postnote

ICT IN DEVELOPING COUNTRIES

Information and communication technology (ICT) can help developing countries tackle a wide range of health, social and economic problems. By improving access to information and by enabling communication, ICT can play a role in reaching Millennium Development Goals such as the elimination of extreme poverty, combating serious disease, and achieving universal primary education and gender equality. However the benefits of ICT are not fully realised in many countries: ICT is often out of reach of the poor and those in rural areas. This POSTnote discusses how this problem is being addressed, focusing on new ICT such as internet and mobile phones. It discusses the role of the UK and wider international community, and the effectiveness of projects funded by international aid.

Background[1]

ICT is any technology that enables communication and the electronic capture, processing, and transmission of information. Radio, television and print media are vital in many developing countries. In recent years 'new' ICT, such as mobile phones and the internet (and associated applications such as 'VOIP', transmitting telephone calls over the internet) have become available to growing numbers worldwide. The most rapid growth is in mobile phone usage. Total (fixed and mobile) telephone access in developing countries increased from 2% in 1991 to 31% in 2004. Internet usage has also grown rapidly: from 0.03% of developing country inhabitants in 1994 to 6.7% in 2004. However, there are wide disparities between developing countries (see next section).

Box 1 shows some examples of ICT for Development (ICT4D) projects, in which the international community, NGOs, the education sector, national governments and industry all play a role. Such projects aim to realise the benefits of ICT in a range of sectors, from health, education, commerce and e-government to scientific

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Box 1. Examples of ICT4D projects

- **Health**: The Keneya Blown telemedicine project aims to provide an online network for all hospitals and health districts in Mali. Physicians are the sole users of the pilot site, but other healthcare workers are invited to consult and contribute content. Medical tele-teaching has also been initiated. Examples of consultations include one between an expert in Geneva and a patient in the Bamako, Mali; and a leprosy consultation between an expert in Bamako and patient in Geneva.[2]
- **Economic empowerment**: The Grameen Bank NGO,[3] a village-based organisation in Bangladesh, offers women low-cost loans to set up mobile phone exchanges in villages where there are few landlines. The women charge for the use of their Village Pay Phones, and earn close to three times the annual average income. Their earnings allow them to send their children to school and enhance their status in the community. However the scheme is threatened by the increasing availability of cheaper phones for potential purchasers.
- **Human rights:** The Kubatana Trust in Zimbabwe aims to strengthen the use of e-mail and internet strategies in local NGOs and civil society organisations.[4] Kubatana makes human rights and civic education information accessible to the general public from a centralised, electronic source, and has become an important means for disseminating information about the political situation locally and internationally.
- **Commerce:**[5] In Senegal, Manobi (a French private telecommunications company) uses Wireless Application Protocol (WAP)-enabled mobile phones to obtain up-to-date market prices for Senegalese fruit and vegetable farmers. The prices are updated in real time via a central database by data collectors at various markets, and offer transparency of prices inside the market that many producers lack.

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capacity building, gender empowerment and human rights. However, the benefits of ICT are not fully realised as many countries have inadequate infrastructure and human capacity to support ICT.

The digital divide

There are wide disparities in the extent to which different developing countries, and different socio-economic groups *within* countries, benefit from ICT. The 'digital divide' commonly refers to the gap between those with *access* to ICT and those without; however, many factors besides physical access contribute to these disparities.

Disparities *within* countries

Even in developing countries with relatively high net ICT uptake, ICT is still out of reach of many groups due to:

- **Lack of appropriate products:** products are often not designed to meet the needs of the poor, or those in remote areas. These groups can face constraints such as access to electricity (lacked by two billion people worldwide).
- **Cost:** roughly half the world live on less than four dollars a day. Many potential users are too poor to afford any form of access to ICT.
- **Education:** even where there is physical access to ICT, many people do not have the technical skills needed to benefit from them.
- **Language**: Poor literacy is a problem with ICT such as the internet. Of those who can read, many know only a local language, while the internet is dominated by English-language content.
- **Human resources:** As in many sectors, the migration of skilled ICT professionals from developing to developed countries contributes to a lack of human resources to support ICT.
- **Lack of robust regulatory framework for ICT** can limit uptake, as illustrated in Box 2.

