure
28.5	29.6	27.1	28.8		. .		MFDP/BoB	%
				. .	. .			
. .	. .	. .	. .	. .	. .	. .	2000, HDR, UNDP/SADC	Metric Tons per capita
. .	. .	. .	17.6	. .	. .	. .	UNDP HDR	
			. .	. .		. .	UNDP HDR, World Resources 94-	Number
. .	. .	. .	1.0	1.0		. .	95	Number
. .	. .	. .	. .	. .			Department of Wildlife	Area in Sq Km
0.27	. .	. .	. .	. .	. .	. .		Ratio of GDP to energy units
. .	. .	. .	. .	. .	. .	. .	Energy Statistics, MMRWA	Per capita Sq Km
. .	. .	. .	. .	. .	. .	. .		Number of hectares
. .	. .	. .	. .	. .	. .	. .		Number of hectares
. .	. .	. .	. .	. .	. .	. .		% wood as source of energy
11.0	. .	. .	. .	. .	. .	. .	Energy Statistics, MMRWA	% terrajoules
35.0	. .	. .	. .	. .	. .	. .	Energy Statistics, MMRWA	% terrajoules
10.0	. .	. .	. .	. .	. .	. .	Energy Statistics, MMRWA	% terrajoules
44.0	. .	. .	. .	. .	. .	. .	Energy Statistics, MMRWA	% terrajoules
0.00	. .	. .	. .	. .	. .	. .	Energy Statistics, MMRWA	% terrajoules
44.0	. .	. .	. .	. .	. .	. .	Energy Statistics, MMRWA	% Energy
325.0	. .	. .	. .	. .	. .	. .		Thousand Tonnes per Annum
38.0	. .	. .	. .	. .	. .	. .	Waste Management Strategy,'98	% of total waste
. .	. .	. .	. .	. .	. .	. .	Waste Management Strategy,'98	
. .	. .	. .	. .	. .	. .	. .		% freshwater
3.8	. .	. .	. .	. .	. .	. .	2000, HDR, UNDP	% of water resources
81.0	. .	. .	. .	. .	. .	. .	2000, HDR, UNDP	Cubic metres

Census years (1981&1991) up to 2002.

Data refers to 1990.

Data refers to 1990.

Data refers to 1984.

For the years 1995 - 1997 GDP deflator base year is 1995.

There was no minimum wage increase in 1994, hence data for 1994 arefor 1993

A two tier rate strcucture was introduced in 1991 for financial parastatals
and non-financial parastatals. The rate shown is for financial parastatals

Net energy supply is the total energy available for use by the finalconsumer

Other sources refer to solar, wind and biogas (all renewable) and
insignficant in amounts (estimated about 30 -25 kilojoules)

Wood is renewable but overexploited in Eastern and Southern parts ofBotswana

Data on waste is not well stored. Waste disposed at landfill sites is
estimated to be around 325000 tonnes a year, excluding mining waste.

It is estimted that only about 38% of household waste is disposed well.

Table 2: Botswana Human Development Database by Districts and Settlement Type

	Unit	National	Urban	Rural	Gabor -one	Francis -town	Lobatse Lobatse
1. Overall status of human development							
Life expectancy at birth (2001)	Years	55.6					
Adult literacy (1993) National (2000)	% of adults	75.1	83.3	64.1	78.1	85.6	81.3
Net enrolment rate, 1st level (1995)	% of age group	96.70	90.63	80.91	91.30	89.50	92.00
Net enrolment rate, 2nd level: Junior	% of age group	. .	. .	. .	. .	. .	. .
Net enrolment rate, 2nd level: Senior	% of age group	. .	. .	. .	. .	. .	. .
Combined 1st+2nd levels enrolment (1995)	% of age group	70.5	. .	. .	77.6	81.5	82
Real GDP per capita (2002)	Pula in 1993/94 prices	10610	. .	. .	. .	. .	. .
Real GDP per capita in PPP$ (2002)	PPP$	8170			. .	. .	. .
Adj. real GDP per capita, PPP$ (2002)	PPP$				. .	. .	. .
Bots. Human Dev. Index (BHDI) (2002)	Index	0.669			. .	. .	. .
2. Poverty and Inequality							
Adult illiteracy rate (1993)	% of people	32	16.7	37.8	21.9	14.4	18.7
Population without health servs. (1995)	% of people	12	2	17	0	0	0
Population without safe water (1991) b/	% of people	23	0	47	0	0	0
Under five malnutrition rate (2000) c/	% of under fives	10.1	6.6	20.3	4.5	6.4	4.9
Rate of income poverty (1993/94)	% of people below PDL	47	29	55	18	. .	. .
Rate of unattended births d/	% of births	5	. .	. .	. .	0.5	. .
Female illiteracy (1993)	% of adult females	29.7	15	35	18.4	14	13.1
Number of registered destitutes (1999)	Number	17554	343	17211	67	116	126
Poverty line for HH size 6 in HIES area A and B in US$	PDL	. .	. .	. .	. .	. .	. .
Poverty headcount ratio (% population <1US$/Day) 1993/94	% of pop <1US$/day	23.6	. .	. .	. .	. .	. .
Income of poorest 40% of population (1993/94)	% of total income	11.7	. .	. .	. .	. .	. .
Botswana Human Poverty Index (BHPI) e/	Index	22	11.7	27.1	15.2	10.1	13.1
3. Survival and health							
3.1 Indicators of Health (World Health Report, 2000)							
3.1.1 Health Attainment							
level							
Disability-adjusted life expectancy (DALE), 1997-99	Number of years	32.3	. .	. .	. .	. .	. .
Male	Number of years	32.3	. .	. .	. .	. .	. .
Female	Number of years	32.2	. .	. .	. .	. .	. .
Expectation fo Disability at Birth	Number of years		. .	. .	. .	. .	. .
Male	Number of years	7.2	. .	. .	. .	. .	. .
Female	Number of years	7.1	. .	. .	. .	. .	. .
Distribution			. .	. .	. .	. .	. .
Measure of equality of Child Survival	Index	0.624	. .	. .	. .	. .	. .
3.2 Responsiveness of Health System			. .	. .	. .	. .	. .

