ICT in developing countries

A cross-sectoral snapshot

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Abstract: The goal of this paper is to highlight the cross-sectoral importance of Information and Communication Technology (ICT) and give the big picture of ICT in developing countries. This is done by presenting a number of successful implementations of ICT applications. The examples are organized according to a simple framework consisting of three layers, which are ICT infrastructure, sector applications and use of applications. The cases throughout the paper shall serve as a basis for creative thought and innovation in ICT in developing countries.

Key words: Information and Communication Technologies (ICT) and development, developing countries, sector applications

1 INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) AND ITS RELEVANCE FOR DEVELOPMENT

Information and Communications Technology (ICT) has become a catchword with different interpretations and viewpoints even among experts. As the name suggests, ICT encompasses all the technology that facilitates the processing, transfer and exchange of information and communication services. In principle ICTs have always been available since the advent of the printing press. The only difference is that from the late twentieth century, rapid advances in technology changed the traditional ways in which information was processed, communications conducted, and services available (Adu 2002). These technological advances have changed business operations and the way people communicate. They have introduced new efficiencies in old services as well as numerous new ones. One could even imagine to go as far as replacing the term "Post-industrial Society" with “Information Society", that is a society where the ability to access, search, use, create and exchange information is the key for individual and collective well-being (Kaplan 2001).

In the 1990s with the rise of the Internet, many have seen ICT as a formidable tool to close the gap between the developing world and the developed world by skipping certain stages of industrial development and leapfrogging into the Information Economy (Negroponte, 1998). The validity of this theory is yet to be proven. But detailed analysis of experience around the world reveals ample evidence that, used in the right way and for the right purposes, ICT can have a dramatic impact on achieving specific social and economic development goals as well as play a key role in broader national development strategies (Digital Opportunity Initiative, 2001).

The goal of this paper is to provide a snapshot of the picture of ICT in developing countries by presenting a number of successful implementations of ICT applications. In our opinion these illustrations allow a better understanding of what has been achieved so far by giving an overview that complements the more detailed academic case studies and the theoretical frameworks and action papers provided by the big international initiatives in the domain of ICT and development. The examples we outline in this paper are organized according to a simple framework explained in the next section.

2 ICT A MULTI-SECTOR INFRASTRUCTURE

Many who are not familiar with the subject wonder if ICT is relevant to the poor. They argue that poor people in developing countries not only have less access to ICT, but they also have fewer schools and teachers, fewer doctors and nurses, and a lower calorie intake per capita than people in wealthy countries. At a first glance these other issues may seem more relevant the fight against poverty than access to a telephone or the Internet? In fact, the debate cannot be framed in these terms. ICT and applications that rely on it are increasingly important in the delivery of services such as health and education, in the creation of economic opportunities for poor people, and in amplifying the voices of the poor. It is not a matter of choosing between ICT and health or ICT and education, but instead that of choosing the most effective way for ICT to help in the delivery of health, education, and small business development services (World Bank, 2002).

However, capitalizing on the opportunities of ICT depends not only on the existence of infrastructure and access, but to a large degree on the existence of ICT related human capacity. These capacities can be divided into three main groups, which are infrastructure related, sector application related and user related (see figure 1). First, ICT can only flourish where the capacity to provide and maintain infrastructure at a reasonable price in a sustainable way exists. Second, ICT only becomes valuable to people when useful local content is available. Therefore a new class of entrepreneurs must develop the capacity to imagine, create and maintain useful applications in

different sectors that are based on ICT and make sense to the local community. Finally, users must develop the capacity to understand and use these applications.

