

Diffusing Information Technology in Botswana: a framework for Vision 2016

The scope for the diffusion of information technology in Botswana is good, but a number of constraints must be overcome in order to achieve success.

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BACKGROUND

The last two decades have witnessed remarkable technological advances in information and communications systems such as fibre optic technology, microelectronics, computers, Wireless Application Protocol (WAP) technology, e-mail and the Internet. Global information super-highways have been developed through which decisions are now being made faster than ever before. However, in a number of developing countries these developments have been concentrated in urban areas. This disparity is a major impediment to increased economic growth and prosperity. The prospect of an information society offered by a global information infrastructure poses challenges and opportunities that could be addressed by proactive information technology (IT) policies. The importance of improving any nation's IT infrastructure to enable it to compete in the global arena is imperative. Information technology cuts across all traditional sectors, and its potential impact is very broad.

In recognition of the opportunities and challenges occasioned by IT, member states of the Southern African Development Community (SADC) in 1999 identified areas that needed to be addressed for the region to realize an information society. Among key areas identified were: improving and broadening equitable access to information and communications technology (ICT); reducing costs related to IT; developing an SADC-wide infrastructure; encouraging the growth of software and hardware development facilities; and improving human resource capacity. The importance of policies related to national information and communication infrastructures, a favourable regulatory environment, the liberalization of the telecommunication sector and the strengthening of the education sector was also emphasized (SADC Secretariat, 1999).

Botswana's national development strategy, christened 'Vision 2016' (Presidential Task Group for Long Term Vision for Botswana, 2000) fits in well with the SADC proposals for

IT strategy. Vision 2016 is a 20-year national development strategy that was mooted in 1996, which among other things focuses on IT infrastructure development that will effectively support education, research and communication. The vision envisages that by the year 2016 all sectors of the economy will have implemented IT. It underlines the IT revolution taking place around the world and recognizes the need for the nation to adapt to meet the challenges of the 21st century. The Vision defines a framework for action in different sectors of the nation such as IT, education, democracy, production, economy, etc. Vision 2016 also recognizes the need for manpower development, especially in the area of IT, in order to leverage the country to compete effectively in the global digital economy.

INTRODUCTION

When on September 11, 2001 America became the target of a massive, well-coordinated and -executed terrorist attack, the details of what took place were known by just about everybody around the globe within minutes. That is how pervasive are the modern media predicated on IT. Countries that have a well-developed ICT infrastructure are well placed to participate in the global information society. In terms of levels of IT diffusion and technological development, countries can be categorized in three groups. Countries in the first category are those excelling in developing new technological systems. Those in the second category are investing heavily in the introduction and application of new technologies. Those ranked third are countries yet to get fully into the IT age (Akelo, 2001). Many countries in the developing world, especially in Africa, belong to the third category.

Nelson (2001) paints a rosy picture of the current trends and practices in the IT revolution, which encourages every country in the current digital economy to review its performance in relation to IT adoption strategy. According to Nelson, the improvement in technology has been accompanied by a decrease in costs. Computer processor performance in terms of speed has increased tenfold in the last five years, while computing power measured by variables such as multi-tasking, ability to handle large volumes of data and virtual memory capability has improved tenfold in the last four years. Similarly, hard disk storage has been enhanced in terms of capacity tenfold in the last seven years. The backbone – the network links that carry data on the Internet – has also been enhanced in terms of bandwidth and speed by a factor of 100 in the last five years. In the next five years, the cost of access to local Internet networks is projected to decrease by a factor of 100. These changes have great implications for technology adoption and use, policy formulation, education and training, leadership and vision.

The development in IT is also reflected in the growth of data on the Internet. The amount of data on the Internet has increased tremendously. During the year 2001 the increase was 1 petabyte (1024 terabytes). In the year 2005, the volume of data on the Internet will amount to 1 exabyte (1018 petabytes). By the year 2010 the amount of data on the Internet will hit 1 zettabyte (1024 exabytes). These developments

mean more people spending more time on the Internet, many organizations using the Internet to do business and the creation of many jobs related to the technology. Even with this Internet revolution, it is estimated that only 5 percent of possible Internet development has so far taken place. This means that there is tremendous potential for the Internet in terms of number of users, number of devices, speed and bandwidth, amount of content and number of applications. It is estimated that within 3–5 years there will be about 1 billion people using the Internet. These developments will benefit economies in a number of ways. In the United States, for example IT accounts for 25 percent of GDP growth and IT jobs are high-paying, with an average salary of USD 46,000 per year compared to an average of USD 28,000 per year in other sectors.