Disparities *between* countries

OECD countries have the highest access to new ICT, followed by South Asian and some African countries. Sub-Saharan countries fare worst (excepting South Africa).[6] In 2004 Zimbabwe had 3.5 mobile subscribers per 100 people, compared with 4.3 for India, 36.3 for Brazil and 102 for the UK. Although levels of access are low in many African countries, growth over the previous five years has averaged 60% a year. In 2004 Africa was the region with the highest mobile phone growth rate. Growth rates in India averaged 90% over the same period, among the fastest in Asia. One reason for differences between developing countries is the wide variation in government policy on ICT (Box 2).

Tackling the digital divide

Many factors could contribute to bridging the digital divide. National governments, NGOs, industry and international donors all play a role, often working together. However, assessing whether disparities are increasing or decreasing is difficult because sales figures give no indication of types of usage of the same ICT in different countries.

Technological developments

New technologies, and changes in usage, can increase access to ICT. For example, recent developments in wireless local area network technologies are raising new hopes for internet diffusion in parts of the developing

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Box 2. ICT policies of different governments[7,8]

In **Ethiopia** 40% import tariffs on ICT equipment makes it too costly for all but the elite. The incumbent public telecom operator has a monopoly over all telecom services. Although the number of mobile phone subscribers is growing, uptake in Ethiopia is among the lowest in Africa. About 60% of telephones and 94% of the 6,000 internet accounts are concentrated in the capital, Addis Ababa. This is due to the limited telecom infrastructure, low levels of computerisation outside the capital and lack of human resources. However the government's attitude to ICT may be changing, with the establishment of an Ethiopian ICT Development Authority, and changes in management of the two key telecommunications agencies.

In **China**, the number of internet subscribers increased from 33 million in 2001 to 94 million in 2004. This growth is partly due to market forces, namely consumers' increasing desire to go online and competition among service providers. It is thought that competition is possible because the government views the ICT sector as an engine for economic growth. Some analysts argue that most growth is in urban areas, while ~60% of the population live in rural areas.

In **Egypt** a dynamic Ministry of Communications and Information Technology has played a strong role in catalysing ICT development in collaboration with the private sector. For example, its transfer of internet subscription charges from consumers to Telecom Egypt and internet service providers (ISPs) coincided with a sharp rise in new users: from ~9 users per ten thousand inhabitants in 2001, to ~55 per ten thousand in 2004.[1]

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world. Sharing of devices is common in developing countries; it can also generate employment (see Boxes 1 and 4). Open Source Software (OSS) is also an expanding area. Since there is no licensing fee attached to it, OSS can be cheaper to acquire than proprietary software (postnote 242). The 'One Laptop Per Child' project aims to supply schools with cheap Personal Computers (PCs) which run on OSS (Box 3).

Box 3. One Laptop Per Child project

This $100 laptop is a robust, open source based computer that can be cranked into operation. It has been developed by the non-profit One Laptop Per Child (OLPC) organisation at the Massachusetts Institute of Technology (MIT), with assistance from corporate members such as Google and NewsCorp. It will be sold to governments by early 2007 and issued to children by schools. Advocates say the laptops will make the learning process more engaging and interactive. Critics are concerned that the project is an attempt to exploit a new mass market under the guise of 'non-profitability'. Some question whether the cost of teaching materials, training teachers, and maintenance have been properly taken into account.

The role of industry

Left to market forces alone, some areas or societal groups considered unprofitable to service might be left without access to ICT. Some analysts question whether industry will make a significant difference to the development agenda. However, industry commentators suggest it is playing a role. For example, in India, Intel is working to address problems in rural areas, where PCs are affected by heat, dust and unreliable power sources. Ericsson, in partnership with the United Nations Development

Programme, is working towards improving mobile coverage for rural users in the developing world. Many industry commentators attribute the rapid increase in mobile telecommunications in Sub-Saharan Africa to private sector investment.

Box 4. Mobile phone line rental in Tanzania
Before liberalisation of the telecommunications sector in the 1990s, very few Tanzanians were able to access a telephone. This was because monopoly landline prices were high and services were poor, biased towards urban-centres and sometimes required payment of a bribe to be connected. With liberalisation, mobile phone subscriber rates in Tanzania increased almost 90% a year from 1998 to 2003. Airtime vouchers in low denominations cater for those who can afford to pay for only one call, while other customers without a handset can use *huduma ya simu*, a roadside line rental service available in many developing countries. Customers save on the costs of time and money used to travel to a landline in town, while the operators gain income and provide a service that reduces the digital divide.

