

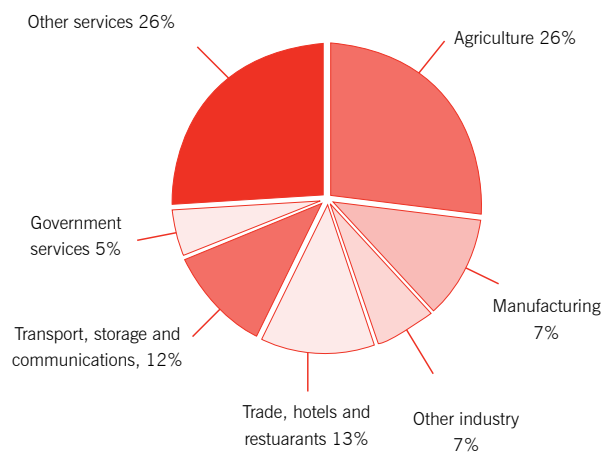
Kenya

Kenya at a glance

The Republic of Kenya gained independence in 1963, and is the regional hub for trade and finance in East Africa. It is bordered by Ethiopia to the north, Somalia to the east, Tanzania to the south, Uganda to the west, and Sudan to the northwest, with the Indian Ocean running along the southeast border. It has a total area of 582 650 km², of which 13 400 km² is covered by water (CIA, n.d.). The total population is about 34.7 million, with an annual growth rate of 2.57 per cent (Globaledege, n.d.). English and Kiswahili are the official languages.

In 1993, the government of Kenya, with the support of the World Bank and the International Monetary Fund (IMF), implemented a programme of economic liberalisation and reform. Through this programme, price controls, import licensing and foreign exchange controls were removed, publicly owned companies were privatised, conservative monetary policies were introduced, and the number of civil servants was reduced. In 2004, the country's GDP increased by 4.3 per cent over the previous year; and in 2006, by 5.8 per cent over the GDP of 2005 (Globaledege, n.d.; World Bank, n.d.). This growth was driven by public and private sector investments and sound economic management. The private sector has attained greater importance in the development process, and currently accounts for two-thirds of GDP. Despite this growth, 50 per cent of the total population still live below the poverty line and the unemployment rate is about 40 per cent.

Figure 3.1: Percentage GDP by sector



Source: OECD (n.d.)

Other sectors that have contributed to economic growth include tourism, transport and communications, manufacturing, trade and construction (see Figure 3.1). Since 2000, transport and communications have been the fastest-growing sectors of the Kenyan economy. This is due to heavy investment in telecommunications, particularly in mobile phone services, Internet provision, radio and TV operations. As a result, many new businesses, such as public pay phones and Internet cafes, have sprung up in major towns as well as rural areas. There are 19 462 community pay phones, and there has been an increase in

the number of mobile phone subscribers (from 2.2 million in 2004 to 4.6 million in 2005) and in geographical coverage of the country (CCK, n.d.).

In Kenya, ICT integration in education is more recent, of a smaller scale and experimental in nature. However, the use of computers in education has progressed slowly from the acquisition of basic computer skills to computer-aided teaching, communications and research. The integration of computers in education is expected to assist in the expansion of knowledge, enhanced communication and technical efficiency, and greater decentralisation in the delivery of education services. In addition, ICTs will play a role in preparing students to acquire skills and competencies that are fundamental for competing in the emerging global knowledge economy.

National infrastructure

Overview

Kenya's infrastructure was considered to be one of the best in Africa during the 1970s. In the past decade, however,

Table 3.1: Summary of statistics in the Kenyan transport and communications sector

Transportation	
Roads	63 000 km
Railways	2 778 km
Airports	225 (15 paved)
Ports and terminals	1 (Mombasa)
Telecommunications	
Fixed telephones	286 729
Fixed telephone density (per 1 000 people)	9
Mobile/cellular phones	5 729 501
Mobile/cellular density (per 1 000 people)	133
Internet users	1.05 million
Internet users density (per 1 000 people)	31
Internet hosts	13 724
International	
Satellite earth stations	4 (Intelsat)
Radio broadcast stations	AM = 24, FM = 18, SW = 6
TV broadcast stations	8

Source: CIA (n.d.); EXU (n.d.); OECD (n.d.)

the infrastructure has deteriorated significantly, owing to the suspension of donor funding and increased public sector corruption, which has resulted in long and cumbersome procurement processes for construction, maintenance and rehabilitation of public infrastructure (OECD, n.d.). The El Nino rains in 1997 damaged the country's infrastructure even further, and potential investors cite the poor infrastructure as a major obstacle. The quality and efficiency of the transport network has decreased and is often characterised by lengthy delays, breakdowns in equipment and closure of major sections of the transport corridor.

