Shifting Focus from Access to Impact

Can Computers Alleviate Poverty?

Dahms, Mona-Lisa

Published in:
Handbook of Research on Overcoming Digital Divides

Publication date:
2009

Document Version
Early version, also known as pre-print

Shifting Focus from Access to Impact

Mona Dahms
Department of development and planning, Aalborg University, Denmark

ABSTRACT
This chapter contains two main messages: Firstly, the concept of the 'digital divide' should be seen as part of the problem rather than as part of the solution. Therefore, the sooner this concept - and with it the binary categories and the 'one size fits all' simplified model of 'development' - is discarded the better. Secondly, the main recommendation for strategies to be adopted in ICT4D projects is that focus should be on the information and communication needs of poor people rather than on technologies; beneficiaries should be actively involved in identification of their needs, in decision making about ways and means to satisfy the identified needs, about purchase of equipment and inputs and about implementation of solutions. Only by actively pursuing participatory design and participatory 'development' can the goal of achieving a free, fair and equal 'Information Society', benefitting poor and rich people alike, be reached.

INTRODUCTION
For more than fifteen years the discourse on information and communication technologies for 'development' has been ongoing. As part of this discourse the contested concept of the 'digital divide' and the associated binary categories of the 'information rich' versus the 'information poor', and the 'knows' versus the 'know-nots' have been used to describe the difference in terms of availability of information and communication technologies between rich and poor countries. The discourse has been accompanied by a large number of development initiatives by multilateral, bilateral and non-governmental organisations alike. These initiatives have been focusing upon providing access to information and communication technologies, mainly in the form of computers and Internet connection, to poor people in poor countries. The question arising is to which extent these many initiatives have brought about 'development' in the form of a positive change of livelihood for the poor people involved.

Attempts to measure the 'digital divide' draw upon the concepts of 'universal service', used to measure availability in rich countries and 'universal access', a more realistically achievable goal in poor countries. These concepts have for many years been used by the telecommunications industry to measure the penetration level of telephone services and attempts have been made to adapt the concepts to also include other information and communication technology services. The indicators used for measuring service and access have mainly been per capita stock or penetration levels of different types of technologies, such as telephones, computers and Internet hosts and users. But after fifteen or more years of many initiatives and meager results it has become increasingly clear that there is a need to move beyond measuring availability and accessibility, to measuring usage and, more importantly, to measuring impact, a challenge which development researchers and practitioners alike have been struggling with for many years.

The two main questions discussed in this chapter are the following:

- To which extent is the concept of the 'digital divide' part of the solution or part of the problem?
- What strategies should be adopted to achieve the ultimate goal: A free, fair and equal global 'Information Society', benefiting poor and rich people alike?

The first section of the chapter is this overview, presenting the main questions and giving a chapter overview. The second section of the chapter sets out with a discussion of the concept of the 'digital divide' and a presentation of different methods of calculating the divide, as well as a discussion of trends. The origins of the concept are explored, followed by a discussion of the 'power divide', i.e. the global power imbalance between rich and poor countries.

In the third section the two concepts of universal service and universal access are presented, together with the three main criteria underlying these concepts: availability, accessibility and affordability, and a model of telecommunication network development. The fourth section discusses the criteria of accessibility in more detail. From accessibility the discussion moves to the concept of usage, including a discussion of usage indicators and usage studies. Also, the concept of impact and of how to measure the socio-economic 'developmental' impact of initiatives within the area of information and communication technologies for 'development' in a meaningful way are discussed.

The fifth section describes the results of a small pilot study on access, usage and impact of information and communication technologies carried out in the small district town of Sengerema in the north western part of Tanzania, where a so called Multipurpose Community Telecentre with computers and Internet access was established in December 2000 and where mobile telephony is widespread. The study was carried out in an attempt to answer the question: Has the high rate of deployment of information and communication technologies in Sengerema town led to related 'development'?

Finally, the sixth and last section attempts to answer the two main questions: Firstly, the concept of the 'digital divide' should be seen as part of the problem rather than as part of the solution. Therefore, the sooner this concept - and with it the binary categories and the 'one size fits all' simplified model of 'development' - is discarded the better. Secondly, the main recommendation for strategies to be adopted is that focus should be on the information and communication needs of poor people; they should be actively involved in identification of the needs, in decision making about ways and means to satisfy the identified needs, about purchase of equipment and inputs and about implementation of solutions. Only by actively pursuing participatory design and participatory 'development' can positive impacts and better living for poor people be achieved.

THE DIGITAL DIVIDE - GROWING OR SHRINKING?

The concept of the 'digital divide' is used to describe the difference in terms of availability of information and communication technologies (ICT), such as telephones, computers and the Internet, between rich and poor countries, as well as between urban and rural areas within the same country.

In this section the concept of the 'digital divide' is introduced and different methods of measuring the divide are presented, together with calculations based on statistics from the International Telecommunications Union. Based on the calculations, trends in the 'digital divide' are discussed. Furthermore, the origins of the concept are explored in some detail, leading to a discussion of the 'power divide', i.e. the global power imbalance between rich and poor countries. Finally, a call is issued for discarding the not very helpful dichotomies in the ICT for development discourse and instead let diversity and user participation be guiding principles for new and innovative ICT for development initiatives.

The Beginning

It all began with "The Missing Link", the report presented to the Secretary General of the International Telecommunication Union (ITU) in January 1985 by the Independent Commission for World Wide Telecommunications Development, later renamed the "Maitland Commission" after the Commission Chair, Sir Donald Maitland. The overriding objective set by the Commission was to achieve universal telephone access by the early part of the 21st century (ITU, 1984, p. 4), the underlying rational being the uneven distribution of main telephone lines among countries and within countries. The objective and the focus on telephones were reinforced eight years later as being "no less appropriate and no less attainable" (Maitland, 1992, p. 5). Another six years later focus had shifted towards information and communication technologies (ICTs) and concerns were voiced about "the opening up of a new gap - between 'information-rich' and 'information-poor ' societies" (Maitland, 1998, p. 1-2). Thus, the focus on telephones was replaced with a focus on the broader concept of ICTs from around the mid-1990s. Simultaneously, the debate about 'ICT for development' (ICT4D) took off and the concept of the 'digital divide' replaced the 'missing link'.