CONCEPTUAL FRAMEWORK

Unlike the developed world, few developing countries have succeeded in exploiting IT for economic and social development. In the development framework, some of the success factors in IT implementation are: the national culture, economy, a well established and reliable communication infrastructure and a competitive environment. Though there is a belief that the underlying process of technology development is uniform across countries once basic economic and political conditions are met (Hasan and Ditsa, 1999), common perceptions are that developing countries encounter problems with IT because of their local environment or traditional culture, affordability, improper or insufficient training.

Developing countries – most of them in Africa – have always lagged behind their western counterparts in adopting IT. Today, however, many countries are beginning to realize that IT helps them to deliver real improvements in all sectors of the national life. Most governments now realize that for them to bridge the digital divide, not only within their own countries but also between them and the developed world, they must embrace technology and formulate policies that will encourage and facilitate the diffusion of such technology across all sectors.

In Botswana, over the last decade, the government has made discernible efforts in adopting IT. The government liberalized its telecommunication sector in 1996, paving the way for two mobile phone companies, which between them as at September 2001 had 273,000 subscribers (*Business Gazette*, 2001). In addition, independent radio stations and several Internet service providers are operational in the country. Botswana offers an ideal environment for potential investors. The country enjoys political stability, a fairly modern infrastructure and a central location within the SADC region. Exports of diamonds, other minerals and beef have helped to establish a sound economy, raised living standards and improved the social and economic infrastructure. The proximity of the country's capital to the Johannesburg and Pretoria metropolis in South Africa has greatly facilitated trade and commerce between the two centres. Botswana also enjoys well-established banking, accounting and financial facilities and a government policy that encourages external investment and internal expansion.

IT infrastructure development has been identified as a priority area by SADC member countries. Building a national information infrastructure is critical in enhancing economic development. A national infrastructure is important for the exploitation of national resources in information, communication, and computing technologies. According to the National Information Infrastructure Advisory Council (1995), a national infrastructure comprises public and private high-speed, interactive, narrow and broadband networks such as satellite, terrestrial, and wireless technologies that deliver content to homes, businesses, and other public and private institutions. It also includes the information and content that flows over the infrastructure, whether in the form of databases, the written word, films, music, sound recordings, pictures, or computer software. Other components of the infrastructure are computers, televisions, telephones, radios, and other products that people will employ to access the infrastructure. The infrastructure also includes the people who will provide, manage, and generate new information, and those that will help others do the same. A national information infrastructure is therefore an invisible, seamless, dynamic web of transmission mechanisms, information appliances, content, and people. By linking large numbers of individuals and institutions to one another and to an array of information and services, a national infrastructure has the potential to be a nation's most significant asset in the knowledge-based economy of the coming century. To participate effectively in the economy of the coming century, all parts of society – individuals, as well as public and private organizations and businesses – will need to use information and information technologies to communicate, collaborate, provide and receive information of all kinds. An enhanced national information infrastructure will make that possible.

THE INFORMATION TECHNOLOGY INFRASTRUCTURE IN BOTSWANA

In Botswana IT is the fastest growing sector and the country is reputed to be one of the fastest growing economies in the world (Magang, 2001). The Internet is fully liberalized and the heaviest users are private institutions and government organizations. However, Internet penetration is still low in urban areas and worse in rural areas. Internet cafés and telecentres are just beginning to become visible in major towns but there are almost none in rural areas. High subscription costs, connection fees and telephone charges for dial-up access are a major challenge to Internet access in Botswana. Low-cost Internet service that could benefit schools, hospitals, village and market centres is not available.

The government has made efforts to invest heavily in telecommunication infrastructure. The data infrastructure is evident in several government ministries, parastatals and public utilities. The enactment of the Telecommunication Act of 1996, which liberalized the telecommunication industry, together with the stable political environment, and the decentralization of computer services coordinated by the Government Computer Bureau are some of the factors that have improved the situation. Botswana's Vision 2016 has also given

impetus to infrastructure development in the country. Botswana also has an industrial policy, which emphasizes a comprehensive science and technology policy.