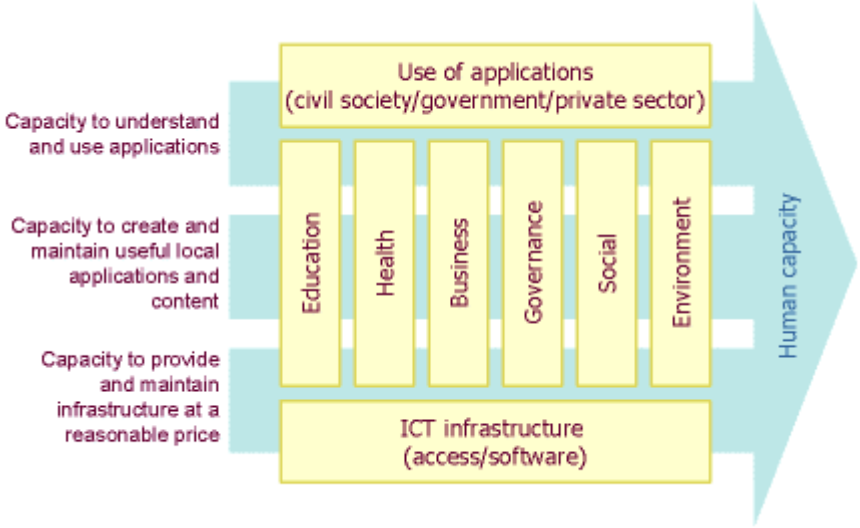

Figure 1: Cross-sectoral impact of ICT

3 A SNAPSHOT OF THE ICT LANDSCAPE IN DEVELOPING COUNTRIES

In this section we try to give an overview of ICT in developing countries by describing a number of cases in infrastructure and sectoral applications.

3.1 ICT infrastructure

In order to benefit from ICT, to deliver better services in health and education, to create better living conditions and to explore new business opportunities a certain infrastructure must be in place.

3.1.1 Universal access funds

Because ICT plays a key role in production, education, social relationships and politics, universal access must be a goal to achieve (e.g., considering shared access within the community). Often this can be done in a sustainable way, which means that access should be provided, such that it can generate enough revenue to pay salaries, replace equipment, and undertake necessary improvement to evolve as the available technologies develop. Where this is not possible so-called "universal access funds" need

to be established promoting private/public partnerships. In Chile, for example, this mechanism has been used to leverage $40 million in private investment on the basis of just over $2 million of public subsidy. As a result 1,000 public telephones have been installed in rural towns, at around 10 percent of the cost of direct public provision. been installed in rural towns, at around 10 percent of the cost of direct public provision. Subsidies of this kind could also be used to support the development of Internet-enabled community centers (World Bank 2002).

3.1.2 n-Logue's rural connectivity model

N-Logue is an Indian for-profit company that taps into the latent rural demand for connectivity. It is built on a franchise-based business model that consists of three levels of interdependent networks. At the foundation-level, n-Logue forges and facilitates relationships among a wide-range of organizations such as hardware and equipment providers, non-governmental organizations (NGOs), content providers, and government. These relationships benefit n-Logue's regional network of franchised Local Service Partners (LSP) at the next level. The LSP works in tandem with n-Logue to set up access centers or nodes to which individual kiosk operators of the third level will be connected. These village-level kiosk franchises are linked to the nodes through fixed wireless local loops (WLL) and provide Internet and telephone access to the local population (Howard et al., 2001).

3.1.3 Grameen Telecom's village phones

Another interesting example of connectivity that aims to link rural villages in Bangladesh to the telephone is Grameen Bank, a micro-finance institution. It created Grameen Telecom, an entity that has the explicit goal of helping the bank's members shift from relatively low-yield traditional ventures like animal husbandry into the technology sector, by creating micro-enterprises that can both generate individual income and provide whole villages with connectivity. Grameen Telecom uses advanced GSM technology in stationary village phones owned and operated by local entrepreneurs. These entrepreneurs, mostly women, purchase the phones with money borrowed from Grameen Bank, and sell phone service to village customers by the call. An average of 70 customers a month uses each phone; this shared-access business model concentrates demand and creates relatively high cash flow, even in poor villages, enabling operators to make regular loan payments and still turn a profit. Repayment rates to Grameen Bank are 90-95% (Cohen, 2001).