In its economic recovery strategy (ERS) for wealth and job creation (2003–2007), the Kenyan government has identified transportation and communications as vital to significant economic growth (Kenya ICT4D National Policy, 2006). Rapid growth in the transport industry has proved to be essential for the domestic economy, as well as for the economies of landlocked countries in the region. With the assistance of various international donor agencies, the government is implementing reforms aimed at increasing the efficiency of existing facilities.

Telecommunications in Kenya

There are currently about 400 000 fixed lines serving 34.7 million people located mostly in the main urban areas between the cities of Nairobi, Mombasa and Kisumu. Outside of these, there are not sufficient lines for data and voice communications (Buruchara, n.d.). Internet access in Kenya began in 1994, and its penetration is very low compared to other regions (see Table 3.2). According to the International Telecommunications Union (ITU), Kenya accounts for 3.2 per cent of Internet users in Africa (Internet World Stats, n.d.). The majority of Internet users in Kenya do not have fixed phone lines, computers or electricity, and use Internet cafes, of which there are in excess of 200 countrywide. Connection charges are now an affordable one Kenyan shilling (about one US cent) per minute; however, the connection speeds can be frustratingly slow.

Challenges

A major challenge facing Kenya is turning around the poor economic performance of the public companies that manage transport infrastructure facilities, and mobilising adequate resources for the maintenance, rehabilitation, construction and expansion of the infrastructure itself (OECD, n.d.). Statistics on transport and communications in Kenya are presented in Table 3.1. Other challenges include electricity shortages, corruption, weak commodity prices, the foreign-debt burden, poor communication infrastructure, inefficient

government dominance of key sectors, and the fact that about 6 per cent of the productive adult population live with HIV/AIDS (CIA, n.d.).

Information and communication technology

The term 'ICT' involves computing and networking facilities (e.g. computers, fixed-line telecommunications, mobile phones and other wireless networks, broadband, specialised application devices, Internet, satellite communications and other networking technologies) that link together, enabling people in organisations and the public at large to communicate and share information (ACP, n.d.). In other words, ICT covers any product that will store, retrieve, manipulate, transmit or receive information electronically in digital form. Information and communication have become an integral part of modern society, such that *information + communication = knowledge society* (Digital Strategy, n.d.). ICT has a significant effect on productivity in most industries, driving innovation, cutting costs, boosting profits, and helping small firms to overcome limitations of size and establish a global presence. It also creates new opportunities for business and employment. Through ICT, modern societies can manage resources better by, for example, improving the efficiency of energy use and supply, cutting production costs and reducing impacts on the environment.

Connectivity and infrastructure

The main ICT regulatory body in Kenya is the Communications Commission of Kenya (CCK), which is considering conducting a comprehensive Internet usage study to confirm the real number of users in Kenya. The main users of the Internet in Kenya are multinational corporations, international organisations and NGOs. All the government's ministries are now accessible via the Internet, a strategy adopted to promote e-government and services to the public in order to enhance growth in the ICT sector. The use of ICT in urban areas may have been influenced positively by the wide use of English, one of Kenya's official languages, in which most IT services are conducted. However, there are at least 40 indigenous languages in the country, and sometimes this has been seen as a barrier to the spread of ICT.

About 2 per cent of Kenyans in rural areas have access to the Internet (Okwemba, n.d.). A government policy to lift duties on imported computers and related equipment has

resulted in an increase in the number of Internet cafes in rural areas. People in rural areas use the Internet to get information on current affairs, to communicate and for commercial and agricultural purposes. However, given that 50 per cent of Kenya's population live below the poverty line, the cost of Internet access is relatively high due to the local telephone call rates in areas outside the major cities. This problem is compounded by lack of electricity or shortages in supply; most Internet cafes use generators or solar power. Other problems include low literacy levels, poor telephone infrastructure and the travelling distances to reach Internet cafes (Buruchara, n.d.; Okwemba, n.d.). If rural communities are to reap the benefits of the Internet, then the service must be presented in their own languages. Such initiatives in Kenya include www.kikuyu.com and www.jaluo.com (the Kikuyu and Luo communities comprise 22 per cent and 13 per cent of the Kenyan population, respectively). In addition, the Google search engine (www.google.co.ke) is offered in both English and Kiswahili. In 2003, the Postal Corporation of Kenya embarked on a project to install wireless Internet access points at some 350 post offices across the country. This has increased Internet access in the rural areas.

