

Information and Communication Technologies (ICT), Internet as a Tool in the Developing World, Challenges and the Way Forward

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Abstract: Recent advances in computing, Information and Communication Technologies (ICT) have given rise to the computational network notion. One of these computing paradigms is the Internet, design as inter-connectivity that determines the establishment of the "info-society", which has no territorial boundaries, is transnational, is represented by a species that becomes community, is planetary and global and requires—as elements of positive growth through the Net-integration and responsibility. In this paper, we consider the challenges faced by the developing countries and the way they are overcoming them. As difficult as it may seem to believe, awareness of the Internet is not yet universal. At least one out of every three or four persons in urban areas of China, India, Russia and the rest of the developing world have yet to hear of the Internet. In the face of poor infra structural facilities that is lack of communication devises and personal computers, poor or no electricity in most of the rural areas, high call rates, costly line rentals and installation expenses of telephone lines for most of the population to access the Internet, unfavorable economic and political superstructures (high tax rates, un-liberalized import and export laws, monopoly in the ICT sectors by the governments), no laws and regulations to foster economic development that can and will sustain technology use and general ignorance among the users (Challenges) of the newly emerging information technology, it is interesting to know that a lot of developments are taken place through awareness, policy changes that have boost the confidence of the investors in the ICT sector, training and education of the citizens to use and maintain the communication devises (way forward) in the developing world. Internet offer several e-services. Users gain access to traditional e-mail and Web, e-government, tele-medicine, e-commerce applications such as e-business, e-employment, tele-conferencing/video conference, tele- shopping and advertisements, Banking transactions, investment opportunities just to mention a few. Governments and organizations are using the space and resources provided by Internet as a catalyst for mobilization of skill labor through out the developing world to improve their economies.

Key words: Information and Communication Technology (ICT), network, internet, info-society, e-commerce, e-employment, awareness, education, challenges and policy changes

Introduction

In an increasingly competitive world, the need for people in business to have adequate sources of information cannot be disputed. Whether it can be said that this need is adequately met in the developing countries is yet to be proved. In developing countries as in developed ones, the value of business information has long been recognized, even though problems of poverty, low productivity, population growth, wide scale unemployment, primary product export dependence and illiteracy characterize developing countries in Asia, Africa and Latin America. Though the picture of life is bleak, many of these are gradually raising basic levels of income, lowering infant mortality, improving educational opportunities and increasing life expectancy. It is believed that by pursuing appropriate economic and social policies with effective assistance from developed nations, many developing countries are soon realizing their development aspirations.

The Internet-or Net, -is nothing more than a means of transport for digitized information. But it makes radically new patterns of human communication possible through its speed of transport and the fact that once a link is established it becomes very cheap to send information to one person or to a hundred. The Internet is more of a concept than a thing. It is best thought of as a new means of transport for information-the "tracks" over which actual information services "run". In the same way railways made regional and national newspapers possible, the arrival of the Internet (and its successors) makes new information services possible.

The Internet allows users to transcend time, distance and old-technology cost constraints. They can form working groups or virtual clubs with the people who share their interests, regardless of where they live.

The advent of globalization, free markets, technological change and the Internet revolution are rendering traditional business and social paradigms obsolete. They are altering in a manner and to an extent to which developing countries are only beginning to comprehend the very foundations on which their survival depends. The ICT has expanded from local, to regional, to international and its operations are governed by new policies.

The Internet has become a de facto standard. In a real sense, the paradigm for economic success has changed for nations in the midst of developing their economies.

Many in the development community are looking to the Internet and related ICTs (information communication technologies) as a universal remedy for decades of economic stagnation and social ills. Whether it is to deliver better health services, promote political transformation, or generate new economic enterprises, proponents argue that ICTs open up new opportunities for the developing world to hitch their futures to the Global Net. Tempering this optimistic outlook are concerns about a widening digital divide, both internationally and within individual communities and a reassessment of the promise of ICTs in light of the dot-com meltdown and fears of rampant globalization.

The Internet doubled in size in 1994 and has done so every year since 1988 and the number of computers connected to the internet in Africa for example jumped by 36% from July 1998 to January 1999. It is the fastest-growing communications medium ever. Millions of people are finding their working lives and increasingly their recreation, changed beyond all recognition. In the

North there are new magazines and television programs devoted to the Internet, cafés where Internet beginners can learn to play in cyberspace, news groups and bulletin boards on subjects ranging from alternative politics to sport or job searches and posting. Users home shop and telecommunicate to work without leaving the house.