Selebi Phikwe	Other towns q/	Central	Ghanzi	Kgal -agadi	Kgat -leng	Kwen -eng	dNorth East	North West	South East	South -ern
83.5	85.6	65.8	56.7	57.6	71.3	62.4	67.3	60.5	72.6	62.3
89.40	91.03	81.80	69.90	82.30	87.00	75.80	91.10	76.10	86.90	81.40
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79.4	77.9	77.7	64.1	75.3	80.6	72.3	85.8	72.2	79.8	76.9
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16.5	14.4	34.2	43.3	42.4	28.7	37.6	32.7	39.5	27.4	37.7
0	0	15	40	36	17	5	1	15	0	15
0	0	35.2	36	18	25	39	16	41.7	13	12
7.5	. .	16.3	15.6	14.6	10.5	12	8.9	4.1	8.1	13.5
. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .
. .	. .	19.5	40	41	15.6	20	. .	31	5.1	25
15.3	13.2	33.9	46	44.5	22.9	33.1	33.5	43	23	33.3
34	..	6543	1407	1554	440	3311	415	1943	574	1024
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11.5			31.2	31			22.8	28.2		26.4
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level (WHO index, 2000)	Index		. .	. .	. .	. .	. .
Distribution (WHO Index 2000)	Index		. .	. .	. .	. .	. .
3.2.1 Respect for Persons			. .	. .	. .	. .	. .
Dignity	Qualitative		. .	. .	. .	. .	. .
Confidentiality	Qualitative		. .	. .	. .	. .	. .
Autonomy	Qualitative		. .	. .	. .	. .	. .
3.2.2 Client orientation	Qualitative		. .	. .	. .	. .	. .
Prompt attention	Qualitative		. .	. .	. .	. .	. .
Access to social support Networks	% with access		. .	. .	. .	. .	. .
Quality of basic amenities	Qualitative		. .	. .	. .	. .	. .
Choice of provider	Qualitative		. .	. .	. .	. .	. .
3.3. Fairness of financial contribution	Index		. .	. .	. .	. .	. .
Distribution (WHO Index 2000)	Index		. .	. .	. .	. .	. .
3.3.1 Health Financing			. .	. .	. .	. .	. .
Fairness of Health Systems (Index), 1997	Index	0.924	. .	. .	. .	. .	. .
Health System Peformance Ranking (overall), 1997		169	. .	. .	. .	. .	. .
Health System Peformance Ranking (Indexl), 1997		0.338	. .	. .	. .	. .	. .
Under five mortality rate (1991)	Deaths per 1,000 births	62	46	80	38	43	52
Under five mortality rate (1999/2000) BMIS	Deaths per 1,000 children						
Infant mortality rate (1991)	Deaths per 1,000 births	48	37	60	31	35	41
Infant mortality rate (1999/2000) BMIS	Deaths per 1,000 births						
Maternal mortality rate (Census 1991)	Deaths per 100,000 births	326	254	348	183	303	161
Underweight births (1998)	% of births below 2.5kg	15	. .	. .	17	15	14
Adult HIV prevalence (1995)	% of sexually active pop.	32.3	. .	. .	28.7	39.6	38.9
New reported cases of AIDS (1995)	Number	535	. .	. .	. .	. .	. .
Mother-to-child transmission of HIV (MTCT)	Rate of transmission						
Pregnant women presenting with HIV/AIDS (1999)	% HIV Seropositive women	35					
Births attended by trained health personnel l/, 2000	% of births	95	. .	. .	. .	99.5	. .
Diarrhoea episodes (1998, childre <5 years) l/	# of cases	69402	. .	. .	5845	5366	1351
Malaria (confirmed cases) 1998	# of cases	5827			59	96	1
Measles (1998)	# of cases	707			84	16	21
Poliomyelitis (1991)	# of cases	2	. .	. .	. .	. .	. .
AFP (Acute Flaccid Paralysis) -2000	# of cases	7	. .	. .	. .	. .	. .
Tuberculosis (Cases)-1999	# of cases	8649	. .	. .	1047	649	336
Tuberculosis Rate (1999)	Cases per 100000	537			517	669	1073
Whooping Cough (1998)	# of cases	8				1	
Oral rehydration therapy use rate	% of diarrhoea cases	. .	. .	. .	. .	. .	. .
Access to health services (2000 BMIS) CSO	% of pop. within 15km	88.00	98.00	83.00	100.00	100.00	100.00
Access to safe water (2000, BMIS) CSO	% with access	97.70	100.00	94.20	100.00	100.00	100.00
Health centres with water supply (2000)	% with access	100.00	. .	. .	. .	. .	. .
Schools with water supply (2000)	% with access	100.00	. .	. .	. .	. .	. .
Access to safe sanitation (2000, BMIS) CSO	% with access	83.60	97.00	56.70	99.80	99.30	99.50
Health centres with latrines (2000)	% with access	100.00	. .	. .	. .	. .	. .
Schools with latrines (1998)/latrines/school	% with access	7.51	. .	100.00	. .	. .	. .

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40	58	63.4	91	105	48	91	43	97	45	76
33	45	48.8	67	76	39	66	35	70	36	57
260	156	305	582	239	316	297	298	600	350	365
18	..	14.2	14	16.5	14	13.5	17	14	13	9
..	..	29.9	18.9	..	..	..	..	37.9	..	..
..	..	..	..	..	..	..	..	..	..	..
..	..	80.5	60	59	84.4	80	..	69	94.9	75
2626	..	18555	2163	2504	1799	4234	1948	4761	1830	6522
36		396	22	3	6	9	5	2447	8	13
17		37	24	29	107	76	11	39	10	164
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345	..	2410	243	434	272	840	149	669	303	676
721			875		415		312		514	1383
		2		3						1
..	..	..	..	..	..	..	..	..	..	..
100.00	100.00	85.00	60.00	64.00	83.00	95.00	99.00	85.00	100.00	85.00
100.00	100.00	96.10	100.00	98.80	94.50	96.60	99.30	96.00	98.40	95.70
..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..
100.00	71.00	71.90	65.70	83.50	89.30	83.10	87.20	54.80	83.10	74.30
..	..	..	..	..	..	..	..	..	..	..
..	..	8.86	4.22	6.09	14.59	10.59	6.98	7.91	3.14	8.58