The country has a nation-wide fibre optic backbone and is laying an ISDN (Integrated Services Digital Network) infrastructure. It has also a VSAT (Very Small Aperture Terminal), facility for satellite communications. These developments have the potential to further improve bandwidth to carry multimedia services, operate at faster speeds and reduce costs. A direct link via satellite to the United States provides a platform for users to gain access through Botsgate, the Internet gateway. The Botswana Telecommunication Corporation (BTC) operates an advanced network with almost 100 percent digital exchanges and an optical fibre transmission system around the whole country. The Corporation's microwave network is one of the most extensive in Africa, linking fifty automatic exchanges and providing connections to South Africa, Zambia and Zimbabwe (<http://www.btc.bw>). There is also an increasing use of IT in business in such places as banks, tourist hotels, etc (<http://www.e-biz.co.bw/>).

There are several multinational and local IT companies operational in Botswana providing hardware, software, training, telecommunication services and Internet connectivity. Notable multinational companies include Microsoft, Compaq, Hewlett Packard, IBM, Vista (cellular) and Mascom (cellular). Notable local companies include Hymax, Paradigm Technologies, Persetech Botswana, Innovative Business Solutions, High Performance Systems, PC Net, Cabling Joint, ATM-DM, eSystems Technology Solutions, PC Solutions, e-Biz and Delete. There are also several IT training institutions, the most notable being the National Institute of Information Technology (NIIT) and IT-IQ, the Microsoft Certified Technical Education Centre in Botswana.

A number of public institutions within the country, such as those dealing with motor registration, water and electricity billing, are computerized. The Botswana Postal Services is set to spend BWP 10 million (USD 2 million) to computerize its counters in 112 post offices across the country (Balise, 2001). The Botswana Stock Exchange has installed a new Central Depository System to enhance transparency and enable simultaneous electronic interfacing with brokers, dealers and clients (Kajevu, 2001). Plastic money – the First Debit Card – has been introduced through the Standard Bank; this can be used anywhere there is a Visa Electron sign, a point of sale machine or an Automated Teller Machine (ATM).

According to Ashurst (2001), one in eight people in Botswana has a cellphone and the number of cellphones far exceeds the number of fixed lines. Mobile teledensity is now 18 percent while the landline teledensity is 7 percent. The number of landlines is estimated at 150,000 (Lekaukau, 2001). The BTC recently introduced Fast Connect Service, a wireless connection to the BTC grid, that will allow Internet access, fax and telephone in homes on a single line at the same cost. The line has a speed of 56kbps. The BTC also has an ambitious programme to extend telephone services to villages. Most villages with over 500 people have already been connected to the telephone grid.

Other developments in IT include the rural electrification programme that will enable IT products and services to reach

the rural areas. Over the past three years, the Botswana Power Corporation (BPC) has electrified seventy-two villages, bringing the power grid closer to the people (Ministry of Finance and Development Planning, 1998). The Government Computer Bureau (GCB) has recently established an advanced TCP/IP based network using frame-relay and FDDI (Fiber Distributed Data Interface) links (<http://www.gov.bw>). The University of Botswana (UB) has a sophisticated fibre optic network on its large and well-resourced campus, which has had an email link to the Internet since 1993 via UniNet in South Africa. The Institute of Development Management (IDM) conducts a number of training courses in basic computer applications and has established local area networks in its offices in Gaborone. The Botswana Information Technology Society (BITS) is a membership organization which has contributed to the Information Technology component of a national process to formulate the national Science and Technology Policy. The Botswana Technology Centre (BOTEC) is an autonomous government body with wide ranging responsibility for technology transfer and development. The BTC provides the backbone Internet service which it sells to private ISPs (Internet Service Providers) for resale to dialup customers. The BTC's international link is a 256kbps connection to the United States with a 128kbps backup link to South Africa. The link is provided by the Sprint/France-Telecom/Deutsche-Telecom alliance, Global-One, which also provided the hardware, software and training. The full-service provider UUNET installed VSAT in Botswana in May 2001 to increase bandwidth.

In the electronic media Botswana has not been doing well. Until the year 2000, Botswana had only one TV station, the Gaborone Broadcasting Corporation, owned by expatriates. In 2000 Botswana Television (BTV) was set up. Another television station, Information Television (ITV), is set to be introduced. It will serve hotels, retail centres, banks and government parastatal buildings such as airports and border posts. Content distribution will be by video or Digital Video Disc (*Botswana Guardian*, 2001).