There are many obstacles to the development of the telecommunications sector in Kenya (CCK, n.d.; Buruchara, n.d.). Firstly, the telephone network in Kenya is poorly distributed and unreliable. This is exacerbated by the monopoly enjoyed by the state-owned Telkom Kenya over international and local lines that connect local service providers to the Internet. Because of the government monopoly, the donor community has chosen rather to invest in the private sector, where it is felt that the ordinary user can benefit. Secondly, Jambonet, the country's major Internet backbone, is often unreliable, congested and costs the country billions of Kenya shillings due to frequent failures and the lacklustre support services of Telkom engineers. There are 72 Internet service providers (ISPs), all competing for the same international link through Jambonet, which means that leased lines are often oversubscribed by their customers, resulting in slow access times. Thirdly, Kenya lacks open and flexible telecommunication policies. For instance, call-centre and data-entry services are in great demand in North America and Europe; companies in these regions often outsource such services to countries in Asia and South America, where the national governments have seen the potential of the industry and have ensured an open telecommunications environment for local companies to bid for and get these contracts. Most African countries (with the exception of South Africa and Ghana) are effectively excluded from this lucrative market that creates many job opportunities (Buruchara, n.d.). In countries such as

Table 3.2: Comparison of Internet usage statistics in 13 African countries, 2000–2007

Country	Population (2007 est.)	Internet users (2000 est.)	Internet users (2007)	Population penetration
Botswana	1 893 526	15 000	60 000	3.2%
Burundi	8 075 188	3 000	25 000	0.3%
Ethiopia	73 872 056	10 000	113 000	0.2%
Kenya	35 062 192	200 000	1 054 900	3.1%
Malawi	11 553 163	150 000	52 500	0.5%
Mozambique	2 035 6242	30 000	138 000	0.7%
Rwanda	8 959 095	5 000	38 000	0.4%
Namibia	2 083 405	30 000	75 000	3.6%
South Africa	49 660 502	2 400 000	5 100 000	10.3%
Tanzania	38 870 348	115 000	333 000	0.9%
Uganda	28 574 909	40 000	500 000	1.7%
Zambia	11 486 812	20 000	231 000	2.0%
Zimbabwe	12 398 897	50 000	1 000 000	8.1%

Source: *Internet World Stats* (n.d.)

Malaysia and Mauritius, high-level government participation has encouraged foreign companies such as IBM, Oracle and Microsoft to invest, thereby creating many employment opportunities and generating considerable export business in the service industry.

There has been pressure from the public and private sector on the government to explore new and cheaper ways of connecting to the Internet, such as through wireless technology and by relaxing the regulatory framework to allow ISPs to use alternative facilities like the very small aperture terminal (VSAT). Previously, only Telkom Kenya had a licence to operate an international VSAT service. For this reason, companies could not enter the market unless the government relaxed its monopoly.

The Kenyan government has recently introduced measures focused on liberalising the telecommunications sector. Telkom Kenya's monopoly over the Internet infrastructure and international bandwidth services ended in 2004, and several new data carriers have been licensed. In addition, new ISPs have been licensed, asymmetric digital subscriber line (ADSL) and wireless broadband technologies have been introduced, and voice over Internet protocol (VOIP) telephony has been liberalised, promising to bring about a long-awaited reduction in international and long-distance calling rates. In 2006, CCK licensed a second telecommunications operator (in both fixed and mobile telephony) to rival Telkom Kenya, alongside the two existing mobile operators,

namely Safaricom Ltd and Celtel Kenya. This immediately led to massive price reductions (to US\$0.12 per 3 minutes and US\$0.9 per minute for local and international calls, respectively) and improved services in these sectors. This has also attracted foreign investment and encouraged the public to adopt more ICTs. Despite these developments, the new operator has yet to roll out its services due to the slowness of government machinery in legally enabling the process. However, there is much potential in Kenya because of the relatively low fixed-line and mobile tele-density of approximately 1 per cent and 15 per cent, respectively (CCK, n.d.). The spread of the Internet makes it a focal point for the use of new technologies (or ICTs) because it is efficient, cheap and easy to use, facilitates interrelationships with other technologies and provides a flexible means of communication.

Major structural adjustments for attracting foreign investment in the ICT sector have been approved. One of these is the relaxation of the rule that requires foreign companies wanting to invest in the local telecommunications sector to allocate 30 per cent of their shares to the public once they commence operations (Oyuke, 2007). Companies will now be required to find a suitable local partner, or announce an initial public offering within five years, or introduce employee option plans. This will significantly reduce wrangles between potential investors and the government that otherwise would hold back the process of liberalising the ICT sector and the development of an e-economy and information society.

The construction of a terrestrial fibre-optic network by Kenya Data Network, at a cost of 4 billion Kenyan shillings, is set to be completed in September this 2007. In similar vein, the construction of an undersea fibre-optic cable, The East African Marine System (TEAMS), linking Kenya to the United Arab Emirates, is set to begin soon (Wanjiku, 2007). These networks will connect all major towns in Kenya to the high-speed Internet world, as well as creating employment opportunities for Kenyans, especially in the outsourcing business. The TEAMS project was motivated by delays in the East African Submarine Cable System (EASSy), a World Bank-funded project that commenced in 2003 and is due for completion in 2007 (Wanjiku, 2007). The EASSy cable is set to run from Mtunzini in South Africa to Mombasa in Kenya and will connect 15 countries to the rest of the world. The three cable networks are set to make Kenya competitive in the provision of international broadband and will attract international investment. This is part of the government's vision to make Kenya 'a prosperous ICT-driven society', as stipulated in the national ICT policy.