Schools with flush toilets(1998)/flush toilets/school	% with access	5.79	100.00	. .	21.08	23.95	17.50
Population per doctor (1998) f/	Number of persons	3999	. .	. .	1330	1128	1912
Population per nurse (1998) f/	Number of persons	369	. .	. .	210	226	135
Number of hospital beds (1998)	# of beds	3572			530	430	286
Number of baby-friendly facilities	# of facilities	. .	. .	. .	. .	. .	. .
Number of BFHI with VCCT	# of facilities	. .	. .	. .	. .	. .	. .
People with disabilities	% of population	2.2	. .	. .	1	1.4	1.8
Full immunisation (2000, BMIS) CSO	% of under-twos	73.4	62	53		64	57.7
B.C.G (TB) immunisation(1999) Routine Immunisation Data (MOH, EPI)	% coverage	67.00	67.60	57.12	68.00	70.00	100.00
Measles immunisation(1999) Routine Immunisation Data (MOH, EPI)	% coverage	74.00	77.80	67.54	100.00	100.00	100.00
Hepatitis B Virus (1999) Routine Immunisation Data (MOH, EPI)	% coverage	70.00	74.60	59.94	100.00	100.00	88.00
DPT3 immunisation (1999) Routine Immunisation Data (MOH, EPI)	% coverage	85.00	80.00	73.58	100.00	100.00	100.00
Polio3 immunisation (1999) Routine Immunisation Data (MOH, EPI)	% coverage	82.00	78.60	70.31	100.00	100.00	97.00
Tetenus toxoid at leats two doses	% coverage	. .	. .	. .	. .	. .	. .
Modern contraceptive prevalence (2000, BMIS) CSO	% women 15-49 using	43.08	41.80	38.30	47.79	36.87	44.78
Average interval before birth	Number of years						
Births attended by trained personel	% births assisted	98.54	98.29	98.91	97.6	97.92	100
Children whose mothers seek care for ARI	% of children		. .	. .	. .	. .	. .
Children whose mothers seek care for diarrhoea	% of children		. .	. .	. .	. .	. .
Children whose mothers offer fluids/continued feeding during ARI	% of children		. .	. .	. .	. .	. .
Low birth weight	% less than 2.5kg at birth		. .	. .	. .	. .	. .
Stunting (% below -2) BMIS 2000	% children	23.1	23	23.1	18.3	32.3	22.7
Underweight (% below -2) BMIS 2000	% children	12.5	11.5	13.6	7	10.2	13.3
Wasting (weight for height-2SD) 2000, BMIS CSO	% children	5	5.2	4.8	6.3	4.7	1.3
Use of colostrum	% women		. .	. .	. .	. .	. .
Exclusive breastfeeding rate (BMIS 2000, CSO)	% women	29.08	25.69	33.33	. .	. .	. .
Continued breastfeeding rate at one year (BMIS 2000, CSO)	% women	53.42	53.45	53.4	. .	. .	. .
Continued breastfeeding rate at two years (BMIS 2000, CSO)	% women	10.71	8.25	13.13	. .	. .	. .
Timely complimentary feeding rate (BMIS 2000, CSO)	% women	57.01	60.16	52.75	. .	. .	. .
Feeding frequency		. .	. .	. .	. .	. .	. .
Calories available per capita per day	calories	. .	. .	. .	. .	. .	. .
Calories available per capita per day for HH below PDL	calories	. .	. .	. .	. .	. .	. .
Household expenditure on food	Pula amount	. .	. .	. .	. .	. .	. .
Total Goitre Rate (1996) Micronutrients Survey	% occurrence in sample	16.5					9.8
Urinary Iodine excretion (1996, None found)	% pop	. .	. .	. .	. .	. .	. .
Use of iodised salts (1996)% Households Surveyed	% households surveyed	41.3					61.5
Salt iodisation (salt tested at 15 parts per million) 2000, BMIS	% households surveyed	61.3	62.1	59.7	61.9	57.7	57.9
Prevalence of anaemia in women (1996) Micronutrients Survey	% women surveyed	33	17	15	17	17	29
Prevalence of anaemia in children (1996) Micronutrients Survey	% children surveyed	38	35	58	35	35	58
Pregnancy suplementation with iron/folic acid tablets	% women surveyed	. .	. .	. .	. .	. .	. .
Vitamin A capsule supplementation, twice a year (just started)	% women surveyed	. .	. .	. .	. .	. .	. .