The 'Digital Divide' Redefined

The term 'digital divide' was first coined as a description of a national ICT problem within the USA in connection with visions about the 'National Information Infrastructure'. When Senator Al Gore in a speech to the ITU First World Telecommunication Development Conference in Buenos Aires in 1994 proposed the establishment of the Global Information Infrastructure, the 'global digital divide' came on the agenda of the ITU and other telecommunications actors (ITU, 1994; Gammeltoft, 2002).

Based on the original measure of 'teledensity' (i.e. main telephone lines per 100 inhabitants), widely used by the telecommunications industry and by the Maitland Commission, the main interpretation of the 'digital divide' found in the literature on ICT4D is a statistical measure of availability, based on per capita stock - f. ex.: numbers of main telephone lines per 100 inhabitants, Internet users per 1000 inhabitants etc. Using this absolute measure, there is an overall trend of a growing 'digital divide' (Fink & Kenny, 2003; Gillwald, 2005) - but using other units of measurement may reveal other trends, as is very convincingly argued by Fink and Kenny (2003). They document that, when measured in relative terms, i.e. when measuring the rate of growth rather than the absolute stock, the ICT gap is rapidly closing (Fink & Kenny, 2003, pp. 5-8), an observation which is also documented in other reports (ITU, 2004, p. 35; ITU, 2006, p. 1).

A simple calculation[i] based on figures from the ITU World Telecommunication Development Reports 1998 and 2006, for Denmark and Tanzania, respectively, demonstrates this: In terms of the number of mobile telephone subscribers, calculations show an increase of the absolute digital divide of 2.7 times over the 8 years from 1996 to 2004, but the relative growth rate of mobile subscribers per 100 inhabitants was 51 times higher in Tanzania. So in spite of huge and growing absolute differences, "it is mathematically inevitable that, at some point, [the poor countries] surpass the rich world - notwithstanding the possibility that in the short term, the absolute gap may continue to widen." (Fink & Kenny, 2003, p. 5). The same conclusion is reached by the ITU, based on a different method of calculating the relative digital divide (ITU, 2006, p. 1).

Fink and Kenny further documents that using a different unit of measurement, such as per income stock - i.e. telephones per US$ of Gross Domestic Product per Capita - the gap is not only closed but middle and low income countries have overtaken high income countries several years ago (Fink & Kenny, 2003, pp. 8-11). A calculation based on the two cases above illustrates that in 2004 mobile telephone subscribers per US$ GDP per capita was 44 times higher in Tanzania than in Denmark, and similarly Internet users per US$ GDP per capita was

14 times higher in Tanzania. This illustrates a point made many years ago by Hudson that people living in rural areas (as do most of the population in Tanzania) are prepared to pay relatively more for telecommunications services (Hudson, 1984, p. 64). The same point is made by the ITU (2006, p. 52) and further confirmed by Gillwald and Esselaar who state that "...consumers across Africa are willing to pay a much greater portion of their income for communications technologies than in developed countries." (Gillwald & Esselaar, 2005, p. 18).

In spite of the above documentation showing that the 'digital divide' is rapidly shrinking, the myth of a growing digital divide is still widespread. A search via Google for 'growing digital divide' gave 29.000 hits in July 2008; thus, the question arises: Why is it that

> *...the original sense of the digital divide term - which attached overriding importance to the physical availability of computers and connectivity, rather than to issues of content, language, education, literacy, or community and social resources - is difficult to overcome in people's minds.* (Warschauer, 2002, p. 5)

Where did the concept of the 'digital divide' originate from, who was behind its creation and who has an interest in perpetuating the concept? These are the questions dealt with in the next subsection.

Origins of the 'Digital Divide'

Even a superficial analysis of contributions to the debate about the 'digital divide' and initiatives to bridge this divide, reveals that the voices of the poor, i.e. the people who presumably are to benefit from 'bridging the divide', are hardly ever heard in the debate. This does not indicate that poor people are not aware of the benefits of telecommunications, as documented in the World Bank report 'Voices of the Poor', where a search for ICT issues reveals that "[m]ore in some parts of the world than in others, poor people talk about the importance of telephones to increase their connectivity to information..." (Narayan et. al., 2000, p. 239). Overall, however, ICT plays a minor role when poor people are asked to express their needs (Narayan et. al., 2000, p. 274).

In reflecting upon the origins of the concept of the 'digital divide' and of ICT4D initiatives to bridge the divide, Gammeltoft argues that the driving forces are to be found in the ICT-industry in the rich countries, mainly in the US, where markets for ICT products are near-saturated, demand is leveling out and overproduction is threatening (Gammeltoft, 2002, pp. 142 - 145). The statement is supported by the observation that when the Nasdaq index dropped between March 2000 and May 2002, the number of articles on the global 'digital divide' indexed by Social Science Citation Index during the same period increased markedly (Gammeltoft, 2002, p. 143). This point of view was underscored by the focus on telecommunications markets already present in "The Missing Link" (ITU, 1984, p. 3-4). Years later, the UNDP was worrying about this situation stating that "Technology is created in response to market pressures - not to the needs of poor people, who have little purchasing power." (UNDP, 2001, p. 3)

Thus, governments in poor countries have for a long time been under international pressure to expand ICT infrastructure, and - in spite of the shrinking 'digital divide' - the international pressure is still maintained. In the introduction to the ITU World Telecommunication/ICT Development Report (WTDR) 2006, giving an overview of global ICT development, it is stated:

> *This overview suggests that while the digital divide keeps shrinking, the world continues to be separated by major differences and disparities in terms of ICT levels. ... many*

> *developing countries risk falling behind, particularly in terms of Internet access and newer technologies such as 3G and broadband.* (ITU, 2006, p. 8)

It may indeed be correct that many so-called 'developing' countries risk falling behind because of lack of ICT infrastructure, resources, skills etc. - but also because of lack of influence, representation and power in the ICT standard-setting bodies, such as the ITU and the Internet Corporation for Assigned Names and Numbers (ICANN). Thus, the international ICT standards and rules are benefiting ICT companies more than poor countries (Wade, 2002, p. 463).