ICT policy development in Kenya

The ICT sector in Kenya currently lags behind those of Tanzania and Uganda, because of regulatory control and the lack of focus and co-ordination in addressing ICT challenges and opportunities. Attempts to develop a national ICT policy have failed twice in the recent past, because the government neglected to include all public and private sector stakeholders and failed to link ICT policies to other national development plans. Determined to avoid these pitfalls and a third failed attempt, which would inhibit economic and social development in the country, the government of Kenya commissioned the International Development Research Centre (IDRC) of Canada in 2003 to support a consultative, participatory and inclusive process for developing, implementing and assessing the national ICT policy (IDRC, n.d.). The objective of the IDRC was to identify the social, technological and institutional structures required for successful ICT policy implementation. The policy development process was implemented over a two-year period (2003–2005) in partnership with the government of Kenya, the private sector and civil society stakeholders. This process helped to develop effective ICT implementation strategies and detailed plans, to raise ICT awareness through workshops and training for senior government officials, to develop indicators for measuring the progress and impact of the policy's implementation, and to document the lessons learned from the process to help other African countries grappling with similar challenges (IDRC, n.d.).

The Kenyan national ICT policy

The national ICT policy of Kenya is a product of the Economic Recovery Strategy for Wealth and Employment Creation (2003–2007) and was developed by the Ministry of Information and Communications in 2006 (see MIC, 2006). Its mission is to improve the livelihoods of Kenyans by ensuring the availability of accessible, efficient, reliable and affordable ICT services. This policy is based on the model adopted by the Common Market for Eastern and Southern Africa (COMESA) in 2003 (see Kenya ICT4D National Policy, 2006). It aims to promote sustained economic growth and poverty reduction, to enable and guide the growth of the country's ICT sector, to promote social justice and equity, to address gender issues in national development, to assist in creating jobs, to improve productivity, to increase access to education, health care and government services, especially for disadvantaged people, and to allow communities to make informed decisions about the use of local resources. The policy also addresses the issue of creating an African network of researchers that would be able to identify effective ways of applying ICTs to key development issues and then to link the results of their research at the community level to national and regional ICT policy-making efforts.

In its efforts to promote growth in the ICT sector, the Kenyan government removed value added tax (VAT) on all computer hardware and software imports, and reduced tax rates on all networking and telecommunication equipment to enable the development of an ICT infrastructure that will drive economic growth. The major limitation to ICT development in Kenya has been the lack of a proper telecommunications infrastructure.

Criticism of the Kenyan ICT policy

The ICT policy document was published by the Kenyan government in March 2006 and subsequently has come under criticism. It includes comments from the public, but does not have legislative status or the force of law. Even though the ICT policy-making process in Kenya involved the government, its development partners, the private sector and civil society (including representatives of open-source organisations, gender activists and the youth), the democratic implications of the policy are considered weak. This is because the government is under no legal or regulatory obligation to consider the public's comments (Van Reijswoud, n.d.).

The Ministry of Information and Communications has circulated an ICT bill for comment by all stakeholders, some

of whom argue that there is no clear linkage between the bill and the policy. The bill fails to adequately address how rural connectivity will be achieved and paid for, and under what timeframe. It also fails to address the liberalisation of the telecommunications sector in order to bring consumer prices down, or to recognise that Kenyan ICT needs institutional and organisational reorganisation; for example, the CCK needs to be given greater regulatory powers to address ICT, and the relationships between different government entities and the ministry need to be defined in order to create a culture of transparency and accountability. The CCK also needs powers to define what it wants to regulate and how to implement the regulations; for example, price controls, requiring disclosure of key financial, operational and technical information, ensure that interconnection charges between different operators are fair and cost-oriented. As a result, the sector is yet to harmonise its activities to enable the implementation and management of ICT programmes without duplication and redundancy in efforts and resources. Therefore, Kenya needs a dedicated ICT regulator or an entity to direct ICT policy and planning at the national level.

A few initiatives have been undertaken to integrate ICT as a benchmark for accelerating development. These include the finalisation of an all-inclusive ICT policy, the initiation of a value-added ICT services project (a back-office automation project) with the target of creating more than 10 000 jobs annually, the initiation of a rural telecommunications project, and the roll-out of district and constituency government portals. The ERS period comes to an end in 2007, and will be succeeded by Kenya Vision 2030, which is to be implemented in 5-year phases.

ICT initiatives in Kenya

Several sectoral strategies have been identified as necessary to achieve the objectives of the ICT policy. Firstly, e-commerce and e-business will be utilised as a means to integrate Kenya into the global economy. These require the development of a comprehensive policy and legal and regulatory frameworks with the support and participation of the international community. The government will also support efforts to raise public awareness of potential opportunities presented by e-commerce.