The role of national governments
Box 2 shows that a range of government strategies, from cutting taxes on devices such as mobile phones, to liberalising markets, can increase ICT uptake. However, it is argued that some policies increase only *net* ICT access. For example, efforts to develop the "high tech" end of the market, such as mobile phones with multimedia exchange, tend to benefit the middle classes rather than improving basic levels of access for all. It is also argued that governments sometimes set over-ambitious targets for ICT uptake, which have little hope of being put into practice.

Some ICT4D commentators suggest developing country governments should encourage uptake of technologies such as mobile phones, which have proved popular among the poor. They say this is better than promoting ICT like the PC, uptake of which has been comparatively slower. There is consensus that education and IT skills training play a role in improving access to ICT. However there is debate over how to raise awareness and generate demand: some say donor-funded telecentres (which offer a range of telephone, computing, internet and information services) have a role to play in familiarising people with basic ICT. Others suggest generating consumer demand is more important, citing the growth of the internet among middle-classes in China (Box 2).

ICT for Development (ICT4D)
The international community plays a key role in stimulating access to ICT. Some major initiatives are outlined in more detail below.

The Millennium Development Goals (MDGs)
The MDGs, agreed at the United Nations Millennium Summit in 2000, aim to reduce world poverty and improve lives by 2015. The UK Department for International Development (DFID) has made the MDGs the focus of its work. ICT is seen as a means of achieving many MDG goals. One target specifically relates to ICT

aiming 'to make the benefits of ICT available to all'. There has been progress in this area, although critics argue that the target does not specify which ICT should be made available, to whom, and by when. Others argue the MDGs should place more emphasis on economic growth: they suggest the MDG-inspired prioritisation of ICT applications for micro- and small-scale firms ignores medium- and large-scale firms that are key drivers of wealth creation and competitiveness.

World Summit on the Information Society[9] (WSIS)
WSIS, a two phase United Nations (UN) summit, aimed at *overcoming the digital divide and creating an all-inclusive Information Society*. During the second phase (November 2005), management of Internet infrastructure particularly top level internet domain names (like .com or .org), was a key area of debate. While WSIS did not result in any major changes to arrangements in this area, one outcome was the creation of the UN Internet Governance Forum (IGF). The IGF will provide a platform for discussing cross-cutting issues such as internet security, although it will have no decision-making powers. While WSIS brought together many actors in the ICT4D field, some critics suggest that it lacked representation from the ICT industry (particularly from developing countries). They also point to a lack of independent research and 'big ideas' beyond the $100 laptop (Box 3).

New Partnership for Africa's Development (NEPAD)
NEPAD is an African-initiated strategic framework for the continent's revival. It identifies ICT development as a priority action area. It focuses on two key areas: the rapid development of ICT infrastructure, and dissemination of ICT skills across the African population, by implementing an e-schools programme across primary and secondary schools. NEPAD has been widely praised for having placed ICT on the development agenda although some critics suggest it lacks the resources and infrastructure to fulfil its goals.

Commission for Africa (CfA)
The CfA is a UK government initiative set up in 2004 to stimulate development in Africa. The CfA report from 2005 recognises the importance of ICT in many areas, including higher education, economic growth, governance, culture, trade and finance. It urges donors to increase funding to support a free media (including new ICT such as internet broadcasting). Critics say that although the commission proposes substantial increases in funding to carry out its recommendations, it is not clear how these funding increases will be delivered.

ICT4D in the UK
In the UK, the Information & Communication for Development (ICD) team within DFID leads on ICT4D activities. Between 2001/2002 and 2005/2006, ICD expects DFID to have committed £40m on ICT4D programmes, with a focus on Africa. A range of initiatives are underway, in areas such as teacher training and education; promotion of affordable access to ICT; and promoting expansion of local internet content. DFID is

also responsible for the UK's contribution to the ICT elements of NEPAD, focussing on regional ICT infrastructure. Currently the organisation of ICT activities within DFID is changing and ICT is being integrated into other DFID programmes. Some fear that this means ICT4D activities will be wound down at DFID, possibly jeopardising the UK's expertise in ICT4D.