Though local IT companies claim that the country has well-trained human resources in IT, the situation on the ground proves otherwise. The BTC had problems with its billing system soon after it had been implemented in 1998. It cost the company BWP 62 million (USD 12,400,000) to purchase the system and by the end of the second year the Corporation had spent an additional BWP 20 million (USD 4 million) in maintenance costs. The company incurred heavy losses with the system, prompting the government to set up a Commission of Enquiry to probe the problem. The Commission established that BTC lacked the IT skills needed to manage the system. A foreign company, International Development Ireland (IDI) was this year contracted to manage the affairs of the Corporation (Chilisa, 2000). There have also been problems reported with the BPC's billing system. These are also attributed to lack of IT skills (Ditsheko, 2001). The Water Utilities Corporation's billing system has also been found not to operate effectively in real time. The Corporation is in the process of outsourcing skills from an IT company to manage the system.

The government spends over BWP 200 million (USD 40 million) on IT projects per annum. Citizen Owned Business

in IT (COBIT) is a lobby group that was formed recently to demand that tenders to be awarded to companies owned by Botswana nationals. Another lobby group is Tswana IT Joint Venture. The lobby wants the government to ensure greater citizen participation in the IT business. The two lobby groups are asking that they should be included in the Citizen Empowerment Policy that gives soft loans to locals to start businesses. They are targeting consultancy, maintenance and support services in government. The government controls 8 percent of the IT work in the country. These lobby groups claim to have IT experts in computer sciences, Microsoft certified engineers and considerable numbers of certified network and hardware technicians (Malema, 2001). However, foreign owned companies dominate the local IT market. Only 1 percent of government IT tenders are said to be awarded to Botswana nationals.

OBJECTIVES OF THE STUDY

The objectives of this study were to:

1. establish the scope of IT diffusion and utilization in Botswana
2. identify the constraints and opportunities of IT adoption and use in the country
3. recommend the way forward.

For the purpose of this study, IT diffusion was taken to mean the exploitation and utilization of IT as a tool to improve the productivity of an employee, department, organization and the country at large.

METHODOLOGY

The questionnaire technique was adopted for this study and in some cases follow-up interviews were conducted to obtain indepth information about some issues such as mission statements or organizational policies to promote IT in the country. Two types of questionnaires were designed, one for training institutions and another for non-training institutions.

The questionnaires were piloted and some of the questions modified in order to eliminate any ambiguity. Some 27 percent of respondents were from the public sector, 27 percent from the private sector and 46 percent from the parastatal sector. Botswana nationals accounted for 48 percent of responses and people of other nationalities for 52 percent. In terms of IT experience, 26 percent of the participants had up to five years' experience, 29 percent between six and ten years' experience and 38 percent had more than eleven years' experience. Six percent of respondents had no previous IT experience.

The study population comprised IT related government departments, IT training institutions; IT vendors and IT oriented parastatals. The organizations studied included, among others, the Government Computer Bureau, the Ministry of Education, the Botswana Institute of Administration and Commerce (BIAC), the National Institute of Information Technology (NIIT), ICL Botswana, the University of Botswana (UB), the Botswana Technology Center (BOTEC), the Botswana Power Corporation (BPC), the Botswana Telecommunications Corporation (BTC) and the Institute of Development

Management (IDM). The training schools covered by the survey offered training at different levels – beginners, intermediate and advanced. Most of the trainees were aged between 20–30 years, followed by those in the 31–40 age group and a small number aged 41 and above.

Sampling was done within Gaborone, the capital of Botswana, using different criteria for each group.

Within the public sector, the Government Computer Bureau (GCB), was chosen because it is the biggest IT department in the sector under the Ministry of Finance and Development Planning. The GCB is responsible for the provision of information technology services to the government. Its main function is to support all government departments by providing IT advice and guidance and ensuring the maintenance of best IT practice in terms of professional standards and relevant infrastructure. The Ministry of Education was also chosen within this sector because it makes decisions on educational curricula and influences training programmes. Various IT departments from the Ministry of Education were also included in the survey: the Departments of Vocational Training, Primary Education, Secondary Education and Curriculum Development, and the IT Unit. The Botswana Institute of Administration and Commerce (BIAC), the Gaborone Technical College (GTC) and the College of Technical and Vocational Education (CTVE) were chosen because they are public sector training institutions.