In all fairness it should be mentioned that to the international pressure for expansion of telecommunications in poor countries has been added a domestic pressure for such expansion, coming from high- and middle-class sectors of society, involved in industrial production, trade and transportation. A decade ago this pressure resulted in long waiting lists and long waiting time for a telephone connection, a situation which has, however, been changed by the roll-out of the mobile telephone (ITU, 1998; ITU, 2006).

The point made above is that the debate on ICT4D and the accompanying concept of the 'digital divide' is driven more by the supply side, i.e. by the powerful ICT industry in rich countries, rather than by the demand side, i.e. by the rural poor in the poor countries. This situation is in contrast to a strong claim made by the World Bank in the World Development Report 1994 about a shift in the delivery of infrastructure from being supply driven to being demand driven:

> *Infrastructure can deliver major benefits in economic growth, poverty alleviation, and environmental sustainability - but only when it provides services that respond to effective demand and does so efficiently. ...* ***Give users*** *and other stakeholders* ***a strong voice and real responsibility****.* (World Bank, 1994, p. 2; emphasis added)

In the debate about ICT, admittedly an important enabling infrastructure, the end users' strong voices are seldom heard and they are hardly ever left with real responsibility for the ICT4D initiatives.

The 'Digital Divide' - Part of the Problem?

The 'digital divide' is defined by the rich countries, as is/was the modernisation paradigm, framing the discourse on ICT4D (Wilson, 2003). According to the modernisation paradigm, the dominant 'development' paradigm formed more than forty years ago, 'development' is perceived as a simple linear and staged process. This in turn means that so called 'developing' countries have to 'catch-up' with and become like so called 'developed' countries stage by stage - or better still: to 'leapfrog' stages on the way to becoming like the 'developed' countries. This perception of 'development' was criticised years ago for being too simplistic and for glossing over important issues of local cultural, socio-economic and political factors influencing poverty and inequity within countries as well as between countries.

Nevertheless, it is within this simplistic view of 'development' that the present discourse on ICT4D is framed, giving rise to two main problems: One is that multiple alternative paths to 'development' are overlooked and therefore never followed. Another, more imminent, problem is that the technological determinism, inherent in the modernisation paradigm and underlined by the fallacy of the 'digital divide', tends to emphasise advanced, i.e. digitalised, technical solutions and detract attention from other, more important contextual factors, rooted in social, cultural, political and economic realities, including the information and communication needs of the poor which the technology was supposed to fulfill (Thompson, 2004).

Elsewhere (Dahms, 2002a, b) it has been argued that information and communication is indeed crucial to 'development' since information is the input to learning processes, individual as well as collective, which are equivalent to 'development' processes. Therefore, the concern about fulfilling communication needs and providing information services needed for poverty eradication is warranted - but the technology to fulfill these needs comes second and should only be chosen once the needs have been identified. Although in the opinion of this author dichotomies are never helpful in trying to understand complex realities, if at all using dichotomies we should be talking about an 'information divide' and a 'communication divide' rather than about a 'digital divide'.

The concept of the 'digital divide' and its accompanying dichotomist categories such as 'developed countries' versus 'developing countries', 'the information-rich' versus 'the information-poor' or 'the knows' versus 'the know-nots' (UNDP, 1999, p. 57) are eurocentric statements which ignore the wealth of local and indigenous information and knowledge in non-western cultures (Dahms, 2001a). As such they reflect the one overall and very real existing world divide: the 'power divide' which separates the powerful rich countries from the powerless poor countries: “The real power of the West is not located in its economic muscle and technological might. Rather, it resides in its power to define." (Sardar, 1999, p. 53; here quoted from: Müller & Bertelsen, 2001, p.3). In a strive for a fair 'Information Society' the focus should be on bridging the 'power divide' through a stronger user voice and equal participation via participatory design and development methods in ICT4D initiatives (Wilson, 2003; Dahms & Faust-Ramos, 2002).

Summing up

In this section the concept of 'digital divide' was discussed and it was documented that, depending upon the way one chooses to measure, this so-called 'divide' is rapidly closing, if not already closed. The origins of the concept was shown to be located mainly within the powerful telecommunications and computer industry in the rich countries, i.e. the pressure for expansion of telecommunications infrastructure is driven from the supply side, not from the demand side. The two main problematic aspects of the concept of 'digital divide' were pointed out: Firstly, 'development' is perceived as a 'one size fits all' process of poor countries becoming like rich countries and secondly, the technological determinism inherent in the concept focus attention on technical issues and draws away attention from more important social, cultural, political and economic factors. It was proposed that if not discarding all talk about 'divides' completely, then at least in the discourse replace the 'digital divide' with an 'information divide' and a 'communication divide', introducing the only real existing divide, namely the 'power divide' between rich and poor countries. In the next section measures of the information and communication divides will be presented and it will be argued that the communication divide is nearly closed, while an information divide still remains.

FROM UNIVERSAL SERVICE TO UNIVERSAL ACCESS

Universal service is a concept which has been used by the telecommunications industry as a yardstick to measure household fixed telephone penetration rates in rich countries. In poor countries, due to a very different economic situation, universal service has been considered unachievable within the near future. Instead, a more flexible and more realistically achievable goal of universal access has been introduced to describe a situation where all individuals have access to a telephone within a reasonable distance from their home.

In this section the two concepts of universal service and universal access, as applied within the telecommunications industry, are presented. Furthermore, the three main criteria underlying universal service or universal access: availability, accessibility and affordability, are discussed, together with a model for network development. Finally, a proposal for the expansion of the concepts of universal service and access to include not only more advanced information and communication services, such as mobile telephones, computers and the

Internet but also more traditional information and communication technologies, such as radio and television, is presented.

Universal Service and Universal Access

The concept of 'universal service', defined as 'a telephone in every household' - or more precisely: in 90% of households - emerged in rich countries in the mid-1960s, when most countries had state owned monopoly telecommunications, so-called Public Telephone Operators (PTOs) and telephone penetration rates were already quite high, usually above 60%. It was, however, not until liberalisation of telecommunications, after around 90 years of monopoly services and with service rates already well above 90% in most of the rich countries, when concern about exclusion of marginalised groups in geographically remote rural areas surfaced, that universal service obligations came into focus. Therefore, the issue was one of securing connection of the few without telephone services while the majority of the population already enjoyed such services (ITU, 1998, pp. 62-63; Benjamin & Dahms, 1999, p. 7).