Unfortunately, there seems to be an impression among some people that plugging in to the Net means you have to give up something of your culture. Actually, you can creatively use the Net to preserve and extend community and culture.

Access to the technologies, cheap sources of accessing the Internet and ensuring that the citizens possess the education and skills to use them are the fundamental policies that developing countries need to consider, unless this is addressed urgently, the employment aspirations and productivity potential of millions of workers in scores of developing countries cannot be. With the inspirational statements from some of the players in the ICT field like:

“Demographics of the Internet will change, where the dominant player on the Internet will be the developing nations”, the author of *Being Digital* and confounder of the Media Lab at the Massachusetts Institute of Technology said.

“Developing countries will soon dominate Internet usage and wireless technology-along with the right policy and cultural mix-will speed the process”. MIT Media Lab director Nicholas Negroponte said.

“Over half of Asia's 500 million mobile subscribers will be broadband enabled in five years”, Hedrick-Wong said. “Asian markets will be 3G [third generation] implementation leaders”. The above statements show that with time developing world will start to dominate the use of Internet.

Almost every country in the developing world has access to the Internet and the World Wide Web. For instance with the help of British Department of International Development (formerly the Overseas Development Administration (ODA)), an independent Web site has been established called One World Online which carries up to date information on human rights and development issues. Similarly the United Nations Conference on Trade and Development (UNCTAD) has initiated the Global Trade Point Network (GTPnet), a computerized networking system linking about two million traders and enterprises worldwide. In Africa the United States' Leland Initiative assistance programme, also known as GII Gateway, is beginning to make headway in creating Internet connections in Africa.

The explosion of the Internet as a resource for business information in developing countries has become an interesting story. The Internet has made people in business aware of how easily data can be stored in different locations and in different formats.

Businesses, governments and NGO's are increasingly using the Internet to recruit personnel, saving time and expense. With its world wide scope and role, the Internet permits significant insights into overall market trends and competitive measures. The use of electronic mail minimizes the cost of employing and employed by cutting advertisements, printing and postage costs. Hence many operational chores are accelerated with the Internet.

The introduction of more widespread technology to poorer countries would undoubtedly mean better-educated and better-informed people, who in turn are more likely to successfully battle the poverty and increase productivity so as to have improved economies.

The ICT revolution offers genuine potential; Introduction of the new information technologies and electronic media and, above all, of the Internet, has modified the relationship between man and machine. The machine is no longer simply a computing tool; it has become a means facilitating contacts between people, organizations and employers-even people organizations and employers of diverse cultures and countries. In this realm, interaction no longer takes place exclusively between man and machine but between one man and another, mediated by the machine: it has become interactivity.

The Internet can help government agencies and private organizations to communicate with the public, with businesses and with one another. The anytime, anywhere character of the Internet allows information and services from the government, job recruiters/employers to be more available to more people and business with greater convenience and lower cost to customers. These guidelines have to be created to help governments; organizations and businesses in developing world to achieve these benefits at reasonable cost and effort.

Challenges

In spite of the promising potential, there are pitfalls in the application of the Internet in businesses in the developing world.

Lack of base infrastructure

In the developing world, the Internet has not delivered on its early Promise, a weak telecommunications infrastructure including teledensity (telephone networks), fewer personal computer (PC) and Internet access, low bandwidth, electricity and sometimes bad roads or access to the rural or remote areas are all constraints. While the number of computers connected to the Internet in Africa jumped 36% from July 1998 to January 1999 as stated early, it is predominantly urban elite Africans who were online. Internet connectivity in the developing world used to be "Have and the Have Not". Meanwhile, more than 70% of Africa's population and for that matter developing world is rural and access to telephones remains scarce. There used to be only about 14 million lines installed in the entire continent-fewer than the number of phone lines in Manhattan and almost all are in urban areas.

The main problem with an e-mail system for most of the developing world (and much of Africa) is the unreliability of electricity and telephone lines, which are often out of order for days on end. Even when they are working, power surges and poor telephone connections can dash attempts at communicating through telematics (a term denoting the convergence of computing, telecommunications and information).