Within the private sector, private hands-on training institutes were chosen because these are ordinarily the first places where many people go for training in order to acquire computer literacy. It was assumed, therefore, that these institutes' training personnel would be in the forefront of diffusing IT skills to the people and would therefore be able to provide opinions on the scope of IT diffusion in the country. A sample of six major IT vendors was also included in the survey. They were chosen because they are deemed to have an overview and foresight of current trends and practices and of the dynamics of the IT industry. In addition, vendors play an important role in guiding the development of IT to meet the desired goals of the nation. They are responsible for bringing IT products into the country and by so doing promote IT diffusion in the country. IT vendors deal with the public and can be relied upon to provide information on people's demands for IT products and services.

Within the parastatal sector, companies were chosen on the basis that they were the first ones to adopt the latest IT facilities in their organizations to improve productivity. A sample of six major IT-oriented parastatals, (including training institutes) were included in the survey. Within these institutions, all heads of IT institutions and departments were requested to participate in the survey. Apart from the heads, others who showed interest were also given an opportunity to participate.

SCOPE

The study was confined to Gaborone because it is the capital city and the centre of major economic activities. It is also the seat of government. Most organizations dealing with IT have their headquarters in Gaborone.

The study limited itself to IT training institutions, institutions such as parastatals, the Ministry of Education, IT departments and IT personnel. Human resources departments were also included in the survey; although they are not directly IT-related, they influence the provision of IT training.

DATA COLLECTION AND ANALYSIS

Questionnaires were distributed individually by the researchers and collected in the same way. In some cases, however, exceptions were made, where heads of departments circulated the questionnaires among their staff. In these cases the researchers collected the questionnaires after they had been completed.

A total of 109 questionnaires were distributed, of which 100 were returned – a response rate of 90 percent. Once all the questionnaires had been collected, they were analysed together. All data were analysed with the aid of a computer using the Statistical Package for Social Sciences (SPSS).

Out of thirty-six departments belonging to twenty-three organizations (including six HRM departments), twenty (56 percent) had mission statements which included IT adoption and use. Some mission statements were quite elaborate, while others were expressed as in single sentence. For example one organization had as its mission statement:

To provide efficient and effective IT services to support academic and administrative functions of the university in a cost-effective manner. To provide adequate security and fault tolerance for IT facilities and develop plans to ensure business continuity, to develop an integrated and responsive wide area network to facilitate internal (corporate) communication and to minimize duplication and fragmentation of networks, databases and computer systems. To make effective use of the corporate network and servers and to make efficient use of technologies available in the organization.

Another organization's mission statement simply read:

To harness the power of information technology to drive the business to success.

A mission statement is very important to give direction to the organization in the fulfilment of its objectives. A mission statement gives the overall picture of an organization's aspirations. It provides a guideline for anyone coming to a department or organization as to what are its purposes (Jain, 2001).

CURRICULAR OFFERINGS ACROSS TRAINING AND ACADEMIC INSTITUTIONS

The University of Botswana, the only higher academic institution in the country, offers a B.Sc. Degree and Diploma in Computer Science. All faculties within the University offer computer awareness courses to their first year students. The Botswana Institute of Administration and Commerce (BIAC) offers a certificate and diploma in computer science. The

Gaborone Technical College offers a Technical Education Programme which includes information and communication technologies. The Institute of Development Management (IDM) offers a course in applications and programming in such areas as MS Office and Java programming. In addition it offers courses in Internet surfing, and diplomas for IT courses accredited by the National Computing Centre (NCC). Some courses are regular, while others are demand-driven. The private hands-on IT training institutes offer various diplomas and short courses in information technology.

According to the data collected, the IT training institutes produce approximately 1,354 graduates at beginners level, 864 at intermediate level and 165 at advanced level every year. Out of a total of 310 IT personnel working in the organizations surveyed, 202 (65 percent) were found to have trained locally and 108 (35 percent) abroad.

Constraints identified by respondents	%
Lack of awareness of benefits of IT by people	58
Shortage of IT manpower	53
Lack of IT exposure in Schools	52
Lack of IT policy	47
Lack of communication infrastructure	45
Lack of awareness of benefits of IT by management	42
Resistance to change	25
High cost of technology	19
Lack of government initiative to adopt IT	17
Lack of financial rewards to IT professionals	11
Lack of interest in exploiting IT	11
Lack of IT training standards	10
Lack of competitive IT market in Botswana	10
Lack of management support	8
Monopoly by IT vendors in supplying IT products	5
Limited software development	5
Shortage of systems analysts	4
Absence of IT strategic plans in organizations	4
Unfair competition in tendering for IT work	3
Unaware of what to achieve using IT	3
Poor implementation of IT projects	3
Insufficient IT training institutes	2
Poor quality of IT training institutes	2
Lack of career guidance in training institutions	2

Table 1. Summary of constraints on IT diffusion in Botswana.