21.80	23.75	5.06	1.30	1.45	2.56	15.83	2.41	2.11	13.27	1.58
3896	. .	8795.1731	5485	6288	7178	7739	47502	15913	3758	14695
254	. .	510.43415	334	300	439	578	516	501	455	535
93		2	48	91	130	222		181	127	257
. .	. .	224	. .	. .	. .	. .	. .	. .	. .	. .
. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .
1.2	1.2	. .	2.3	2.9	3	2.9	2.8	3.4	2.2	2.5
56.2	. .	3.2	44.6	. .	69.3	39.4	. .	49.2	. .	. .
100.00	. .	60.1	69.00	93.00	91.00	58.00	25.00	75.50	84.00	52.00
	. .									
89.00		57.60	77.00	97.00	84.00	65.00	61.00	84.50	100.00	55.00
85.00		68.40	70.00	86.00	78.00	60.50	55.00	70.00	81.00	51.00
100.00		66.00	91.00	98.00	86.00	80.50	64.00	97.50	86.00	65.00
96.00	. .	80.20	91.00	95.00	88.00	69.50	69.00	89.50	80.00	60.00
. .	40.90	78.80	. .	. .	. .	. .	. .	. .	. .	. .
41.80		. .	48.76	38.50	36.50	36.90	38.16	44.12	48.88	34.49
	100	37.87								
100	. .		100	100	100	100	94.4	95.5	100	98.48
. .	. .	98.84	. .	. .	. .	. .	. .	. .	. .	. .
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27.1	8	. .	30.6	20	21.4	32.1	18.1	15	15.3	25.7
10.6	8	23	30.6	12.7	7.1	15.4	9.5	11.4	7.2	17.6
4.7	. .	13.3	18.4	5.5	5.4	3.8	2.9	5.7	2.7	6.2
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22.4	. .	. .	11.3		5.3	9.9	24.7			
. .		41.4	. .	. .	. .	. .	. .	. .	. .	. .
48.4	59.3	. .	5.2		50	1.7	72.1			
41.5		35.6	49.2	67.1	83.8	73.9	68.1	39.3	69.2	65.2
38		58.2	44		28	38	32			
25	. .	15	48		29	41	36			
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Nightblindness in children (n/a)	% children surveyed	. .	. .	. .	. .	. .	. .
Nightblindness in pregrant women (n/a)	% women surveyed	. .	. .	. .	. .	. .	. .
Serum retinol (1996) Micronutrients Survey	% women surveyed	. .	. .	. .	. .	. .	36.8
Access to basic Essential Obstetric Care (EOC) facilities	% of women with access	. .	. .	. .	. .	. .	. .
Access to comprehensive EOC facilities	% of women with access	. .	. .	. .	. .	. .	. .
Antenatal care coverage	% of women with access	. .	. .	. .	. .	. .	. .
Average age at first birth	age in years	. .	. .	. .	. .	. .	. .
Average interval between births	years	. .	. .	. .	. .	. .	. .
Birtrhs attended by skilled health personnel (2000, BMIS)	% births by person	94.8	98.8	93.3	100	97.3	100
Ceasarian sections per total births at EOC facilities (1998)	assisting	6.22	. .	. .	. .	. .	. .
Case fatality rate at EOC facilities	% of Total Births	. .	. .	. .	. .	. .	. .
Proportion of women estimated to have complications (1998)	rate of death	9.87	. .	. .	. .	. .	. .
who are treated at EOC facilities	% of Total Births	. .	. .	. .	. .	. .	. .
Perinatal Mortality rate	per 100000 births	. .	. .	. .	. .	. .	. .
4. Educational attainment							
ECCD gross enrolment	% pupils/age group		. .	. .	. .	. .	. .
Grade 1 pupils who attended ECCD			. .	. .	. .	. .	. .
Programme	% pupils		. .	. .	. .	. .	. .
Total Primary School Enrolment (thousands)-2003	Number of pupils	331.5	60.9	270.6	27.2	14.3	5.8
Primary Apparent (gross) intake rate (1997)	Number of new entrants	134.8	. .	. .	127.52	114.14	135.31
Male (1997)	into grade one as % of	139.6	. .	. .	135.51	131.44	146.67
Female (1997)	age-group population	133.5	. .	. .	120.04	100.32	124.18
Primary net intake rate (National =1997) Districts=1994	Number of new entrants	62.4	. .	. .	61	65.8	64.4
Male (National =1997) Districts=1994	into grade one as % of	61.7	. .	. .	61.3	73.6	66
Female(National =1997) Districts=1994	official age-entrace population	63.1	. .	. .	60.8	59.6	62.7
Primary net enrolment ratio (1995)	% of age group enrolled	96.7	. .	. .	91.3	89.5	92
Male	% of age group enrolled	95.7	. .	. .	91.1	89.1	91
Female	% of age group enrolled	97.7	. .	. .	91.5	89.9	92.7
Primary gross enrolment ratio (1998)	Number of children enroled	117.4	. .	. .	. .	. .	. .
Male (1998)	whether or not they are	119	. .	. .	. .	. .	. .
Female (1998	relevant age-group	117	. .	. .	. .	. .	. .
Public expenditure on education (1994/95) m/	Pula Millions	708	. .	. .	24.77	14.64	8.98
Public expenditure on education (1995/96) m/	Pula Millions	827	. .	. .	31.73	18.89	7.39
Public expenditure on education (1996/97) m/	Pula Millions	1101	. .	. .	30.30	16.40	7.54
Public expenditure on education (1997/98) m/	Pula Millions	1200	. .	. .	29.82	23.63	11.33
Public expenditure on education (1998/99) m/	Pula Millions	1641	. .	. .	13.35	23.88	15.35
Primary Education expenditure per pupil per GNP per capita			. .	. .	. .		
Primary Education expenditure as % of total edu. Exp(1994/95) m/	percentage	. .	. .	. .	21.40	21.40	21.40
Primary Education expenditure as % of total edu. Exp(1995/96) m/	percentage	. .	. .	. .	20.98	20.98	20.98
Primary Education expenditure as % of total edu. Exp(1996/97) m/	percentage	. .	. .	. .	22.67	22.67	22.67
Primary Education expenditure as % of total edu. Exp(1997/98) m/	percentage	. .	. .	. .	22.02	22.02	22.02
Primary Education expenditure as % of total edu. Exp(1998/99) m/	percentage	. .	. .	. .		. .	. .
Number of Untrained Primary School Teachers (1997)	# of teachers	768	. .	. .	75	18	12
Number of Untrained Primary School Teachers (1998)	# of teachers	952			88	11	2

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64.3	. .	. .	34.5	. .	22.2	18.6	32.1	. .	. .	. .
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94.7	100	89.9	100	100	96.8	98.4	76.2	90.9	100	96.7
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8.6	5.0	108.5	6.3	8.2	14.5	42.9	12.1	32.1	10.0	36.0
127.64	. .	102.88	123.17	104.28	96.72	105.61	106.55	127.76	96.05	101.79
139.13	. .	105.63	120.29	111.92	94.79	106.10	112.75	132.26	97.02	102.97
118.39	. .	100.04	126.21	96.46	98.78	105.10	100.34	123.39	95.11	100.60
62.8	. .	56.13	45.1	42.7	41.2	41.5	55.7	44.6	38.2	44.1
68.7	. .	55.90	46.9	44	39.1	39.4	57.9	44.6	38.3	42.2
68.7	. .	56.47	43.3	41.2	43.4	43.7	53.4	44.6	38.1	46
89.4	91.03	81.80	69.9	82.3	87	75.8	91.1	76.1	88	81.4
87.6	91.33	78.70	65.9	78.6	83.7	69.6	90.1	72.7	86.2	76.6
90.9	90.8	84.8	74.2	85.9	83.7	81.9	92.2	79.4	89.7	86.2
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13.62	7.99	145.73	14.14	27.15	21.37	46.37	13.20	27.49	10.57	63.50
13.71	7.16	154.34	12.42	25.23	21.30	53.10	14.58	31.35	12.27	61.78
12.95	6.01	135.26	12.67	22.06	26.27	32.39	16.20	26.43	12.52	34.11
13.76	11.33	187.36	18.18	30.41	27.54	61.05	16.90	37.85	15.24	78.00
12.56	7.41	170.77	7.41	31.89	21.13	77.74	13.43	47.58	13.69	64.36
21.40	21.40	21.40	21.40	21.40	21.40	21.40	21.40	21.40	21.40	21.40
20.98	20.98	20.98	20.98	20.98	20.98	20.98	20.98	20.98	20.98	20.98
22.67	22.67	22.67	22.67	22.67	22.67	22.67	22.67	22.67	22.67	22.67
22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02	22.02
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19	8	739	55	148	182	272	171	225	54	313
19	4	248	30	25	45	169	38	127	30	116