One hold-up in establishing e-mail in developing countries is their phone lines cannot handle rapid data transmission, calculated in bps (bits per second), which has made e-mail so affordable. While the norm in the First World is 56 000 bps, in some parts of the developing world, phones can handle just 28 800 bps. Telephone lines are very poor and connections are not stable. This means that even those who have access to the internet must spend hours downloading material that would take only minutes for those in the developed world with the best access. Happily, both CompuServe and America On-Line will soon be offering 56 000 bps access, which improves

prospects for general e-mail access and opens the door to real time conference calls on computer.

Policy

Governments in the developing world seems not to be ready for the ICT revolution and were taking too long a time to recognize its importance. In some cases local political oppositions have rendered the promised benefits of technology elusive. Government policies can create unfavorable climate for Internet use, prevent organizations and individuals from investing in the ICT especially in the rural areas. Many researchers, businesses, unemployed and the general citizens in developing world cannot access the technology for various reasons. The government is not making it easily available. The telecom regulating agencies and in some cases the only internet service provider do not get along well with each other.

It's not just a matter of resources. Most of the developing world has enough resources to provide access in the major cities and even most of the rural/remote areas where higher educational institutions, businesses and major research laboratories are located. But it takes time. That's what makes them third world. The major difference between the first and the third world is the time it takes to transfer something from the realm of possibility to reality.

There are examples of where new technology has been introduced quickly to India—for instance, the green revolution and the installing of telephone lines to make long distance and international calls in small towns and villages throughout India. "But they are far too few". says Professor Arunachalam.

Cost and quality

In those areas where the infrastructure has been developed, the Internet may be perceived as an all-round good deal for businesses. But not every business and community has an opportunity to take advantage of the Internet. The cost in some cases can make access and use of the Internet prohibitive. In addition, the infrastructure may simply not be developed in remote areas, making access at any cost impossible. The cost of hosting websites (e-services sites) is high for most governments and businesses.

The speed and quality of available networks will determine the type of applications that can be supported by the network and the higher the number of applications the more the number of citizens accessing the network. But with the type of connections like twisted pair copper wire, coaxial cable or the dial up systems that are in place makes accessing slow and sometimes unreliable. The type of hardware or software used, in most cases old hardware and software are used in the developing countries. The size of the market, number of suppliers and different application of hardware are also a constraint on the developing world. The cost of personal computer (PC), software and hardware are way above and accessing Internet depends on the accessories, this limit to use of the Internet in the developing countries.

Capacity development

In spite of the efforts by many businesses, strategic capacities are lacking. There may be a

lack of adequate and sustainable structures and institutional procedures needed to get connected to a computer, modem and telephone. In addition, certain skills, tools and information are required when using the Internet. In most developing countries, some of these capacities are scarce due to the weak financial base of most business organizations; this has hampered the development of the Internet especially in the area of developing and hosting e-commerce sites including that of e-employments. A low level of education among the citizens of the developing world is also a challenge to the use of Internet in job search and posting.

Inconsistency of telecommunications access

Throughout the developing world, Internet service providers are in an investment phase, especially in remote areas. Some talk of an Internet showdown in developing countries. Some see the Internet as the central focus for all communication facilities including telephone, fax, data communication and online electronic commerce. But it is difficult to gauge just how ubiquitous this sort of service will be and when it might occur.

Traditions and cultures

The fear of a new technology making an impact and also the fear of some institutions losing their revenues are also hampering the use of the Internet. For example the Radio and Television Stations and the Newspapers losing on advertisements on job posting or Postal Agencies losing on posting of applications by job seekers, even though their coverage are not wide and generally localized. Even when they have large coverage, sometimes the adverts can go unnoticed or by the time it is noticed the dead line might have passed. The low educational level of the use of ICT or the Internet throughout the society is also a factor.

Way forward where to begin?

The first step everywhere is to create awareness and understanding of the nature of the fundamental advances which are now possible in development, their practical implications and how they translate into operational terms for individual organizations, governments and the citizens. Every government, investor and donor agency needs to address the new generation of policy which these advances call for and the new public/private sector relationships they require.

Initial utility programs can build on existing colleges, universities or large private sector concerns that are already operating networks and open and distance learning techniques. In rural areas, they can build on existing initiatives already using technology at local levels. Virtually all existing programs use the technology for narrow purposes. Utility programs can widen the uses of that same equipment and build on the local acceptance of the technology which has already been achieved.