Secondly, e-government will be designed, planned and implemented through partnerships between the government, private sector and civil society. This strategy will focus on empowering citizens through increased and better access to government services. E-government services will improve co-operation between government agencies, promote better

and more effective resource utilisation, reduce transaction costs and create a competitive business environment for the government, citizens and the private sector.

Thirdly, the ICT policy will encourage the growth and implementation of e-learning by promoting its development through sharing and integrating the resources necessary to address the educational needs of primary, secondary and tertiary institutions. E-learning curricula will be developed to support virtual or distance learning, particularly in higher education and training. A national centre of excellence will be created to act as a platform from which the youth will be informed of the opportunities e-learning can afford them, as well as creating opportunities for marketing Kenyan study programmes abroad. Finally, the government will promote ICTs in health services by installing these technologies in all public health facilities, providing IT training to medical staff, setting standards and norms for IT in the healthcare system, developing legislation governing telemedicine and health information, and establishing national resource centres for IT in the healthcare system.

E-government in Kenya

E-government refers to the delivery of public sector services through different ICT tools, mainly the Internet. The Kenyan government and the private sector have adopted ICT in a positive way and its use is increasing. A directorate for e-government has been set up in the office of the president, in which all the ministries have registered their services online. The objective is to deliver e-services to citizens and businesses in all corners of the country (MIC, n.d.). The ministries are actively involved in using IT applications for data warehousing and information processing and dissemination. This has improved service delivery and productivity. The banking sector has embraced the use of ICT in its operations through automated teller machines (ATMs), Internet banking (IB) and electronic funds transfer (EFT); both the Kenya Ports Authority and the Kenya Revenue Authority have computerised, speeding up service delivery and enhancing transparency. With the support of the Department for International Development (DFID), the government of Kenya has developed and implemented its public financial management and accountability reform programme, which includes the computerisation and integration of financial information, improved links between tax and accountability, improved procurement systems, and enhanced capacity at the Kenya National Audit office (DFID, n.d.).

According to the mid-term review of the ERS for wealth and employment creation, released by the Ministry of Planning

and National Development and covering the period 2003–2006, the ICT sector in Kenya has performed well in some areas. However, one of the targets the government failed to meet was the completion and digitisation of all government forms that the public need to access and which will become part of planned digital villages across the country. This was constrained by the slow adoption of ICT in government institutions and by cumbersome procurement regulations that delayed the implementation of ICT projects and programmes. Another constraint was competing priorities in government, which often lead to disproportionate allocation of funds based on immediate returns. Thus, long-term ICT programmes have been denied equal opportunity and attention. Despite these bottlenecks, most e-government services are now available online as a result of increased support for Internet awareness and improved roll-out of e-government.

E-government in Kenya has been incorporated within the Transparency and Communications Infrastructure Programme (TCIP) sponsored by the World Bank (Mshindi, n.d.). This project has two components – connectivity and e-government. In terms of connectivity, the TCIP project will provide financial support for a Governmental Virtual Private Network, for the pre-purchasing of international and national capacity for universities and technical colleges, government users and the business-processes outsourcing industry on a competitive basis, and for an SMS/e-service initiative. E-government initiatives will focus on rolling out applications in targeted agencies, rolling out procurement services in selected departments and scaling up the government information portal for the public to access information on the budget, public projects, expenditure, the profiles of people, and the amounts and use of constituency funds. The success of the e-government strategy depends on completion of the terrestrial and underwater fibre-optic networks. In addition, the access and use of IT tools and energy (mostly in rural areas) needs to be addressed. The government is planning to set up Internet kiosks across the country, because people need affordable access, local content and knowledge on how they can benefit from technology.

Government officials are taking full advantage of ICT, especially approaching the Kenyan elections in 2007 (Namunane, n.d.). The Internet, newspapers, mobile phones, FM radio, public relations firms and election pledges pertaining to industrial development are set to play a bigger role than they have in the past. The voters are more informed than ever, owing to advances in technology and the proliferation of electronic media in the country. For example,

mobile phones assure good reach within the country, mainly through the short message service (SMS), the Internet is useful in urban areas because presidential candidates have set up their own election campaign websites (e.g. www.raila07.com and www.kalonzomusyokaforpresident.com), and well-equipped secretariats and staff apply the latest technology to weigh statistics, look into voting patterns and offer advice to the candidate on how to lead campaigns.

The East African Community (EAC) is in the process of developing a harmonised e-government strategy for the region. This is in addition to other objectives of the EAC, which include a common customs union, a common market and a monetary union (Ouma, n.d.). The EAC members are Kenya, Uganda, Tanzania, Rwanda and Burundi. A working group, whose purpose is to develop a draft regional e-government strategy for East Africa, has been established. The plan is to ensure that the working group becomes fully operational for the drafting of a regional e-government strategy and the mobilisation of technical assistance. The effective implementation of e-government strategies requires an enabling legal and regulatory environment. In addition, the operational efficiency of the EAC e-government strategies must be supported by the necessary legislation on data security, network security, cyber crime, information systems and electronic transactions. The delivery of e-government in the region requires leadership and long-term commitment from policy-makers at all levels, senior government officials in the public service, the private sector and civil society. Once these structures have been established, the region aims to move towards ICT-enabled applications like e-customs, e-parliament, e-commerce, e-health, e-procurement and e-delivery of meteorological information.