3.2 Applications in governance

Where ICT infrastructure is in place it has an important impact on national and global governance. Firstly, ICT facilitates international information flows across national state borders, increasing and facilitating cooperation between governments. Secondly, traditional forms of political governance, such as national governments, but also international organisations are watching the balance of power shift. ICT empowers civil society, which refers to the set of institutions, organisations and behaviour situated between the state, the business world, and the family (LSE, 2002). Easier access to information and an increased information flow in civil society, including NGOs and the media, makes institutional actors, such as governments and international organizations, increasingly transparent and accountable. Finally, events on the other side of the world can have an impact on nation states while denying national governments some of the traditional tools, which would enable the censoring of information, and influence over them. Furthermore, ICT allows civil society to organize, regroup and cooperate in ways that bring their opposition, demands and concerns more attention. (see figure 2).

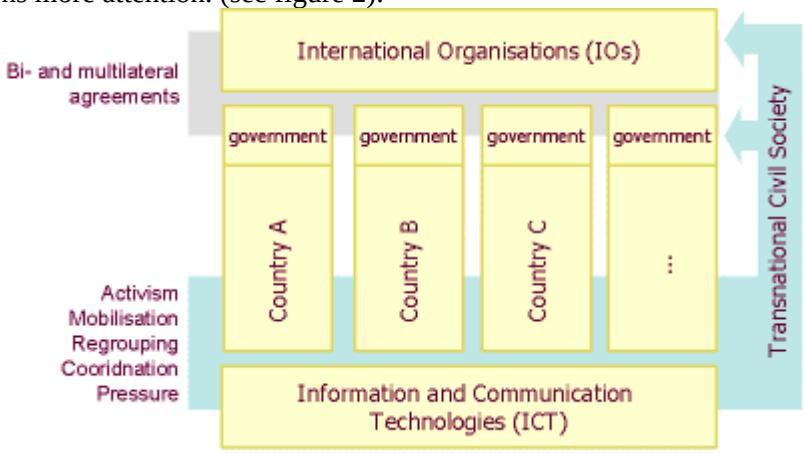

Figure 2: Global Governance

3.2.1 Women's Voices Kenya

Women's Voices is a video initiative Nairobi, Kenya, that demonstrates how ICT empowers women living in poverty by giving them a voice in public policy making in. Through digital video equipment, including old and borrowed Betamax cameras, the women in the project learnt scripting, shooting and editing and how to present their communities by showing rough-cuts and recording opinions. This has led to direct and sustained contact with political representatives and those in control of civic services. A

major impact has been the increase in participation in the political process, and the women have also secured a contract with a local TV network to regularly supply short news briefs from their villages (Foster, 2002).

3.2.2 B92

The Zagreb radio station B92 is an example of ICT and freedom of expression. In the 1990s it pioneered the use of the internet as a means of bypassing media repression and is a role model in the fight for and maintenance of democratic rule throughout the world. During the repressive rule of former Yugoslavian president Slobodan Milosevic the station was closed down several times. But by switching to an electronic news bulletin on the Internet, the radio station was able to continue broadcasting an independent viewpoint and could contribute to the fall of Milosevic.

3.2.3 Ghana Dot Gov

Ideally, ICT can contribute to a better relationship between governments and citizens, by increasing information flows, transparency and accountability. Further, for citizens and civil society to have any influence on decisions that affect them, and to obtain their rights, they need to be able to connect and communicate with government via easy to use and accessible information tools.

The Ghana Dot Gov project, a cooperation between the International Institute for Communication and Development (IICD) and the Ghana Ministry of Information and Presidential Affairs, aims to gradually achieve the goals outlined above by developing an attractive and functional web portal. This portal will be used to effectively disseminate information and is a first step towards a more coordinated approach to information sharing across government (IICD, 2002). But in order to profit from these so-called e-government services, civil servants must still learn what information is useful and worth disseminating. As nice as the historic of a ministry and the CVs of its appointees may be, it probably has only little value in terms of good governance.

3.3 Business applications

ICT has an important impact on business in developing countries by creating new opportunities, especially by enabling the creation and delivery of digital goods, such as music, but also by simply eliminating the middlemen. This so-called dis-intermediation (Benjamin & al., 1995) has allowed firms in developing countries to increase margins and revenue by accessing lucrative foreign markets directly.