The early focus should be on private sector usage to build up revenue; then the utility operators should reach out to surrounding rural communities.

Base infrastructure

The potential for wireless technologies and satellites to extend telecommunications and internet access across wide areas and into remote rural communities would supplement fixed wire telecommunication infrastructures that already exist to provide Internet access to the enormous e-citizens especially recruiters/employers and seekers of jobs. This in a way has reduced the total reliance on the old telephone line. There has been a great change in the telephone system in the developing world in the past decade and this has led to telephone-based e-mail system using a computer, a modem and ordinary telephone lines. This setup would allow transfer of all types of files - word-processing, spreadsheets and graphics files.

With the help of donor agencies and investors, the developing countries have developed and extend reliable electricity (Both thermal and hydro electric power) in both the urban and rural communities. This has also led to opening of telecenters, cafés and cyber shops where the ordinary citizens can have access to Internet.

Development of ICT companies in some developing countries notably India and China and these countries extending their knowledge and technologies to the other developing countries is helping in the ICT revolution and access to the Internet. For example; Indian IT and Internet companies active in Nepal include NIIT, Aptech, SSI, TCS, Pentasoft, Nucleus Software, Satyam Infoway and Contests 2 Win. Many more are joining the fray and a growing number of Nepalese students are also turning to colleges in India for IT and engineering degrees. "We host over 3,000 Indian domains and now over 50 Nepalese domains", said Vikas Garg of Delhi-based Web hosting company Jingle Infotech. The International Development Research Centre (IDRC), funded by the Canadian government, has launched a R63 million projects aimed at improving access to information and communications technology (ICT) in Africa.

The project, launched at an African networking conference in SA last week (15th April 2003), will apply Canadian ICT expertise to projects for education, health and community development.

Although inadequate information and communications technology (ICT) infrastructure, as well physical infrastructure, logistics and trade facilitation are some of the shortcomings in the developing countries, they vary in regional outlook.

Asia and the Pacific

Dominates in all these areas, pointing the way for other developing countries and regions to follow. It leads in the deployment of crucial broadband technologies and its governments play a key role in attracting investment in the sector and supplying a skilled, educated workforce to meet the growing needs for outsourcing by foreign firms. Its enterprises are also more integrated into intraregional and global trade flows than those of other developing regions. Asia and the Pacific now accounts for 46% of digital subscriber lines worldwide and is adding 50 million new Internet users each year. Given the sheer demographic weight of the region, the potential for further growth is clear.

Latin America

Is also making progress, although activity is highly concentrated in Argentina, Brazil, Chile

and Mexico. Some 50-to-70% of Latin American enterprises in the formal sector have access to the Internet.

In Africa

Connectivity is slowly improving, but e-commerce there remains limited. Local Internet connection is now available in all African capitals and legal monopolies in Internet service provision have almost disappeared, resulting in about 30% rise in data traffic from the continent in 2001.

Policy

Administrations are following developed world best practice for legislation and regulation that is related to e-commerce, including taxation, disclosure, privacy, encryption and contract law and sometimes removal of monopoly enjoy by the national telecom companies. This is a demanding objective - most developed countries have prepared their legal codes and regulatory frameworks to deal with the new challenges. Networking (ICT infrastructure and services) in most developing countries has been subject to independent regulation, whatever industrial structures are in place. The independent regulator have powers that cover at least pricing, interconnection, international accounting rates and are bias towards liberal licensing of network operators and, particularly, service operators. Multiple competitive service providers can provide some of the benefits of competition if the administration is unwilling to end the monopoly of the state operator, but the importance of the regulator is then even greater.

Other steps taken for easier access: First, innovative approaches through establishing partnerships with public, private sector and civil society, leaders from all sectors-government, business and non-profits-in developing countries are creating policy, legal, regulatory and fiscal conditions to encourage these technology-rich businesses.

Perhaps there is a way, through tax breaks, protection to investors, tax exemptions or cuts to encourage multinational companies to increase infrastructure investments in the world's poorest countries.

NGOs "at the forefront": The Internet has been particularly competently used by non-governmental organizations (NGOs) which in many parts of the South are at the forefront of electronic communications. In countries such as Ghana and Tanzania, the majority of electronic mail accounts are on hosts set up to meet the needs of NGOs, according to information from provider GreenNet.

The "instant response" facility offered by the Net is a boon to development - when it is available, dependable and affordable.