E-commerce in Kenya

E-commerce, which amounts to conducting business electronically, without the seller and buyer being in physical contact, is driving the next phase of the Internet boom. Mobile phones have become more affordable over the years, and SMS is a medium of interaction in radio and television programmes, seasonal greetings, invitations and competitions, and has become part of our vocabulary ('SMSing'). If people can do all these things via SMS, then more affordable personal computers and greater accessibility to the Internet by more people would be revolutionary.

In Kenya, billboards everywhere advertise various ICT products and services, from mobile phone handsets to wireless providers, computers, and television and radio stations. These are considered the 'vectors of growth,

the sweet spots of finance' (Gilder, 2002). E-commerce in Kenya has proliferated as a result of the lower cost of communication, which has enabled people to reach wider markets and has made it possible for goods to be traded in a completely new way. For instance, some women's groups in Tabaka, Gucha district, now sell their soapstone artefacts online (see www.soapstoneafrica.com), simply by taking digital photographs of their products and posting them on their website. Most firms in major towns cannot conduct business without e-mail, which allows them to reach the sophisticated Western markets. Many Kenyans are now making innovative efforts in e-business, especially in consultancy and outsourcing. For example, Kencall (an inbound and outbound telecentre service) provides telemarketing and support services to customers in Britain and the U.S. Kencall was set up in response to the government's call to create jobs in the IT-enabled market (see <http://www.kencall.com/index.htm>).

In Kenya, the main issues of concern with e-commerce include consumer protection, intellectual property rights, privacy and security. While using the Internet to transact, one cannot tell whom one is dealing with; the person could be a conman or a terrorist. Nevertheless, people must trust technology for e-business to grow. There is also an urgent need for Kenya to enact e-commerce laws to prevent people from dealing in copyrighted information, music and software. Lack of legislation and proper infrastructure has prevented many Kenyans, especially those in the tourist industry, from doing more business online.

The government of Kenya and development partners have put reforms in place to tackle the problem of e-transaction and e-commerce laws (Mshindi, n.d.). Firstly, the Freedom of Information Policy has been drafted, providing the framework within which laws and regulations can be applied regarding the use of, access to and manipulation of information. Secondly, Kenya has applied to the World Bank for support in implementing specific activities including e-government, and is finalising the documentation and processes necessary for the World Bank to evaluate the request. If successful, the government aims to realise some elements of the 'Kenya Vision 2030: Transforming National Development' within three years. These include tripling the number of telephone lines, increasing the number of Internet users from 1.5 million to 5 million, increasing business-process outsourcing employment from 4 000 to 100 000 jobs, establishing at least one digital village or e-centre in each constituency, ensuring that every school in Kenya has access to ICT resources, and providing e-government services at district and constituency level. However, more remains to be done in this sector.

ICT policy and the Kenyan education system

Overview

Kenya has a literacy rate of 85.1 per cent, one of the highest in Africa (OECD, n.d.). The national educational system is based on a concept known as '8-4-4' – eight years of primary education, four years of secondary schooling, and four years at university. However, trained teachers are in short supply at most public schools, and overcrowding is a major problem, with some classrooms accommodating more than 100 pupils. Academic achievement at both public and private schools is measured through the Kenyan Certificate of Primary Education (KCPE) and Kenyan Certificate of Secondary Education (KCSE). Kenya's National Development Plan accords high priority to unifying education levels across the country (Otieno & Ngolovoi, n.d.).

Kenya is currently undergoing a revolution in the ICT sector, which is destined to change the way schools conduct their business. The National ICT Policy for Education and Training aims to integrate ICT into education and training systems, and to use it to promote and enable educational reform (MOE, 2006). One of its visions is to create an e-enabled and knowledge-based society by 2015. The government has set up ICT structures in primary, secondary and tertiary institutions in order to build an ICT-literate community. ICT has been integrated into teacher training, and regulatory obstacles to the adoption of ICT technologies have been removed. The policy also recognises the potential of the youth, and promotes their empowerment as learners, developers, contributors and future decision-makers. Although the national policy is still awaiting enactment by parliament, a lot is happening in the area of ICT education. For example, there is increased student enrolment in distance education programmes and greater commitment from teachers and administrators towards offering quality education. It is estimated that about 5 000 and 6 000 students, respectively, are taking part in distance learning programmes at the Kenyatta and Nairobi Universities (UON, n.d.; Sankale, n.d.). The government is also reaching out to rural areas to introduce electrification so as to facilitate equipping rural primary and secondary schools with computers and the Internet.