Primary School Teachers who are certified by national standards	# of teachers (1997)	10686	. .	. .	866	455	183
Primary School Teachers who are certified by national standards	# of teachers (1998)	10702			850	473	188
Primary School Pupil-teacher ratio (1998)	ratio of teachers to pupils	28.1	. .	. .	28	29	31
Survival rate to grade 5	% children who reach g 5	. .	. .	. .	. .	. .	. .
Primary school Coefficiency of efficiency		. .	. .	. .	. .	. .	. .
Learning acheivement		. .	. .	. .	. .	. .	. .
Literacy rate of 15-24 year olds(1993)	% age group able to read	90	. .	. .	. .	. .	. .
Primary education Quality of learning outcomes	& write	. .	. .	. .	. .	. .	. .
Unit cost of Primary education {national= 1997) -(1998) n/	exp. Per pupil in Pula	844.72	. .	. .	108.21	368.18	582.61
Public expenditure on primary education (1994/95)	Pula Millions	171.00			5.98	3.54	2.17
Public expenditure on primary education (1995/96)	Pula Millions	177.00			6.79	4.04	1.58
Public expenditure on primary education (1996/97)	Pula Millions	231.00			6.36	3.44	1.58
Public expenditure on primary education (1997/98)	Pula Millions	272.00			6.76	5.36	2.57
Public expenditure on primary education (1998/99)	Pula Millions	334.00	. .	. .	2.94	5.26	3.38
Public expenditure on primary education (1999/2000)	Pula Millions	362.00			2.70	7.75	6.82
Public expenditure on primary education (2000/2001)	Pula Millions	. .			31.55	12.94	1.28
Expenditure on teacher's salaries (1998/99) o/	Pula Millions	425.75	. .	. .	3.75	6.71	4.31
Junior secondary net enrolment rate (1995)	% of age group enrolled	45.30	. .	. .	. .	. .	. .
Male	% of age group enrolled	39.2	. .	. .	. .	. .	. .
Female	% of age group enrolled	51.1	. .	. .	. .	. .	. .
Senior secondary (1995)	% of age group enrolled	19.9	. .	. .	. .	. .	. .
Male	% of age group enrolled	19.6	. .	. .	. .	. .	. .
Female	% of age group enrolled	20.2	. .	. .	. .	. .	. .
Primary+Secondary net enrolment rate (1995)	% of age group enrolled	70.5	. .	. .	77.6	81.5	82
Male	% of age group enrolled	69.1	. .	. .	77.8	78.8	81.3
Female	% of age group enrolled	71.9	. .	. .	77.5	83.8	82.6
Progression rate: standard 1 to form 1 (1995)	% of standard 1 entrants	77.8	. .	. .	. .	. .	. .
Male	% of standard 1 entrants	71.5	. .	. .	. .	. .	. .
Female	% of standard 1 entrants	84	. .	. .	. .	. .	. .
Progression rate: standard 1 to form 4 (1995)	% of standard 1 entrants	29.9	. .	. .	. .	. .	. .
Male	% of standard 1 entrants	28.5	. .	. .	. .	. .	. .
Female	% of standard 1 entrants	31.2	. .	. .	. .	. .	. .
PLSE pass rate (1998) p/	% of persons taking exam	99.86			99.88	99.72	99.88
Male	% of persons taking exam	. .	. .	. .	. .	. .	. .
Female	% of persons taking exam	. .	. .	. .	. .	. .	. .
JC pass rate (national= 1998) ditricts=1995	% of persons taking exam	76.80	. .	. .	86.80	84.40	82.60
Male	% of persons taking exam	. .	. .	. .	. .	. .	. .
Female	% of persons taking exam	. .	. .	. .	. .	. .	. .
Cambridge pass rate (1995)	% of persons taking exam	75.50	. .	. .	79.30	88.25	77.80
Male	% of persons taking exam	. .	. .	. .	. .	. .	. .
Female	% of persons taking exam	. .	. .	. .	. .	. .	. .
Number of students at tertiary level							
5. Incomes and employment							
Size of labour force (2001)	Number of persons	558753	189417	369336	. .	. .	. .

292	214	3455	193	280	458	1413	422	935	307	1213
299	201	3459	210	291	456	1390	426	899	330	1230
30	23	29	24	23.5	27	28	26	29	27	25
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321.44	326.10	346.44	259.84	857.40	320.59	399.16	245.26	326.38	301.42	393.62
3.29	1.93	35.20	3.41	6.56	5.16	11.20	3.19	6.64	2.55	15.34
2.93	1.53	33.03	2.66	5.40	4.56	11.36	3.12	6.71	2.63	13.22
2.72	1.26	28.38	2.66	4.63	5.51	6.79	3.40	5.55	2.63	7.16
3.12	2.57	42.47	4.12	6.89	6.24	13.84	3.83	8.58	3.46	17.68
2.76	1.63	37.60	1.63	7.02	4.65	17.12	2.96	10.48	3.01	14.17
3.82	0.24	89.06	0.00	15.61	6.89	49.49	2.68	26.32	5.85	23.95
5.67	1.14	7.58	7.79	7.60	5.73	22.42	6.08	42.91	0.00	6.50
3.53	2.08	47.99	2.08	8.96	5.94	21.84	3.78	13.37	3.85	18.09
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79.4	77.9	77.7	64.1	75.3	83.7	72.3	85.8	72.2	79.8	76.9
79.9	79.6	75.2	61.5	71.9	83.7	65.9	85.9	70.2	77.1	71.6
79	76.27	80.2	66.7	78.6	83.7	78.6	85.6	74.1	82.3	82.3
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99.93		99.86	99.81	99.90	99.94	99.88	100.00	99.83	100.00	99.81
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85.20	85.50	75.50	64.70	57.60	83.70	75.30	83.00	79.60	81.00	73.10
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71.90	..	74.66	..	89.30	83.70	87.60	..	67.70	68.77	71.50
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Employment share of formal sector (2001)	% of labour force	48.44					
Employment share of trad. Agriculture (2001)	% of labour force	9.9	. .	. .	. .	. .	. .
Employment share of public sector (2001)	% of labour force	18.68					
Employment share of private sector (2001)	% of labour force	29.76					
Labour force unionisation (1988)	% unionised	4.1	. .	. .	. .	. .	. .
Unemployment rate (2001)	% of labour force	19.6	15.6	21.66	13.7	17.5	21.5
Total employees of public work progs (1995)	Annual total	61693	. .	. .	. .	. .	. .
Income distribution (1994)	Share of lowest 40%	11.7	. .	. .	. .	. .	. .
6. Agriculture							
Cereal production (2002)	MT'000s	32			. .	2.70	. .
Planted area for crops (2002)	Hectares'000s	734	. .		. .	29.06	0.00
Rainfall	mm	414.2		. .		. .	. .
Whether declared drought year	Yes/no	Yes	. .	. .	. .	. .	. .
Cattle ownership (1995)	% farming HH without cattle	49	. .	. .	. .	. .	. .
7. Gender							
Female share of the population (2001)	% of population	51.6	50.9	51.8	50.63	51.66	52.16
Male share of the population (2001)	% of population	48.4	49.1	48.2	49.37	48.34	47.84
Female life expectancy (2001)	Years	57.4					
Male life expectancy (2001)	Years	52					
Female adult literacy (1993)	% of female adults	70.3	. .	. .	81.6	86	86.9
Male adult literacy (1993)	% of male adults	66.9	. .	. .	73.9	85.2	73.9
Female net enrol. rate, 1st level (1995)	% of age group	97.7	. .	. .	91.5	89.9	92.7
Female net enrolment rate, 2nd level:Junior	% of age group	. .	. .	. .	. .	. .	. .
Female net enrolment rate, 2nd level:Senior	% of age group	. .	. .	. .	. .	. .	. .
Female net enrol. rate, 1st+2nd levels (1995)	% of age group	71.9	. .	. .	77.5	83.8	82.6
Male net enrolment rate, 1st level (1995)	% of age group	95.7	. .	. .	91.1	89.1	91
Male net enrolment rate, 2nd level:Junior	% of age group	. .	. .	. .	. .	. .	. .
Male net enrolment rate, 2nd level:Senior	% of age group	. .	. .	. .	. .	. .	. .
Male net enrol. rate, 1st+2nd levels (1995)	% of age group	69.1	. .	. .	77.8	78.8	81.3
Female share of earned income	% of earned income	. .	. .	. .	. .	. .	. .
Male share of earned income	% of earned income	. .	. .	. .	. .	. .	. .
Women in parliament	% of MPs	9.1	0	6.25	0.00	0.00	0.00
Women councillors in local authorities	% of councillors	23.1	22.5	23.3	17.20	16.70	38.50
Women in managerial positions (1991)	% of positions	25.7	. .	. .	23.90	25.90	25.40
Women in prof./technical positions (1991)	% of positions	50.6	. .	. .	43.00	51.00	51.60
Women in clerical/sales positions (1991)	% of positions	65.6	. .	. .	68.60	64.70	58.00
Women's share of formal employment (1991)	% of positions	34.1	. .	. .	39.16	39.78	38.19
Women in service positions (1991)	% of positions	38.6	. .	. .	35.40	48.60	44.40
Female headship of households (1991)	% of households	47	44	50	34.00	39.00	37.00
Reported violence against women cases	Number	. .	. .	. .	. .	. .	. .
Gender equality index (GEI)	Index	0.8	. .	. .	0.87	0.74	0.88
8. Demography and urbanisation							
Population (2001)	Thousands	1681	721	775	175	84	29
Annual population growth rate (estimated in 2001)	% increase per annum	2.4	4.6	1.8	5.5	5.2	2.3