The international trade regime has been sensitive to policies that encourage the growth of the ICT sector in the developing world and governments are encouraging the growth of the domestic ICT sector while making imported inputs available at the right prices.

Cost and quality

One solution to the problem of the high cost, or even total absence, of ISPs in developing countries is a combination of satellite, radio and telephone technology with computers that now brings e-mail, WWW access and database searching by e-mail and a host of electronic conferences (forums) and businesses (e-commerce application sites) in more countries in the developing world. Affordable access will continue to be a major roadblock in many emerging economies, but solutions like wireless Internet have facilitated online access even in remote parts of the developing world. The declining costs of telecommunications generally and, in particular, the potential for wireless telecommunications to substitute or supplement for the more expensive investments in fixed-wire systems, the growth of telecenters, Internet cafés and cyber shops at relatively low prices has provided unprecedented access to public services as well as vital information on e-commerce applications (example e-employment sites), social benefits and other government services.

Capacity development

Awareness and advocacy on the connectivity through the provision of hardware and software; and specifically, the satellite revolution holds considerable promise.

Capacity building is a necessity and universal access through the establishment of community centers.

Development of information-based products, as, for example, has been the case with software in India, or the direct application of information technology to enter higher value added manufacturing, as has been the case in Costa Rica;

On December 13, 2000, the government of Nepal released a national IT policy supporting electronic commerce, IT education and e-government and setting a target of 10 billion Nepalese rupees in IT exports in five years (1 Indian rupee= 1.6 Nepalese rupees). The policy is being regarded as a step in the right direction, although it still falls short on critical areas like e-commerce legislation. The policy reduces import duties on hardware and software to a mere 1% but this applies only to companies in the IT sector and not to residential users. And e-commerce sites in Nepal still cannot accept payment from abroad in U.S. dollars.

In Senegal, liberalization of telecommunications regulations has spawned a host of "telecenters" providing access to telecommunications and creating thousands of jobs.

Traditions and cultures

Another factor that helps in the usage of the e-services systems: Where citizens are confronted by inadequate domestic institutions or services, they may seek access to alternatives in other environments. Examples include access to the internet and information technology providers. For many decades this cross-border access has been the privilege of a wealthy minority in most developing countries, but with the new networking tool (Internet) and its lower cost to access by the individual citizen to the point where it becomes an option for many more, the benefits to the individual citizen may be significant.

Education

There is a conscious effort going on in the developing world to educate the administrators and the citizens on availability and appropriateness of ICT (Internet) in their economies and their daily lives. This is helping in creating and hosting more of e-commerce sites including that of e-employment.

Visibility and security

Most developing countries conducting e-business applications on the Internet need both a means to advertise their products and a way to secure transactions. To ease some of these problems, some countries has turn to commercial Internet service providers (ISP's) such as America Online, CompuServe and Global Network Navigator (GNN) to provide basic commercial services on the Internet. These Internet providers have in place technical support mechanisms for electronic payment and security.

Confidence and risk assessment effects

Those who are witnessing the speed and scope of change in the developing world - including suppliers (ISP), customers, regulators, financiers and politicians-are changing their expectations of what might be possible in the future. This may be the most subjective and contentious of all of the feedback effects listed here and yet prove to be the most influential.

For every administration that has successfully liberalized and privatized its networking sector, ISPs are skirting the country's telecom monopoly by building wireless local-access networks and using satellite and microwave technologies. Internet providers are also servicing a largely rural population by opening small telecenters-central points where users pay small charges for short periods of access to do things such as surfing and sending e-mail. This model is currently been imitated everywhere in the developing countries.

Business institutions and governments in developing countries are realizing that the Internet makes it quite easy to deploy enterprise-wide messages through electronic mail. This report has found out that, ICT (Internet) can have a far-reaching impact on the job recruiters/employers and the Job seekers in poorer countries if the right policies, reliable and affordable telecom infrastructure (cheap access to Internet), educated workforce and institutions are in place and serve as important spurs to development and job growth.

In some cases, the high mobility of ICT capital and its inherently knowledge-based nature may allow lower income countries to "leapfrog" stages in traditional economic development via investments in human resources.

For this to occur, three needs are most important: a coherent national strategy toward ICT, the existence of an affordable telecom infrastructure and the availability of an educated workforce.

With the realization of the world becoming global village, the mindset and policies of the governments and businesses in the developing world are changing.