CONSTRAINTS ON THE DIFFUSION OF INFORMATION TECHNOLOGY

Out of 100 participants who completed the questionnaires, 98 felt that the scope for IT diffusion in Botswana was good while two participants did not think so. However, those who responded positively identified a number of constraints on improved IT diffusion in Botswana which are summarized in Table 1.

SUMMARY OF RECOMMENDATIONS

Respondents were asked what recommendation they would make to improve IT diffusion in Botswana. More than half (55 percent) felt there should be increased IT exposure for children from kindergarten onwards, while 53 percent felt that a national IT policy should be promulgated and 50 percent felt that IT awareness must be created and enhanced. Other recommendations are summarized in Table 2.

CONCLUSION

The diffusion of IT in Botswana is uncoordinated and haphazard due to lack of policy to guide the development of the industry. The study identified as operational constraints to IT diffusion a lack of human resources, of government support, of a proper communication infrastructure, of the availability of finance, of proper implementation of IT projects and of software development. The lack of qualified and experienced IT personnel was seen as a very crucial factor. The IT infrastructure, though fairly developed, has not been exploited to promote the adoption and use of IT. The fear of retrenchments among staff when plans to introduce are mentioned often sent shivers down their spines.

Recommendations made by respondents	%
Need for affordable and improved telecommunication infrastructure	43
Need for IT training institutes to offer more IT training	41
Need for IT training standards	21
Need for incentives for IT professionals	10
Need for departments to have IT policies	9
Empowerment of local IT firms	8
Reduction of taxes on IT products	7
Create conducive environment for IT investments	7
Create IT awareness	5
Partnership of public and private sectors in IT promotion	5
Improve software development locally	5
Institutionalize career guidance in training institutions	5

Table 2. Summary of recommendations made by respondents.

Many schools in Botswana do not have IT facilities, nor do the majority of teachers have computer skills; most teachers in the country are computer illiterate. Teachers are supposed to be at the lead of technological and social changes because they are purveyors of knowledge. Lack of IT skills among teachers, who constitute one of the largest workforce groups within the public sector, shows that more is needed in this sector to promote IT diffusion (Tlale, 2001). This calls for a review of the education system right from primary school to higher education in order to educate people more in IT. The education system should incorporate IT in the curriculum and it should eventually be made an examinable subject.

Although the Internet infrastructure is in place, the facilities are very limited. Informatics development is paramount to economic development (Gibson, 1998) and high-speed data communication facilities are a critical prerequisite for undertaking meaningful IT projects. The need for establishing a solid infrastructure for sustaining long term IT growth in Botswana from which information service providers can thrive is imperative.

The government must promulgate an IT policy that will provide a conducive environment for private sector participation to enhance infrastructure and human resource development. Only then will the country position itself to participate in the global digital economy.

The lack of relevant mission statements is indication of a lack of seriousness on the part of organizations in promoting IT, which is thus not included in organizational strategic plans and is therefore not seen by many organizations as a tool to improve organizational development and efficiency. There is a need for each organization and department to have written IT mission or policy statements to guide them to look forward. There is also a need for more IT awareness campaigns and seminars.

Although only 10 percent of participants identified the lack of a competitive IT market as a constraint to IT diffusion, it is important. A competitive market is critical in influencing the firms' competitive strategy and structure. This in turn influences IT strategy and structure, which then shapes IT adoption strategies. Finally, IT adoption decisions affect the performance of the organization and in the absence of a competitive IT market environment, national IT policy and standards for IT training, IT is unlikely to be diffused to its optimum potential. Though many of the survey responses, as well as a review of the literature, indicated that there is better scope for IT diffusion in the country, this is not the case on the ground. What is visible, however, is the great potential for the country to harness technology because of its conducive environment in terms of infrastructure, politics and financial resources.