In poor countries today the situation is radically different, with privatisation and liberalisation of telecommunications having been already fully or partially completed in many countries (ITU, 2006, p. 2) while the diffusion of services still is far from being 'universal'. A concern about the large 'unconnected' proportion of the population is therefore well placed in these countries. While the goal of universal service may be appropriate for rich countries, poor countries are focusing their efforts on achieving 'universal access', meaning that everyone should be within a reasonable distance of a telephone, thus shifting the focus from providing services to individuals and individual households to providing services to groups of people. What is to be considered a 'reasonable distance' varies from one country to another and definitions depend upon the local context, including factors such as geography, population density and network coverage (ITU, 1998, p. 70).

Universal service and universal access are different goals and thus require different policies to be achieved but they are both part of the same continuum - from no services at all to universal individual services for everyone, with universal access somewhere in between. Another common characteristic is that both of the two concepts are so-called 'moving targets', i.e. they are dynamic and changing over time, depending upon two main and related factors: Network growth and technological development, more specifically digitisation and wireless technology (ITU, 1998).

Criteria for Service and Access

There is a general consensus within the ITU that the contemporary concepts of 'universal service' and 'universal access' should encompass three criteria: Availability, i.e. geographically nationwide telecommunications network coverage; accessibility, i.e. non-discriminatory access to equity services for all users, independent upon their geographical location, ethnicity, religion, gender etc.; affordability, i.e. pricing of services at a level that most users can afford (ITU, 1998, p. 63).

Pursuing these three criteria simultaneously might easily lead to conflicting policies; for example, extending the network to increase availability demands investments which may work against the criteria of affordability; subsidising users in sparsely populated rural areas to achieve affordable access for such users (as was done in many rich countries during monopoly operations) might lead to less revenue and thus less money for expansion of the network (ITU, 1998, p. 65; Benjamin & Dahms, 1999, p. 10).

The three criteria should be seen not as conflicting but rather as different priorities at different stages of the telecommunications network development process. According to the ITU (1998, p. 65) this process may be conceived as a five-stage process:

1) Network establishment, i.e. providing long distance service to major urban centers.
2) Wide national reach, i.e. expansion of the network to all geographical areas.
3) Mass market expansion, i.e. mass usage encouraged by low prices of services.
4) Network completion, i.e. focus upon social services and special needs.
5) Complete individual services, i.e. individual access to all types of services, including advanced information services.

During the first two phases, as the network grows to achieve nationwide geographic coverage, the criterion of availability is in focus. Already in 1998 the technology for global coverage was in place, thus availability was technically achievable (ITU, 1998, p. 92-93). During the third phase, focus might shift from availability to affordability. Like accessibility which will be discussed in more detail in the next section, affordability may be defined in different ways. Seen from the supply side, i.e. from the perspective of the service provider, the important question is how much it costs to produce a telephone call, including all necessary supporting functions. Seen from the demand side, i.e. from the perspective of the user, a relevant measure would be a certain percentage of household income for spending on telecommunications costs. Pricing of telephone services is a matter of finding the balance between supply and demand, i.e. financial sustainability for the operator and affordability for the user.

Based on a calculation of world average annual operating costs for telephone services and an estimated affordability threshold of 5% of household income, the ITU estimated in 1998 that out of the total 1,466 million world households, households already with telephone services numbered 504 million or 34%, households which probably could afford such services numbered 286 million, while the number of households which could not afford such services was 676 million or 46% of world households (ITU, 1998, p. 36).

A comparison of trends in mobile services prices over the 8 years between 1996 and 2004 shows that connection charges have decreased dramatically, while costs of calling have remained fairly stable. A comparison of prices of mobile services in low income countries with prices in high income countries for the year 2004 shows one significant difference: The average cost of 100 minutes of prepaid mobile use as a percentage of the GDP per capita is 4.2% for low income countries, while it is only 0.09% for high income countries, i.e. almost 50 times higher for the low income countries (ITU, 2006).

During the fourth and the fifth phases of the network development process, focus will mainly be upon universal accessibility and universal services. The ITU estimated in 1998 that most rich countries and a handful of middle income countries had successfully reached stage four, with a number of middle- and lower income countries at stages 3 and 2 and the poorest countries still struggling at stage 1 to provide access to basic infrastructure (ITU, 1998, p. 66).

This picture had shifted in 2004, where the 'connected' proportion of the world population amounted to 2,963 million (main telephone lines plus mobile cellular subscribers) or 46% of the total world population of 6,363 million individuals (ITU, 2006). Approximately 1,757 million or 28% of the world's citizens owned a mobile telephone (ITU, 2006, p. 173). Given predominant usage patterns in poor countries where usage rates are estimated at five to ten times higher than ownership rates and where usage via mediators is widespread (Heeks, 2005) there is reason to believe that many more could use a phone if needed. Furthermore, average global mobile population coverage stood at 86.9% and even in low income countries 60% of the population was covered by the mobile network, with some countries in this category having mobile population coverage of more than 80% (ITU, 2006).

Another model that might be useful for analysing the telecommunication network development process is the diffusion of innovation model described by Rogers (2003). This model, which has its focus on socio-economic characteristics of the diffusion process rather

than on technical development, operates with four main elements: An *innovation* which is being diffused through *channels of communication* over a certain *time* to the members of a *social system*. An important aspect of this model is the *consequences* of the introduction of the innovation into the social system. The model may be graphically described by an S-shaped curve, depicting the percentage of adoption as a function of time, with a low rate of adoption up to a certain 'take-off' point after which time the rate of adoption increases until, at the point of 'leveling-off', the rate of adoption again drops to a fairly low level. Obviously, the specific shape of this S-shaped curve will vary from society to society and from one type of innovation to another (Rogers, 2003, p. 11).