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17.2	14.9	21.6	18.8	16	22.9	23.2	18.5	22.3	18.2	23.4
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0.18	. .	3.32	0.00	0.00	0.83	0.77	. .	1.18	0.15	7.53
8.11	0.00	99.28	0.12	0.77	23.85	35.21	. .	10.98	7.64	49.46
. .	. .	397.00	342.00	243.00	420.00	365.00	386.00	453.00	468.00	476.00
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51.18	48.47	52.14	49	49.71	51.4	51.58	53.11	51.7	51.96	52.02
48.82	51.53	47.86	51	50.29	48.6	48.42	46.89	48.3	48.04	47.98
84.7	86.5	66.1	54	55.5	77.1	66.9	66.5	57	77	66.7
82.1	84.6	65.4	59.1	61	63.4	55.7	68.7	65.2	67.1	55.7
90.9	90.8	84.8	74.2	85.9	90.5	81.9	92.2	79.4	89.7	86.2
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79	76.27	80.2	66.7	78.6	84	78.6	85.6	74.1	82.3	82.3
87.6	91.33	78.7	65.9	78.6	83.7	69.6	90.1	72.7	84	76.6
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79.9	79.6	75.2	61.5	71.9	77.3	65.9	85.9	70.2	77.1	71.6
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0.00	0.00	7.69	0.00	0.00	0.00	20.00	0.00	0.00	0.00	0.00
26.70	16.67	25.40	14.30	17.40	12.50	25.90	20.00	21.70	33.30	25.00
31.30	16.90	27.70	14.90	30.70	36.00	25.20	20.60	27.90	26.40	26.20
42.20	36.90	57.00	51.30	51.10	57.80	57.10	59.10	40.70	55.40	61.80
41.70	53.20	63.00	60.00	59.40	71.70	71.50	70.90	54.90	70.80	68.50
33.41	28.78	39.56	24.53	28.15	39.69	33.55	41.34	33.80	41.26	33.49
46.40	28.10	61.30	51.00	57.00	63.00	60.40	62.70	46.00	61.60	65.20
32.00	26.33	53.80	43.00	43.00	49.00	53.00	57.00	47.67	48.00	53.00
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0.79	0.79	0.82	0.67	0.82	0.7	0.78	. .	0.71	. .	0.84
45	27	449	27	34	63	186	47	118	52	160
2.3	4.5	1.7	1.6	1.8	1.7	1.8	1.7	1.7	3.6	1.7