Finally the need for the government and the private sector in Botswana to spearhead IT development through partnership in such areas as infrastructure development, human resources, national IT policy, IT awareness programmes, reduction of tariffs on computing, telecommunication, software and network equipment, cannot be overstated.

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Abstract

Presents the findings of a questionnaire survey carried out to determine the scope of IT diffusion in Botswana in the context of the National Vision 2016. The study was aimed at establishing the extent of IT use in the country; identifying the constraints and opportunities of IT diffusion and recommending the way forward. The target population comprised of IT-related government departments, IT training institutions, IT vendors and IT-oriented parastatals. The survey was confined to the capital, Gaborone and produced a response rate of 90 percent. The results showed that 98 percent of participants believed that the scope for IT diffusion in the country was good. However, several constraints were identified, including lack of skilled manpower, lack of IT policy, inadequate IT infrastructure, inadequate private sector participation, tendering procedures that favour foreign companies more than local companies, absence of clear mission statements for IT diffusion within organizations, lack of understanding of the use of IT by management and fear of retrenchment by staff.

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MORE ON INFORMATION TECHNOLOGY IN AFRICA

Information technology and the dialectics of poverty in Africa.

S.W. Jimba. *New Library World*, 101 (1158) 2000, p.253-262. tbls. refs.

Developments in computer and telecommunications technology have pushed information into the forefront of business. Information is now considered the most important factor of production in a world economy that is gradually becoming globalized. These developments are also the principal pillars upon which the change from an industrial age to an information age hinges. Spells out the role of information in the new 'information society' and how it affects the fortunes of a nation. Undertakes a historical approach to underdevelopment and poverty and applies it, by analogy, to the call for African countries to use electronic formats to solve the continent's myriad problems. Suggests a gradual approach to implementing IT.

Out of Scandinavia: facing social risks in IT development in South Africa.

H. Scheepers, L. Mathiassen. *Journal of Global Information Management*, 8 (2) Apr-Jun 2000, p.36-49. il. refs.

Considers the development and implementation of information technology in South Africa. Draws an analogy between the trade unionist systems development tradition in Scandinavia and the possible application it might have in South Africa. Describes the situation in South Africa, presents the trade unionist approach to systems development, and describes the underlying principles that have been identified by Scandinavian researchers. Evaluates these principles from a South African perspective and discusses the possible uses they might have in the South African situation.

Africa's right to information. A review of past developments and future prospects.

R. Pfister. *Social Science Computer Review*, 17 (1) Spring 1999, p.88-106. tbls. refs.

Contribution to the Second part of a 2 part series devoted to equality and inequality in information societies. Briefly describes the channels of communication until very recently. With the development of modern technology new forms of communication were added. Outlines the initiatives and discussions from the 1960s to the 1980s on the relationship between economic development and access to information in the Third World generally and in Africa in particular. The Second part deals with new communication technologies, the areas of application in Africa, and their possible impact on Africa's development.

An investigation of the impact of information and communication technologies in sub-Saharan Africa.

L. Adam, F. Wood. *Journal of Information Science*, 25 (4) 1999, p.307-318. il. tbls. refs.

Information and communication technologies (ICT) have been in use for over 30 years in Africa, but the impact of ICT on users in the region is not well documented. Reports results of a study to examine the impact of ICT in sub-Saharan Africa, based on a study using a grounded theory approach. Four main aspects of the impact of ICT were identified: actual impact; potential impact; constraints; and actions centred around users and their reactions. Results indicate that an understanding of ICT users' iterative and adaptive behaviour and their day to day difficulties in coping with problems of ICT in the local context is necessary for impact assessment. The constructionist behaviour in which individuals, organizations, professionals and groups map their world and situation and the complex action and interaction between them imposes the structure of ICT use. Discusses the impact of ICT in the context of its use and the concrete circumstances of the individuals involved and the tasks undertaken, together with historical and environmental perspectives. (The author may be contacted by electronic mail at adam2@un.org).

The impact of new information technology in Africa.

A.A. Alemna. *Information Development*, 15 (3) Sep 1999, p.167-170. refs.

Stresses the importance of new Information and Communications Technologies (ICT) in Africa. Provides an analysis of the opportunities and challenges facing African countries in their attempt to introduce and implement policies meant to encourage the use of these technologies. Concludes that although African countries in general acknowledge the importance of the information revolution, very little concrete action has been taken in this area. (The author may be contacted by electronic mail at balme@libr.ug.edu.gh).