This model has been widely applied to study a number of innovations throughout the world. For the model to be useful with ICT, however, two special characteristics of these interactive technologies have to be acknowledged (Markus, 1987). Firstly, telecommunication networks are characterised by network externalities, i.e. the fact that for every new subscriber who adopts the innovation, value is added to the network, not only for the new subscriber (personal valuation) but also for all existing subscribers (social valuation) because they now have yet another person they may contact via the network. The concept of 'critical mass' is closely connected with this network externalities characteristic. Once the point of critical mass occurs on the S-curve, i.e. a critical mass of adopters have adopted the innovation (or in other words: a critical number of subscribers have signed up with the network) the diffusion process will become self-sustaining (Rogers, 2003). Secondly, the use of interactive technologies, such as telephones and the Internet, relies upon mutual interdependency. For example, in the communication process there needs to be a sender and a receiver to create a beneficial communication service. Similarly, to create beneficial information service there needs to be an information provider and an information user (Markus, 1987).

As has been argued above the objective of the Maitland Commission seems indeed to be within reach less than a decade into the 21st century, due to the expansion of the mobile network, an expansion which has been made possible mainly due to rapid network growth, a highly competitive market and the introduction of prepaid services (ITU, 2006, p. 5). Thus, the 'communication divide' is almost closed - but the 'information divide' remains a concern.

From POTS to PANS - and back

There has been a marked shift in the debate about universal service and universal access, from focusing upon 'plain old telephone services' (POTS) to focusing upon 'pretty amazing new services' (PANS) which have become available with new technologies (Benjamin & Dahms, 1999, p. 19). The digitalisation of the network and of different information and communication services means that, technically speaking, there is no longer any difference between voice telephone services and data services, such as fax, voice mail and the Internet - the different services have converged to the point where any telecommunications line - whether cabled or wireless - can carry any kind of service - whether voice, audio, video or data (ITU, 1998, p. 84).

Such technological development obviously does influence the definitions of 'universal service' and 'universal access'. The ITU did, however, in 1998 advice the low income countries that: "There is no compelling reason, at present, to expand the definition of universal service to include *individual* access to information services." (ITU, 1998, p. 85; emphasis in the original text), an advice which was mainly based upon concern about the criterion of affordability. Only eight years later the same ITU was advising the same countries to invest in broadband wireless access in order to become part of the Information Society (ITU, 2006, p. 87), although the average GDP per capita for low income countries had decreased from US$471 in 1995 to US$468 in 2003 (ITU, 1998; ITU, 2006).

As was pointed out above many ICT4D initiatives have been driven more by the commercial interests of telecommunications and computer companies than by the actual information and communication needs of the end users and therefore the focus has often been on new and advanced technologies, mainly computers and the Internet, while more traditional information technologies, such as books, newspapers, radios and television have been neglected (Deane, 2005; Dahms, 2002a, b). James (2005) argues for the introduction of the concept of 'technological blending', i.e. of combining traditional forms of information and communication technologies with newer forms, rather than replacing the old with the new. This is:

> *... a way of ensuring that the benefits of new technology do not accrue only to a tiny minority of the rural population ... Blending may contribute to an inclusive rather than an exclusive outcome ... [because] the widespread reach of the more traditional technology, reduces the costs of bringing the new technology to a wide audience.* (James, 2005, p. 286)

Relevant examples of technological blending mentioned by James (2005) are: the Internet with community radio; the Internet with telephony; voicemail with public pay phones. Similarly, Deane stresses the importance of traditional information technologies, especially the radio, because: "old, pervasive communication technologies sometimes offer a more appropriate solution than new, more exclusive ones." (Deane, 2005, p. 53). The pervasiveness of radio is confirmed by the ITU statistics which documents that in low income countries radio is the most common type of ICT technology. In Tanzania, for example, the number of fixed line telephone subscribers is 0.4, mobile subscribers 4.35, computers 0.7, radios 41.8 and television 4.2, all per 100 inhabitants (ITU, 2006, p. 173).

Furthermore, as a result of a transformation of the media landscape towards more democratic and more dynamic media, many local community FM radio stations have sprung up and "[r]adio has become an interactive medium not, perhaps to the same extent as telephony, but certainly one that makes it a far more significant communication - and voice - provider than was envisaged 20 years ago." (Deane, 2005, p. 59).

A well known example of blending community radio with the Internet is the Kothmale Internet Community Radio Project in Sri Lanka, which has combined conventional community radio broadcasting with Internet access, using the community radio as interface between local rural communities and the Internet. In the Multipurpose Community Telecentre, Sengerema, Tanzania, where this author has carried out research, the same combination of community radio and Internet is found and the radio clearly has a much wider outreach than the Internet, as will be documented later in this chapter.

Interestingly, although the ITU is the international UN body for radio communication, and "[t]he most popularly collected indicators in developing countries have been those on radio and TV" (ITU, 2006, p. 14), statistics about radio as an important information technology were not included in the World Telecommunication Development Report (WTDR) 1998 but have been included in the WTDR 2006 (ITU, 2006).

The main point is not to argue that any one information technology is superior to another but to point to the fact that the range of information and communication technologies available is very wide and includes both modern and traditional technologies. Therefore, the concepts of universal service and universal access should be expanded to include a broader range of ICTs, at least in the poor countries where even traditional technologies still are not widespread. Another point is that the choice of technological solution should be based on a thorough analysis of the information and/or communication needs to be fulfilled, before any investment in technology is made. Providing a solution without knowing what the problem is has too often led to the creation of 'white elephants' and a waste of money.

Summing up

In this section universal service and universal access have been discussed as 'moving targets', the definitions of which are depending upon the technological development and the network growth. The three criteria underlying universal service and universal access: availability, accessibility and affordability, were introduced. While availability and affordability were discussed at some length, the concept of accessibility still remains to be more closely examined. It was documented that the 'communication divide' is rapidly closing, due to the spread of mobile telephony, while an 'information divide' remains to be dealt with. Finally, it was argued that the concepts of universal service and universal access should be expanded to not only include new technologies, such as computers and the Internet, but to also include more traditional technologies, for example, radio and TV. The next section will deal with the concepts of accessibility, usage and impact and the relationship between these concepts. Since it was argued in this section that the 'communication divide' is all but closed by the mobile telephone but that an 'information divide' may still exist, the next section will focus mainly on the 'information divide'.