3.3.1 Caribbeat Entertainment

Caribbeat Entertainment is a company that markets and sells Caribbean music through the use of advanced ICTs. The main purpose of Caribbeat is to provide an online music portal that offers a range of services to artistes, musicians, distributors, and other persons with interest in Caribbean music. This is done through a number of activities, such as an online facility that plays music from the English, French, Spanish and Dutch speaking islands. The music, which is free of charge and is transmitted from a server based in California can immediately be purchased in form of CDs from the online music store. Caribbeat Entertainment's biggest achievement to date has been the discovery of Abijah, a rising star who has won the Caribbean Music Expo (CME) Talent Search in 2000 (2000x).

3.3.2 Peoplink

An example of dis-intermediation id PEOPLink, a global artisans trading exchange, through which local craftspeople in poor regions can increase their incomes not only through access to new markets, but also because the wholesaling intermediaries for their produce have effectively been removed. Local craftspeople can now receive up to 95 percent of the selling price for their produce where previously they received only 10 percent (Digital Opportunity Initiative, 2001). Several similar initiatives, offering indigenous peoples opportunities to globally market their traditional crafts and farm products exist on the Web, such as the Virtual Souk in the Middle East and North Africa, Global Echo in the Philippines, or Ecosandals.com in Kenya.

3.4 Educational applications

Education is a critical component of the Information Society and is important in two capacities. Initially, experts are needed to provide and educate in the installation and maintenance of ICTs, to provide content and tools and to demonstrate the use these applications. When a certain degree of human capacity building has been achieved, ICT also helps delivering education more efficiently.

3.4.1 Global Learning Opportunity on the Web (GLOW)

IT skills, practically prerequisites in today's job market, are often basic and straightforward to learn, but are a world away from the chronically poor. GLOW is a school initiative in the Philippines that takes a commercial approach in order to reach sustainability. It uses a for-profit business model to provide vocational and Internet training to underprivileged youth, free of

charge. Revenues come from commercial arrangements like agency fees from recruitment of graduates, fees from companies who need personnel trained, and paying clients who outsource tasks like Web development to the centers (Digital Dividend, 2001a).

3.4.2 Educ.ar

Educ.ar is an ambitious project of the Argentine government and some dedicated entrepreneurs who have set out to transform the national education system. The project aims at supplying connectivity in schools, building capacity for school teachers in the use and creation of digital content and media-tools for the classroom, and, providing educational content for teachers and students through the Educ.ar portal. The sheer dimension of the project, however, increases risk for failure. The Chilean version on the contrary, the state-owned and run Enlaces program, is already up and running (Digital Dividend, 2001b).

3.4.3 The African Virtual University (AVU)

A quite successful and implemented case of ICT in education is the African Virtual University AVU. It uses modern information and communication technologies to give the countries of sub-Saharan Africa direct access to some of the highest quality academic faculty and learning resources throughout the world. It aims at bridging the digital divide by training scientists, engineers, technicians, business managers, and other professionals who will promote economic and social development and help Africa leapfrog into the Information Society (Wolff, 2002).

3.5 Environmental applications

3.5.1 Environmental capacity building in Central America

A range of NGOs, governments, and universities in Central America have set up an initiative to provide ICT-related environmental training capacities within the region. The project provides public and private organizations with the capability to place environmental, social, economic, and other data on-line. It also familiarizes a large number of users with the contributions that information available on the Internet can make toward planning and social and economic development (infoDev, 2002).

3.6 Health applications

3.6.1 Satellife

Satellife is an NGO that uses multiple ICTs, from satellites to modems, to connect health professionals to critical information in under-resourced areas. Because manual health surveys in rural Africa are expensive, inadequate, inaccurate and slow, the organization launched a project that uses PDAs to collect timely public health data and to return it to policymakers. In a Ghanaian trial programme over 2,400 surveys were collected within five days. The data was analysed and a report delivered on the sixth day instead of the usual six months (Stockholm Challenge, 2002).

3.6.2 Insight Initiative

Health & Development Networks (HDN), an international NGO, used ICT to increase the participation and broaden the perspectives of two major HIV/AIDS conferences in Africa and Asia. Through moderated e-mail discussion forums HDN was able to include people in the conferences, who can rarely participate in the international discourse. Key correspondents fed in articles and reported the events. Reports were archived online, cross-posted to other forums and sent out on the World Space radio public-health channel. Surprisingly, the greatest participation came from Africa, challenging common assumptions about IT access and reinforcing the value of IT for health-related advocacy in the developing world (Stockholm Challenge, 2002).