Controversy over ICT4D

It is broadly agreed that ICT can play a part in bridging developmental disparities between and within countries. There is less agreement over how high a priority it should be, in relation to other developmental concerns. Some suggest that the introduction of ICT in developing countries will rapidly improve wealth as well as social and personal well-being. They say it should be treated as a matter of urgency, since any delay puts developing countries at risk of being further marginalised. Others question the relevance of spending development aid on improving access to ICT, arguing that basic services should be prioritised. However it is increasingly acknowledged that the two approaches are linked, since ICT can improve access to basic services, such as health and education.

Aid sceptics say many ICT4D projects are financially unsustainable in the long term, and question the extent to which many projects are demand-led. Telecentres and projects involving subsidised public access to the internet have been dubbed 'rusting tractors for the 21st century' by some.[10] However, proponents argue that, if run properly, such projects could contribute to local communities just as public libraries do.[11] Supporters of ICT4D accept that there is little empirical evidence that ICT4D projects actually result in poverty reduction, but argue that, because ICT is a multi-purpose tool, it is difficult to demonstrate a simple cause and effect.

Other impacts of ICT

It is difficult to demonstrate that increasing access to ICT has a positive impact on development, when looking at the broader picture rather than at specific case studies. There is limited research in this area. Although such links have been established in developed countries (where, for example there is evidence of a link between telecoms development and economic growth) it is too early to observe this effect in developing countries. ICT has many social, environmental and economic impacts:
- **Cultural:** In many cases culture adapts to fit technological development, and not vice versa.
- **Intellectual Property Rights:** ICT can help disseminate indigenous knowledge (such as herbal medicine). However, by publishing such information on the internet the knowledge of the economically poorer may be exploited with no benefit to them.
- **Employment:** ICT can take jobs from those who have previously benefited from their specialised knowledge, such as agricultural middlemen who know market prices. ICT does create new jobs, although they are likely to be quite different from the disappearing jobs.
- **Environment and health:** ICT devices often contain toxic substances, particularly 'reconditioned' (but

sometimes obsolete) ICT hardware donated to developing countries. Increased use of ICT presents challenges for managing electronic waste as well as energy consumption.

ICT and freedom of speech

There is debate over the extent to which ICT will lead to increased freedom of speech in states where censorship of traditional media is widespread. Filters, blocks and tracking devices can be used to control information distributed with ICT. However, many commentators argue that in the long term, the nature of the technologies may make censorship unfeasible.

Overview
- Information Communication Technology (ICT) is increasingly seen as a means of enabling other developmental needs rather than as an end in itself.
- However there are wide disparities in access to ICT, with many new technologies out of reach of the poor. Reasons include cost, inappropriate design, lack of infrastructure, education, human resources and support from government.
- Technological developments and changes in the way new ICT are used (e.g. sharing devices) can help bridge this 'digital divide'.
- The importance of ICT in achieving development goals is increasingly recognised in international initiatives such as the Millennium Development Goals; however there is debate over the effectiveness of 'ICT for Development' (ICT4D) projects.
- NEPAD and the Commission for Africa are both notable for placing ICT on the development agenda.

Endnotes
1 Statistics sourced from www.itu.int, unless otherwise stated.
2 www.keneya.net
3 www.grameentelecom.net
4 www.kubatana.net
5 www.manobi.net
6 The Digital Divide: ICT Development Indices 2004, *United Nations Conference on Trade and Development, 2005*
7 G Feller, 'ICT Policy of Ethiopia: changing positively', *Information for Development (I4D)*, vol3 no6 (2005), pp 28-29
8 G Liang, 'Surveying Internet Usage and Impact in Twelve Chinese Cities', *Chinese Academy of Social Sciences*, 2003
9 R Heeks, 'WSIS: What did it achieve for ICTs and development?' *DIG eDevelopment Briefing*, no.11 (2005), IDPM, Manchester
10 R Heeks, 'ICT and the MDGs: on the wrong track?' *I4D*, vol.3, no.2 (2005) pp 9-12
11 S Ferreiro, 'Information Literacy: A Perspective from Chile'. White paper prepared for UNESCO, presented at the Information Literacy Meeting of Experts, Prague, July 2002.

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