FROM ACCESS VIA USAGE TO IMPACT

The historic emphasis on ICT indicators such as per capita stock or penetration levels, demonstrated in the available statistics, "does not mean that per capita measurements are necessarily the best way of measuring ICT access and use. They are, rather, the easiest way of measurement" (ITU, 2006, p. 11). After fifteen years of ICT4D initiatives and very meager results on the ground it has become clear that it is necessary to go beyond measuring availability and accessibility. The need for not only usage indicators but also impact indicators has been voiced as necessary means of documenting 'development' - i.e. positive socio-economic impact of the ICT4D initiatives on people's livelihoods.

In this section first of all the criteria of accessibility which was mentioned in the previous section and which is the most complex of the three criteria underlying universal service and universal access, will be explored in more detail. From accessibility the discussion moves on to the concept of usage with a discussion of newly introduced usage indicators and a short summary of some recent usage studies. Finally, the concept of impact is discussed and the complex issue of how to measure socio-economic 'developmental' impact of ICT4D initiatives in a meaningful way is touched upon briefly.

Accessibility - a Multifaceted Concept

The concept of accessibility was defined above as 'non-discriminatory **access** to equity services for all users, independent upon their geographical location, ethnicity, religion, gender etc.' (ITU, 1998, p. 63; emphasis added). The problem with this definition is that it uses the word access to define the word accessibility, and therefore a more detailed discussion of what might be understood by access is needed. When applied as in the term 'universal access' in the ITU report (ITU, 1998) the meaning is simply availability, not only of the network as such but also of the connected telecommunication equipment, whether a telephone, a radio or a computer, within a reasonable distance from either the home or the workplace of the individual.

But the fact that the telecommunication equipment is available does not necessarily lead to access because a number of factors influence meaningful individual access, some of which are:

- The existence of the network and the equipment, i.e. availability.
- The user can afford to use the equipment, i.e. affordability.
- The user has the required skills and knowledge to use the equipment, i.e. usability.
- The equipment is located where the user can get at it, i.e. physical access.

- It is considered culturally appropriate, based on religious and/or ethnic considerations, for the user to be in the location and use the equipment, i.e. cultural access.
- The equipment can be used at a time suitable for the user, i.e. timely access.
- The user herself feels comfortable about using the equipment, i.e. psychological access.

Based on a discussion of the 'literacy divide' Warschauer makes an interesting comparison between the acquisition of literacy and the access to ICT, stating, among other points, that there are many types of ICT access, the meaning and value of which varies in particular social contexts and that ICT access is not only a matter of education but also of power (Warschauer, 2002, p. 10).

Depending upon which particular type of information technology is being considered, different factors may form barriers to access. As an example take usability: Compare access to information on the Internet with access to information from the radio: While illiteracy and lack of English language skills may constitute major barriers to access for rural villagers to most of the contents on the Internet, a local radio station broadcasting in local language can be accessed by the majority of the population in rural areas.

Illustrating the usability aspect a historical comparison may be appropriate: The telephone was invented in 1876, approximately 30 years after the electric telegraph which had quickly become a commercial success with a widespread global network. It took, however, only a few years for the telephone to surpass the telegraph in popularity, because: "[a]s Bell himself pointed out in a memorandum from 1878 about the future prospective of the telephone, its major advantage over the telegraph is that *you do not need special training to use the telephone*" (Nielsen et.al., 1990, p. 152; emphasis in original text; own translation). This observation confirms one of Rogers' points about the attributes of an innovation: "The complexity of an innovation, as perceived by members of a social system, is negatively related to its rate of adoption" (Rogers, 2003, p. 257).

Even if all of the above factors are positive, access alone may not lead to 'development'. The 'value chain of information': Data → Capta → Information → Knowledge → Wisdom (modified from Fuchs, 1997) describes how value is added from one stage to the next. When combined with the 4 A's model developed by Heeks (1999) describing the value adding process, from data via capta to information and beyond: *Data* → **A**ccess → **A**ssess → *Capta* → **A**dapt/**A**pply → *Information* → **A**ct, the combination of the two become a powerful tool for making visible the qualitative difference and the considerable gap between data placed on the Internet and knowledge as the main driver of 'development' (Dahms, 2002a, b) and it brings into the open a number of implicit assumptions about access to and usage of ICTs (Dahms, 2001b).

The value adding process, transforming information into knowledge is a learning process which may be perceived as a 'development' process, especially when the individual learning is linked with collective learning in a community of practice (Dahms, 2002a, pp. 323 - 324). But before 'development' happens, i.e. before any noticeable (positive) impact can be observed, the IT equipment has to be used, i.e. the concept of usage is important.

Usage - Necessary but not Sufficient

There is a general consensus among actors in the ICT arena that there is a lack of reliable statistics going beyond the per capita measurements - there is a 'statistical divide' (ITU, 2006, p. 11). In an attempt to overcome this divide and provide comparable and reliable statistical information on ICTs, the 'Partnership on Measuring ICT for Development' was established in June 2004 as a multi-stakeholder initiative, including a number of UN-, regional- and national

organisations (ITU, 2006, p. 12). The Partnership adopted a 'Core list of ICT indicators' in 2005. Some of the indicators appearing on this list deal with usage.

The concept of usage is not as complex as the concept of access, since it simply implies a user having overcome the barriers to accessibility and making use of the available and accessible ICT equipment in question. Some of the indicators included in the 'Core list of ICT indicators' focusing on individual use are the following (ITU, 2006, p. 17):

HH6	Proportion of individuals who used a computer (from any location) in the last 12 months
HH8	Proportion of individuals who used the Internet (from any location) in the last 12 months
HH10	Internet activities undertaken by individuals in the last 12 months (with a choice of types of activities)
HH11	Proportion of individuals with use of a mobile telephone

Although indicators of availability of radio and television are included in the core list, no indicators deal with the use of either of these information technologies. Indicators for business use of ICTs are also included in the list, as are indicators on the ICT sector and trade in ICT (ITU, 2005). The list of indicators is still new and has not yet been used in many surveys. Therefore, the amount of statistics of usage of ICT is presently limited and is almost exclusively focused on the use of the Internet.