Primary and secondary education

Kenya introduced free primary education in 2003 and most of the children who graduate from primary schools

can read and write. It is estimated that since the adoption of free and compulsory education, 95 per cent of children attend primary school but only 50 per cent attend secondary school. This is due to there being insufficient places in secondary schools, which poses a major problem for the country's education system. After the government introduced a mechanism for cost-sharing and user charges in 1994, tertiary education has received about 13 per cent of total educational expenditure. The education sector in Kenya has performed poorly in promoting gender equity in higher education, and literacy levels remain higher for males (90.6 per cent) than for females (79.7 per cent) (CIA, n.d.). This may be due to socio-economic status and regional disparities.

Tertiary education

Kenya has six public universities and more than 18 private universities with varying levels of accreditation. According to UNESCO (n.d.), 90 per cent of the 91 541 tertiary students are enrolled in public universities. In addition to the universities and their constituent campuses, higher education in Kenya includes polytechnics, institutions of science and technology and diploma-level teacher training colleges (Otieno & Ngolovoi, n.d.). All universities have web pages on the Internet, but most of them do not offer online distance learning courses. It is estimated that 150 000 students take the KCSE examination each year. About 20 000 students are absorbed into public universities under regular and parallel programmes and 6 000 students enrol at private universities, while 60 000 students enrol at post-secondary mid-level colleges, which offer certificate, diploma and higher diploma courses. Access to university institutions is highly competitive and is influenced by the availability of finances. In 2006, about 58 000 out of the 68 000 students who qualified failed to attain admission to the public universities.

E-learning in Kenya

E-learning is facilitated through the use of ICTs. It can cover a spectrum of activities from supported learning to blended learning (the combination of traditional and e-learning practices) and learning that is entirely online. E-learning is often used in distance learning programmes and is offered through electronic media such as CD-ROMs, mobile phones, video conferencing, e-mail, web sites, interactive TV and satellite broadcasts. Because Africa has a severe shortage of electricity, telecommunications, computers and trained teachers, it has become increasingly important to encourage e-learning as a viable means of enabling large numbers of

students to access education (Gunga & Ricketts, 2006). The advantage of e-learning is its capacity to serve both on-campus and distance learning students at the same time.

The African Virtual University

Several African universities are using virtual learning environments (VLEs) to collaborate in content development and delivery practices; the African Virtual University (AVU) is an example of this (see <http://www.avu.org/about.asp>). The AVU is an independent, intergovernmental organisation that was started in 1997 and has its headquarters in Nairobi. Its main objective is to promote and support initiatives in open, distance and electronic learning (ODEL) in Africa (Dzvimbo, n.d.). The AVU is a network of African tertiary education and training institutions that are involved in the use of various ODEL methodologies to increase access to their own demand-driven programmes in an affordable, cost-effective, flexible and sustainable manner. The AVU has made this possible by developing a learning platform that allows institutions from different countries with different levels of technological and educational development to network through the use of ODEL. In such a networked environment, e-learning should thrive because it allows for the rapid updating and sharing of information, and instruction. This environment promotes group interaction, institutional collaboration and self-learning. The need for e-learning in Africa arises from the increasing demand for education and the need to use relevant technology to deliver it to significant proportions of the population (Gunga & Ricketts, 2006).

Public universities

All Kenyan public universities and two of the private universities have introduced distance learning programmes in order to meet the increased need for lifelong learning. Distance learning is gaining popularity because of its ability to reach out to working professionals who cannot take time off from work to enrol in regular classes. This has helped several institutions to reduce operating costs, promote gender equity and take education to the people by finding ways to increase their access to secondary and tertiary education. However, the implementation of ICT in education in Kenya is not without obstacles (Ndege, n.d.). These include low initial capital investment, inadequate budgets for development and recurrent expenditure, and weak ICT infrastructure, especially in rural areas where it is unreliable and some institutions are not willing or able to exploit external connectivity. It is necessary for public universities to evaluate the costs of various technology choices in order to make informed decisions. Other problems include the

simplistic perception of distance education as 'second best', low female participation in science subjects, strong resistance to ICTs by the older generation, and a negative attitude towards the use of technology in education in some parts of the country.

International organisations

International organisations have been attracted to the country as a result of new government policies on the adoption of ICT. The mission of these organisations, which include Computer Aid International, Computers for Schools Kenya and the New Partnership for African Development (NEPAD) e-schools, is to provide computers to secondary, primary and tertiary institutions so as to strengthen e-learning and other ICT education programmes. The Ministry of Education is working closely with NEPAD to introduce e-learning in primary and secondary schools (Sankale, n.d.). Six secondary schools have already been chosen to serve as models for the implementation of the e-project. These schools will have access to computers and the Internet.

Other e-learning initiatives in Kenya include: Click online, a pilot project using handheld computers, which is geared towards reducing the cost of education in poor countries; the Schoolnet initiative; and ongoing SMS technology development to enhance data collection and provide online support for teachers.