Population share (2001)	% of people	100.00	54.20	45.80	11.70	5.61	1.94
Annual growth in population	%	2.40	. .	. .	5.50	5.20	2.30
Total fertility rate (1991)	Chlidren per female	5.20	4.60	5.90	4.60	5.10	5.00
Condom distribution (PSI)-2000	Millions	2.17	. .	. .	. .	. .	. .
Condom distribution (Central Medical Stores)-2000	Thousands	122.87	. .	. .	. .	. .	. .
Dependency ratio (1991)	Per ec. active pop.	0.73	. .	. .	0.30	0.40	0.40
Crude birth rate (1996 pop report)	births per 1000 pop.	32.40	. .	. .	. .	. .	. .
Crude death rate (1998 DS)	deaths per 1000 pop.	10.13	. .	. .	. .	. .	. .
Population density (1996) Population Report, CSO	persons per sq km	2.60	. .	. .	1033.00	1064.20	694.60
Population density in arable land	persons per sq km	. .	. .	. .	. .	. .	. .
Squatter settlements	Number	. .	. .	. .	. .	. .	. .
9. Participation and dependency							
Children immunised for measles (1998)	% of under-twos immunised	80			51	65	62
Avoidance of HIV	% sexually active pop.	68.3	. .	. .	68.7	56.9	. .
Youth in education and training (1995)	% of 14-18 year olds (gross)	58.20	66.39	58.47	57.50	73.90	88.60
% of pre-schoolers at pre-school	% of 3-5 year olds	8.70	13.50	2.40	16.00	7.50	18.70
% of adults with formal sector job	% of people aged 15-64y	46.18	71.12	13.15	98.29	71.54	32.16
Number of registered societies	MLHA Reg. of Societies	1599.00	1030.00	569.00	752.00	75.00	60.00
Private newspapers	Weekly sales per 100 pop.	4.12	12.24	2.28	16.85	9.39	10.22
Circulation of daily newspapers	Daily sales per 100 pop.	. .	. .	. .	. .	. .	. .
Radio sets per 1 000 inhabitants	per 1000 people	. .	. .	. .	. .	. .	. .
Radio Listenership		. .	. .	. .	. .	. .	. .
Television sets per 1 000 inhabitants	per 1000 people	. .	. .	. .	. .	. .	. .
Percent of women who watch television		. .	. .	. .	. .	. .	. .
Mobile Telephone subscribers per 1 000 inhabitants	per 1000 people	. .	. .	. .	. .	. .	. .
Access to postal services	per 1000 people	. .	. .	. .	. .	. .	. .
Internet access	number with access	. .	. .	. .	. .	. .	. .
Satellite/cable TV access	per 1000 people	. .	. .	. .	. .	. .	. .
Personal computer per person	per person	. .	. .	. .	. .	. .	. .
New citizen business formation (1994)	New bus. registered (net)	1795	. .	. .	. .	. .	. .
Teenage girls becoming pregnant, 1991 (National(1996) BFHS)	% of teenage girls	19.1	. .	. .	12	21	17
People Participation Index (PPI)	Index	0.43	..	..	0.73	0.53	..
10. Social change and social stress							
Serious crimes(1999)(h/ i/ j/)	Reported adult cases h/ i/ j/	2563	. .	. .	15652	13998	16546
Rape cases	Reported adult rape cases	1101	. .	. .	. .	..	. .
Children in prisons	number		. .	. .	. .	. .	. .
AIDS orphans (all orphans)	Number		. .	. .	. .	. .	. .
Children in juvenile courts (1999)	Number	664	. .	. .	. .	. .	. .
Children in institutional care arrangments	Number		. .	. .	. .	. .	. .
Child-headed households	% of total households		. .	. .	. .	. .	. .
Registration at birth (2000)	% births registrered	59.15	65.14	52.37	61.63	81.13	46.43
Number of working children	Number	. .	. .	. .	. .	. .	. .
Internally displaced children (n/a)	Number	. .	. .	. .	. .	. .	. .
Refugee children	Number	. .	. .	. .	. .	. .	. .
Unaccompanied children	Number	. .	. .	. .	. .	. .	. .

3.01	1.80	30.01	1.80	2.27	4.21	12.43	3.14	7.89	3.48	10.70
2.30	4.50	1.70	1.60	1.80	1.70	1.80	1.70	1.70	3.60	1.70
4.90	4.40	5.80	5.20	5.10	4.90	5.50	5.10	6.40	3.90	5.40
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0.30	0.30	0.50	0.50	0.50	0.50	0.50	0.60	0.50	0.50	..
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891.60		4.60	0.20	0.45	7.90	5.20	9.20	0.90	29.20	7.65
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53		78	93	85	84	77	41	83	92	65
62.2	..	..	..	..	..	73	..	67.7	..	78.3
81.70	43.55	62.40	55.00	50.10	55.80	57.40	50.11	48.00	81.40	53.80
11.90	17.70	1.20	7.00	2.90	5.00	1.40	4.40	1.50	12.60	..
55.11	28.19	17.69	31.35	15.94	15.35	1.32	8.43	17.92	14.55	10.16
83.00	61.00	149.00	10.00	13.00	103.00	87.00	18.00	15.00	112.00	62.00
8.79	4.86	1.69	0.61	1.59	2.82	1.51	..	2.42	0.86	0.79
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18	15.6	20.6	25	17	18	16	19	..	16	..
0.52	..	..	..	..	..	0.27	..	0.29	..	..
8082	..	16309	2333	..	7888	5586	..	..	..	..
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47.83	60	50.35	41.38	74.58	60.47	54.33	76.07	58.92	76.52	71.82
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Reported rapes of children 0-18 years (1999)	# of cases	143	. .	. .	. .	. .	. .
Number of street children	Number		. .	. .	. .	. .	. .
Landmine victims (n/a)	Number	. .	. .	. .	. .	. .	. .
Child soldiers (n/a)	Number	. .	. .	. .	. .	. .	. .
School-going disabled children	Number						
Divorces	Per 1,000 couples	. .	. .	. .	. .	. .	. .
Female genital mutilation (FGM) (n/a)	Number of cases	. .	. .	. .	. .	. .	. .
Domestic Violence (injury)	Number of cases	. .	. .	. .	. .	. .	. .
Domestic Violence (death)	Number of cases	. .	. .	. .	. .	. .	. .
Adult female rapes reported (Police Districts, 1998)	Number of cases				201	76	
Women incarceration rate (1998)	% of pop. In jail	10	. .	. .	. .	. .	. .
Refugee women	number of women		. .	. .	. .	. .	. .
Internally displaced women (n/a)	number of women	. .	. .	. .	. .	. .	. .
Registered vehicles 2002	Thousands	167	. .	. .	. .	. .	. .
Road accidents h/ k/(2001) Transport Statistics	Number	17125	10542	6583	7285	1858	616
Deaths caused by road accidents h/ k/ (2001) Transport Stats	Number	526	241	285	105	53	23
Injuries caused by road accidents h/ k/(2001) Transport Stats	Number	7419	3609	3810	1866	976	316
11. Technology and information							
Use of electricity for household lighting (2001)	% of households	10.1	26.25	3.16	23.5	16	14.5
Access to a radio (2001)	% of households	67.6	75.845	64.31	76.16	77.2	74.97
Access to TV (2001)	% of households	25.13	43.97	17.78	48.58	37.36	38.93
Connected telephone subscribers (2001)	Connected telephone	135539	59835	75704	34138	10783	3695
Telephone density (2001)	Telephones per 100 persons	8.06	15.92	5.8	18.35	12.99	12.45
Internet users (2002)	Number of Users	60000	60000	. .	. .	. .	. .
12. Democracy							
Voter registration (2004)	Thousands	421.3	. .	. .			
% voter turnout at national elections (2004)	% of reg. voters that voted	76.2	. .	. .			
% turnout of voting age population (1994)	% of VAP that voted	44.6	. .	. .	. .	. .	. .
% of opposition seats in nat. assembly (2004)	% of seats	21.31	. .	. .	. .	. .	. .
Total size of armed forces	Thousands	. .	. .	. .	. .	. .	. .
13. Economy -2003							
GDP, constant prices (1993/94)	Pula	18038.1	. .	. .	. .	. .	. .
Annual GDP growth rate	% of GDP	7	. .	. .	. .	. .	. .
Mining share of GDP	% of GDP	35.9	. .	. .	. .	. .	. .
Non-mining share of GDP	% of GDP	64.1	. .	. .	. .	. .	. .
Agriculture share of GDP	% of GDP	2.4	. .	. .	. .	. .	. .
Manufacturing share of GDP	% of GDP	3.9	. .	. .	. .	. .	. .
Government share of GDP	% of GDP	16.4	. .	. .	. .	. .	. .
Government share of consumption	% of GDP	33.5	. .	. .	. .	. .	. .
Private share of consumption	% of GDP	28.4	. .	. .	. .	. .	. .
Tax revenue share of GDP	% of GDP	33.74	. .	. .	. .	. .	. .
Mineral tax revenue share of GDP	% of GDP	20.65	. .	. .	. .	. .	. .
Rate of inflation	%	9.2	. .	. .	. .	. .	. .
Exchange rate	$ per Pula, year end	0.2251	. .	. .	. .	. .	. .
Exports	% of GDP	44.39	. .	. .	. .	. .	. .