A number of studies document the unequal use of ICTs within countries, most impressive of which is the study on an African e-index, including national surveys from 10 African countries. In the introduction to this study Gillwald states that "[t]he characteristic user of the Internet and other ICTs ... is often young, male, well-educated, relatively wealthy, tends to live in the capital city of their country, and is likely to be a member of the dominant ethnic group of their country." (Gillwald, 2005, p. 8). This description succinctly sums up the different internal divides appearing in poor countries with the advance of ICTs. The 'digital divide' between countries is being replaced by multiple 'digital divides' within countries, between urban and rural areas, between men and women, between rich and poor people and between different religious and ethnic groups.

Furthermore, the description coincides in many aspects with Rogers' characteristics of 'earlier adopters' as better educated, with a higher social status, more cosmopolite and with greater exposure to mass media communication and to interpersonal communication channels (Rogers, 2003, p. 288 - 291). On age Rogers is inconclusive while the two important social factors: gender and ethnicity are not included in Rogers' discussion at all, although the discourse on gender and development has been widespread since the early 1970s and gender is included as an explicit cross-cutting element in many ICT4D initiatives.

A study from Pakistan indicated limited productive usage of the Internet (Mahmood, 2005). In the Republic of Korea the three main activities undertaken by individuals using the Internet were: getting information, communicating and leisure (ITU, 2006, fig. 2.2, p. 15). An ICT user study at Bagamoyo College of Arts, Tanzania, focusing on the use of computers by 18 teachers and 50 students, found that the computers were mostly used for Internet access and that e-mail for social communication was by far the most popular service used (Uimonen, 2006). Another Internet study from Tanzania documented that very few people use the Internet for work related information. The main use of Internet in Tanzania was e-mail and web browsing for "news, sports, music, study and sponsorship opportunities, business news and 'general browsing'." (Mercer, 2005, p. 9). Not immediately apparent from the research results was that pornography accounted for approximately 25% of Internet use (Mercer, 2005, p. 10). The point made by Mercer is that Internet use in Tanzania is very similar to use in other countries, i.e. the 'developmental' usage is very limited.

A comprehensive study on community telecentres concluded that the centres were mainly used for personal social motives, maintaining contacts with family and friends (Etta & Parvyn-Wamahiu, 2003). The researchers conclude that "[i]t is hard to see how this type of use can lead to large-scale education or transformation if this is the desired end result." (Etta & Parvyn-Wamahiu, 2003, p. 162).

The ITU agrees that "[t]he evidence for the impacts remain scattered" (ITU, 2006, p. 39) and the answer is twofold: 1) More ICTs: "... it is obvious that the lack of critical mass will limit the effects of ICTs.... This highlights the importance of developing countries ... to make broadband deployment a priority" (ITU, 2006, p. 39 - 40) and 2) more statistics: "... there is an urgent need to complement access and usage indicators with impact indicators." (ITU, 2006, p. 20). This prompts us on to the issue of impact.

Impact - the Crucial Issue

As already pointed out above, positive impacts of ICT investments are not well documented and recent concerns have been voiced over this lack of proof. Thus, the ITU states that "[e]vidence remains largely anecdotal and the link between ICT deployment and development remains vague in many ways." (ITU, 2006, p. 19). UNDP states that "[t]here is very little solid evidence to convince a sceptic that ICTs are reducing poverty in more than a handful of the (often quoted) examples. Overall, there is more promise than reality..." (UNDP, 2005, p. 2). Gillwald states: "... until recently the empirical evidence of a casual link between ICTs and economic growth remained tentative and very little has focused on developing countries, and Africa in particular." (Gillwald, 2005, p. 9).

When discussing socio-economic impact of ICTs it is useful to distinguish between two different types of impact: The direct impact of the ICT sector on the national economy and the indirect economic impact that ICT may have in other sectors of the economy and on people's livelihoods. The direct impact in terms of ICT products and services cannot be ruled out completely for poor countries, as demonstrated by the GrameenPhone Village Phone Program in Bangladesh. The programme not only enables rural people who cannot afford a telephone access to telephone services but also provides a good income-earning opportunity for more than 280,000 mostly women Village Phone operators living in rural areas (ITU, 2006, p. 51). In this chapter, however, the emphasis will mainly be on the indirect impact because "it has been highlighted that the real potential for ICTs lies more in their use, and their ability to impact productivity of the wider economy, than in the ICT sector itself." (ITU, 2006, p. 35).

Concerning the indirect impact early studies from the 1970s and 1980s in the rich countries on impacts of ICT investment on productivity in companies showed zero or negative impact, a fact which was called the 'productivity paradox' (Pilat, 2004, p. 43; Nielsen & Thomsen, 2008, p. 50). Later studies, however, have found a positive impact of ICT investments but have also pointed out that "turning investment in ICT into higher productivity is not straightforward. It typically requires complementary investments and changes, e.g. in human capital, organisational change and innovation" (Pilat, 2004, p. 58). Another study found that wealth, measured as GDP per capita, was the single most important factor influencing ICT investment in poor countries (Shih et.al., 2008).

These important findings have to be acknowledged by actors in the ICT4D arena if investments in ICT are to lead to the required goal of 'development'. A certain level of acknowledgement is apparent in this quote: "It needs to be acknowledged, however, that ICTs are not the answer to all social issues and it is important to list some of the barriers that limit their impact." (ITU, 2006, p. 73). According to the ITU the two main barriers to achieving beneficial impact of ICTs are 1) the costs of connectivity (i.e. the cost of the equipment and of a connection) and 2) the achievement of critical mass (ITU, 2006, p. 77). Pointing to these

two issues as the main barriers confirms the above focus on 'more ICTs' by implicitly assuming that 'connectivity' is a must, thus, overlooking the potential of traditional information technologies, such as, for example, the radio, the 'connectivity' of which costs nothing and by once again stating that more will be better.

At the people level a survey in Tanzania documented that two thirds of the surveyed population said that mobile phones helped them save both travel time and travel costs, and the same survey found that households in South Africa and in Tanzania spend 6.8% and 5.9%, respectively, compared to an estimated 3% in rich countries (ITU, 2006, p. 52). A number of other concrete project examples of the positive impact of ICTs - in farming, in education, in environmental protection and in health - have been listed by ITU (ITU; 2006, p. 79).