Several organisations support and promote learning initiatives in Kenya. These include Computers for Literacy in Kenya (see <http://www.clik.org>) and Schoolnet Kenya (see <http://www.schoolnetfrica.net>). Schoolnet Kenya is a non-governmental organisation that works in partnership with various stakeholders to foster and support the realisation of access and equity in education through the use of ICTs. Its mission is to ensure development in access to and use of ICTs in primary and secondary school education in Kenya. The Kenya Educational Network (KENET) is constructing the terrestrial fibre-optic network that will connect most towns in Kenya (Thairu, n.d.). KENET is an organisation that strives to establish a platform for communication and networking among educational institutions in Kenya. The objectives of KENET include establishing a high-speed national IP-based network connecting all learning and educational institutions, providing sustainable and permanent Internet access to all institutions, creating at least one learning centre in each institution to support e-learning, developing a comprehensive national education portal with an appropriate e-learning platform, and training sufficient faculty and ICT support staff to collaborate with educational institutions and the public in the development of relevant content and to generate research within Kenyan and other external institutions.

The Kenyan Ministry of Education

The government has developed initiatives to enable the majority of schools in the rural areas to have access to ICT. In 2004, the Ministry of Education launched an ICT trust fund to address digital challenges by ensuring that all public schools have access to computers by the year 2009. The fund is supported by the government and 20 pioneering corporations and parastatals. Its mission is to equip 80 per cent of the schools within five years. Currently, 400 out of the targeted 4 000 institutions have benefited from the fund. The fund is also trying to power schools in rural areas with solar energy (Mulama, n.d.).

In its efforts to ensure the bridging of the digital divide in Kenya, the government has committed itself to halving adult illiteracy rates by 2015. About 16 per cent of adults, mostly in rural areas, cannot read and write, which effectively excludes them from taking advantage of ICTs. At the same time, the government has made plans to ensure that more schools, especially those in rural areas, have access to computers by commissioning a project, based on the Taiwanese model, to locally assemble cheap computers in partnership with four tertiary institutions (Wahome, n.d.). These institutions will train technicians to assemble the computers locally, and will develop software and research on the components, which will be certified locally.

The Ministry of Education has made it possible for KCPE candidates to check their results via mobile phones and the Internet. By so doing, the government has assured the public that such applications are possible and that technology is about real people – it exists to answer a human need, and to simplify and speed up processes. The use of SMS technology to check results saves a lot of time and money and lessens the agony of waiting for the paper-based results to reach schools.

Public schools in Kenya have a shortage of teachers, following the government action to freeze teacher employment a decade ago. This problem can be alleviated by e-learning, which makes it possible for one teacher to handle a large number of students. Students anywhere would be able to join class discussions, access discussion chat rooms, answer questions via e-mail, download assignments and even take examinations online.

Kenya Institute of Education

After a successful one-year e-learning pilot project, the Kenya Institute of Education and WorldSpace are planning to revive Kenya's nationwide school broadcast service, using WorldSpace technology to broadcast educational content to 11 million students in 18 000 primary and 3 000 secondary schools (KIE, n.d.).

AMREF

In the health sector, e-learning is revolutionising healthcare by creating an electronic infrastructure for the rapid training of nurses. The project is called the Kenya Nurses Training Programme, an e-learning initiative of the African Medical Research Foundation, and is based on material developed and provided by Accenture Learning (AMREF, n.d.).

E-learning is set to become an essential part of public schooling in Kenya. The need for this formed part of the discussions at the 2nd International Conference on ICT for Development, held in Nairobi, 28–30 May 2007 (E-learning Africa, 2007). The title of the conference was ‘Building Infrastructures and Capacities to Reach Out to the Whole of Africa’, and its theme reflects the significant efforts made by many African countries to set up their national and regional ICT infrastructures to create access to education, training and services for all.

Challenges to e-learning

Although the spread of the use of ICT in education is increasing, the e-learning initiative in Kenya has to overcome the following challenges:

- Many schools, especially those in rural areas, can fully embrace ICT only if electricity is made available to them. The alternative is to use generators, but the operational costs are too high.
- Most teachers in public schools are computer illiterate, and few have basic IT skills. In addition, some senior education officials are technologically shy (‘technophobic’), making it difficult to implement e-learning.
- Kenya has over 20 000 primary and secondary schools, so implementing an e-learning programme is a costly exercise. The costs of purchasing and installing computers, their maintenance, connection to the Internet and use of online services would add a heavy burden to the government and schools’ budgets. Therefore, the government is reaching out to its development partners and private organisations to source funds for these purposes.
- Security is another problem. Most public schools, especially those in rural areas, cannot afford to set up a good computer laboratory with acceptable security features.
- Because it is not easy to control information over the Internet, it is highly likely that students could access pornography and security-compromising material, and could send hate messages or threats to their teachers, and so on (Kamuri, n.d.).

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