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783	..	2459	194	419	854	568		1117	..	970
60	..	109	13	11	33	40		49	..	30
451	..	1411	121	268	454	472		619	..	471
32.4	77.99	3.2	4.6	2.9	4.2	4.5	3.3	5.3	11.9	2.6
72.95	76.05	64.23	54.96	56.49	73.37	65.61	58.69	62.09	75.43	61.79
33.28	54.77	14.78	13.22	12.66	26.83	20.5	14.31	14.84	38.37	16.29
6352	4867	25104	1762	2283	6042	13726	2811	8252	7307	8417
12.74	17.89	5.01	5.31	5.43	8.22	5.96	5.67	5.77	12.05	4.9
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Imports	% of GDP	34.92	. .	. .	. .	. .	. .
Current account balance	P million	3703.4	. .	. .	. .	. .	. .
Total external debt	Pmillion	2194.7	. .	. .	. .	. .	. .
Debt service ratio	Debt service as % of exports	. .	. .	. .	. .	. .	. .
Net foreign direct investment	% of GDP	. .	. .	. .	. .	. .	. .
Gross domestic investment	% of GDP		. .	. .	. .	. .	. .
Gross domestic savings (1994)	% of GDP	25	. .	. .	. .	. .	. .
ODA inflow							
14. Public expenditure-2003							
Public expenditure as % of GDP	% of GDP	43.23	. .	. .	. .	. .	. .
Annual growth in real public expenditure	% of GDP	6.39	. .	. .	. .	. .	. .
Overall budget surplus/ (deficit)	%	-9.78	. .	. .	. .	. .	. .
Health share of expenditure	% of expenditure	7.03	. .	. .	. .	. .	. .
Education share of expenditure	% of public expenditure	22.59	. .	. .	. .	. .	. .
Defence share of expenditure	% of public expenditure		. .	. .	. .	. .	. .
Ratio of defence to health and educ. expend.	% of public expenditure	0	. .	. .	. .	. .	. .
15. Environment							
Carbon Dioxide Emissions (metric tons per capita)-1996		1.5	. .	. .	. .	. .	. .
Biodiversity: a) Land are protected (1993)	% of total land area	17.6	. .	. .	. .	. .	. .
b) Number of species under threat (1994/95)	all species	154	. .	. .	. .	. .	. .
c) Number of species exinct (2000)	(Black Rhino)	1	. .	. .	. .	. .	. .
d) Area of land desertified	Area in Sq Km		. .	. .	. .	. .	. .
GDP per unit of energy use (1997)	Ratio of GDP to energy units	0.27	. .	. .	. .	. .	. .
Arable land per capita	Per capita Sq Km	. .	. .	. .	. .	. .	. .
Average annual rate of deforestation-1996	Number of hectares	0.5	. .	. .	. .	. .	. .
Average annual rate of reforestation	Number of hectares	. .	. .	. .	. .	. .	. .
% population relying on traditional fuels for energy use	% wood as source of energy	. .	. .	. .	. .	. .	. .
Renewable Energy as % of conventional energy	% terrajoules		. .	. .	. .	. .	. .
Volume of solid waste produced (1997)	Thousand Tonnes per Annum	325	. .	. .	. .	. .	. .
% of solid waste managed well (1997)	% of total waste	38	. .	. .	. .	. .	. .
Freshwater recharge	volume		. .	. .	. .	. .	. .
Freshwater pollution	volume		. .	. .	. .	. .	. .
Annual freshwater withdrawals (% of water resources)-1996	% of water resources	3.8	. .	. .	. .	. .	. .
Annual freshwater withdrawals (cubic metres)-1996	Cubic metres	81	. .	. .	. .	. .	. .

a/ For data items with no mention of sources, refer to time series database.
b/ Access to piped water.
c/ Data refers to children who are moderately or severely underweight for their age., Jan-August, 2000
d/ BIDPA estimates.
e/ Data Kgalagadi refers to Kgalagadi South.
f/ Data for Central refers to Serowe, Palapye, Mahalapye, Tutume, Bobirwa and Boteti.
h/ Data for Central refers to 1993.
i/ Murder, rape, defilement and robbery.
j/ Data combines all types crimes and indicates the crime concentration.
k/ Data for Kgalagadi refers to Tsabong; data for Kgatleng is for Mochudi; data for Kweneng is for Molepolole; data for North East is for Maun; data for North West is for Kasane and data for
m/ Data on expenditure on education by districts is derived by using extrapolations. Using available data on primary school expenditure by Local Authorities, the share of expenditure on prir
n/ This is calculated by dividing the total estimated expenditure on primary education by the number of pupils enroled in primary schools for each district
o/District estimates of teacher's salaries are calculated by applying the percent of teacher's salary to national expenditure on education to the district estimates of expendure on education
p/Pass rates is calculated as number of pupils who got grade A to E as percent of total candidates who sat for PSLE
q/Other Towns = Jwaneng, Orapa and Sowa Town

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Central is for Serowe. Data for Central is for Serow/Palapre + Bobonong + Mahalapye, data for Southern is for Ngwaketse, Data for North west is for Ngamiland + Chobe

mary education is calculated by using the national ratio of primary education to total education expenditure

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