3.7 Social applications

3.7.1 Women Networking Support Programme (WNSP)

WNSP is an initiative launched by the Association for Progressive Communications (APC) and its team consists of women from all over the world, working in the field of gender and ICT and actively supporting women's networking. The goal of WNSP is to promote gender equity in the design, implementation, and use of information and communication technologies, with special focus on inequities based on women's social or ethnic background. These objectives are achieved through the provision of research, training, information, and support activities in the field of ICT policy, skills-sharing in the access and use of ICT, and women's network-building. Further, WNSP has developed the Gender and ICT Evaluation

Methodology (GEM), which shall help in examining the relationship of gender and technology as a whole (APC, 2002).

3.7.2 Mine Action Programmes (MAP)

MAP is a Website built on top of a database that helps in the eradication of anti-personnel landmines in Mozambique, one of the most mine infested countries in the world. The primary objective of MAP is to link the different actors via the Internet in an effort to help facilitate better coordination and increase the possibility for closer collaboration amongst practitioners, researchers, programmers, donors, and government agencies within Mozambique, as well as to other efforts taking place at the regional and global levels (Bellanet, 2002).

4 CONCLUSION

Technology per se does not solve social problems, but the availability and use of information and communication technologies are a pre-requisite for economic and social development in our world. They are the functional equivalent of electricity in the industrial era (Castells, 1998). The cases outlined in this paper show that ICT underlies all sectors and can have an important impact on development. They give an overview of what is being achieved through ICT and they serve as a basis for thought and innovation. The examples demonstrate that ICT is not competing for donor funds in the areas of education, health, economic and social development, but rather increases their efficient delivery. However, in order to fulfil the promises of ICT in development, three basic capacities that have been illustrated in the cases above (see table 1: overview of cases) must be boosted. The first one is the capacity to provide and maintain ICT infrastructure at a reasonable price. The second one is the capacity to create and maintain useful local applications and content. And the last one is the capacity of the public to understand and use these applications.

	Case	Strengths	Problems
Access	Universal Access Funds	Minimal public funds to expand connectivity in “economically uninteresting” regions by subsidizing private companies	Difficulty of attributing and enforcing subsidized licences to connect “economically uninteresting” regions
	n-Logue	Fosters entrepreneurship through franchising. Adopts fixed wireless technologies	Complexity of the business model
	Grameen Village Phones	Rural connectivity built on private investments (Diaspora)	Inadequate technology (GSM) limits its use and expansion
Governance	Women’s Voices Kenya	Empowerment and political participation of the socially excluded group of poor woman	Limited scalability
	B92	Political resistance to a totalitarian regime	
	Ghana Dot Gov	Improved transparency and efficiency through gov. information dissemination	Steep learning curve of what is the right information to disseminate and how it is done
Business	Caribbeat	Access to global markets through digitalized music.	Copyright infringements may pose a problem for digital products
	Peoplink	From the grassroots. The Web as a marketing channel to access foreign markets and improve income	Existence of many similar business models, such as Virtual Souk or Ecosandals
Education	GLOW	Sustainable for-profit business model for Internet training and skills for the poor	
	Educ.ar	Aims at brining connectivity to schools and building digital capacity among teachers	The dimension of the project increases the risk of failure in an economically hostile environment
	African Virtual University	Global knowledge transfer from North to South through satellite connections	Sustainability is an issue of this Worldbank funded project
Health	Satellife	Efficient collection of health data with PDAs	Relatively expensive and complex technology
	Insight Initiative	Increased virtual participation to a HIV/AIDS conference in Africa and Asia	Connectivity and bandwidth of virtual participants
Social	Women Networking Support Programme	Global networking for woman working in the field of gender and ICT	Reaching target groups like socially underprivileged woman in poor countries
	Mine Action Programmes (MAP)	ICT for coordination in eradicating anti-personnel landmines	Missing bandwidth prevents the use of graphical tools such as maps

Table 1: Overview of cases

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