Education, training, debt relief, democratization, investment in infrastructures, improved and cheaper telecommunications all have a part to play in an eventual narrowing of the

information gap. But the opportunities offered by the Internet are also identified as positive elements in an already unequal world: clearly, the developing world has much to gain from increased access to ICT and no time to lose.

There is no overstating that there is vast potential for businesses in developing countries on the Internet. Businesses and governments need to determine what they want to achieve very specifically via the Internet, in this case development and design of websites to aid employment (e-employment sites) so as to reduce the cost and time spend in such exercise. This will help in the spread of skilled personnel in the developing world. Alternatives should be explored; some alternatives may likely prove a more reasonable option given the costs of the Internet in some places in the developing world. As the costs drop for telecommunications technologies and infrastructure, the Internet will develop as a strong resource for information for business and as an appropriate tool to employ skill personnel, to disseminate information to other businesses and customers.

“The creation and gain of jobs, the content and quality of work, the location of work ... all are affected by the emerging era of digital globalization”.

It is known that ICT is global in its reach, irreversible in its drive and pervasive in its impact, but if the dotcoms and the WWW are to play an effective role in contributing to the goal of providing decent platform for Job search and Posting via the Internet in the developing world, then they must make sure that the policy framework and base infrastructure exists globally.

The most important final conclusion is that ICT (Internet) can make a difference, This report noted. “With the right policies and institutions, developing countries can steer the ICT revolution. They must build partnerships, provide education and promote socially responsible connectivity to have social justice in their world as well as the e-world. Let's ensure that dotcoms are synonymous with decent work”.

Application of ICT especially Internet to complement the traditional way of searching for employable personnel and looking for job could result in important efficiency gains in developing countries.

Today, in whatever year this is, the web is still growing at an amazing rate. Technology has improved considerably and the web is regarded as an indispensable tool for education, business and entertainment. There are billions of pages on the web, with thousands more being added every hour. The Internet is a system that is nigh-on impossible to destroy and looks set to become an ever-larger influence on the world in the future.

References

- ILO's World Employment Report, 2001. Despite Improved Employment Outlook. Digital Divide Looms Large.
- International Labor Organization (ILO) communication. Digital divide is wide and getting wider. Vast swathes of the globe are technologically disconnected.
- Jack Woodall (Dr.), The Internet and the Developing World, woodall@wadsworth.org.
- Jane, B., 1999. For Developing World, the Internet has not Delivered Wealth. <http://www.apnic.net/mailling-lists/s-asia-it/archive/1999/09/msg00042.html>

- John Abdul Kargbo. Institute of Library, Archives and Information. University of Sierra Leone.
Mail: Institute, Private Mail Bag, Freetown, Sierra Leone.
- Jonathan Peizer. CTO, Information Programs and Internet Program Director for the Soros Foundations. E-mail jpeizer@sorosny.org.
- Liss Jeffrey, Ph.D. Adjunct faculty director, Research Network/ Director/executive producer byDesign E Laband Visionary Speaker series / Electronic Commons, McLuhan Program in Culture and Technology. University of Toronto.
- Mike Holderness. Freelance science and technology journalist. (Extracted from Ceres, The FAO Review, No. 158 - March-April 1996).
- Nicholas Negroponte. Director MIT Media Lab. <http://news.zdnet.co.uk/story/0,,t269-s2082541,00.html>
- Roberts, N. *et al.*, 1988. Business information sources: a consideration of requirements, *Edu. Inform.*, 6: 27-37.
- Richard, S. 1998. The Internet and the Developing World. *British Med. J.*, 316: 1111 (11 April)
- Samuel Inyang. Stuck in the Ruts on the Information Superhighway. Director of Projects ProHealth Foundation, Nigeria.
- The Internet Society. International Secretariat 12020 Sunrise Valley Drive, Suite 210, Reston, VA 22096, USA. e-mail: amr@linus.isoc.org Web page: <http://www.isoc.org>
- Tracy Burrows, ITWEB Journalist. R63m African connectivity project launched. <http://www.itweb.co.za/sections/telecoms/2003/0304220849.asp?O=E>
- U.N.'s on the Internet in the developing world. Virtual Villages, Technology and the developing world. <http://www.cnn.com/COMMUNITY/transcripts/2000/6/20/afifi/> June 20, 2000