The challenge of measuring developmental impacts of so called 'development' projects and initiatives in a meaningful way is one that researchers and practitioners alike have been struggling with for years. It seems, however, that the dialogue between those involved in ICT4D and arguing for ICT investments and those involved in more traditional 'development' activities and often opposed to ICT spending has only recently started to become more fruitful and has resulted in a proposal for measuring the impact of ICTs (ITU, 2006, p. 78).

The ITU proposal has substantial similarities to the so called Logical Framework Analysis (LFA) which has been applied by many development organisations as a tool for planning, monitoring and evaluation of projects since the 1970s. Thus, the ITU proposal includes some of the same elements as the LFA: objectives, inputs, outputs and outcomes (which ideally should be equivalent to the objectives). It stresses the importance of distinguishing between the different elements while also devising ways of measuring all of them (ITU, 2006, p. 78). The ITU emphasises that measuring inputs, say, the number of computers made available in a primary school, is not sufficient; nor is measuring outputs, such as, the number of teachers having been trained to use computers. Real impact needs to be measured at the outcomes level, i.e. documented improvement of teaching, leading to improved learning for pupils because the teachers use their computer skills. Furthermore, ITU recommends that in the process of measuring outcomes it is necessary to use "a combination of hard or soft performance measures" (ITU, 2006, p. 80) i.e. both quantitative and qualitative methods.

According to critiques of LFA the model for measurement of impact proposed by ITU is not very conducive to participatory approaches. Originally taken from engineering and management the LFA was introduced as a planning tool and as such it served well to shift focus from technology to people and to emphasise the importance of outcomes. Its use has, however, been extended to the processes of monitoring, evaluation and measurement of impacts as well, with considerably poorer results. Reporting requirements of donor organisations have kept project managers around the world busy writing - sometimes deceptive - reports on LFA plans and indicators rather than pursuing project tasks, such as improving livelihoods or increasing empowerment (Earle, 2002). On the issue of reporting ITU comments as follows:

> *... often the relationship between the supporter/donor and the funded means that there is a pressure to report success. This pressure, which exists at all levels in the system, can undermine the ability of all involved to learn from failure, which is often a better teacher than success.* (ITU, 2006, p. 82-83).

The two major problems with the LFA are, firstly, that the oversimplified, linear stage model of change (similar to the modernisation paradigm) underlying the approach strives for a universal 'one size fits all' model of 'development', disregarding cultural complexity and diversity. Secondly, it is based on a Western perception of logic and as such is often alien to people from the South (Earle, 2002).

Applying the LFA is often a top-down, hierarchical and constraining process which does not leave much room for participation, especially not participation of the poor people who are the intended beneficiaries and whose priorities are often different from those of outsiders and local elite. The LFA approach to monitoring and evaluation is more focused on control of achievements rather than on learning. Thus, the use of LFA as a tool for measurement of impact may serve to reinforce unequal power relations and to induce lack of trust between donors and beneficiaries (Chambers & Pettis, 2004; Earle, 2002).

Summing Up

This section started out with a discussion of the multifaceted and complex concept of accessibility, showing that accessibility depends upon a number of contextualised factors and in some ways can be likened to literacy. It went on to discuss the much simpler concept of usage and presented a selection of usage indicators adopted in the recent Core list of ICT indicators. A number of usage surveys were summarised, leading to the somewhat depressing conclusion that there is not much evidence of positive impacts of ICTs. This brought into focus the concept of impact and the categories of direct and indirect impacts, the indirect impacts assumed to be the most important in poor countries. An important finding concerning the impact of ICTs is that a range of other simultaneous activities, such as, skills development, organisational change and innovation, are needed to achieve the expected positive impacts of ICT investments. Finally, an ITU proposal for measuring impact, similar to the well known Logical Framework Approach (LFA), was presented and discussed. In the next section a micro-level study on access, usage and impact is presented.

ICT ACCESS, USAGE AND IMPACT IN SENGEREMA, TANZANIA

In the small district town of Sengerema in the north western part of Tanzania a so called Multipurpose Community Telecentre (MCT) with computers and Internet access was established in December 2000; the first mobile telephone operator, Vodacom, introduced services in August 2001; the second mobile operator, Celtel, started services mid 2002; ultimo 2002, the formerly national monopoly telephone company, Tanzania Telecommunication Company Limited (TTCL), digitalised the trunk and the access network as a national TTCL contribution to the MCT project; a third mobile operator, Mobitel, started operations in November 2003. Thus, the ICT deployment in Sengerema town has been extraordinarily high over the last 7 years – but has it led to related 'development'? In an attempt to find an answer to this question a small pilot study on access, usage and impact in Sengerema District was carried out. This section describes and discusses the results of this study.

The Telecentre Project and the Pilot Study

The pilot study is part of ongoing research since 1999 on the impact of the Multipurpose Community Telecentre (MCT) in Sengerema, Tanzania. This centre was established as a pilot project in December 2000, funded partly by three international donors (ITU, UNESCO and IDRC), partly by national organisations and by local contributions. One of the objectives of the MCT project was:

> *To **demonstrate the impact and usefulness** of the accelerated introduction of information and communications enabled services and programmes into rural community life in Tanzania with special emphasis upon the rural development, small business, education, health and government service sectors.* (Tanzania, 1999; emphasis added).

Services offered at the MCT are, among others: Computer training; Internet access (e-mail and Web-surfing); secretarial services, including typing, photocopying, binding; computer consultancy; telephony; telefax; local radio broadcast via Radio Sengerema FM; Internet Service Provision to institutions (the last two services were not part of the

original project plan). For a more detailed description of the Sengerema MCT, see Dahms, 2004.

The pilot study on access, usage and impact of ICTs was carried out in Sengerema District, Mwanza Region, Tanzania, during April - May, 2008. The study included 14 women's groups, i.e. groups of women who collectively carry out some form of joint production, such as, for example, tailoring, gardening, fishing and processing of fish, agricultural activities etc.. Each of the groups were 'talked through' a questionnaire, including closed quantitative questions on access and usage as well as open qualitative questions on impact. The 'talk through' was done with the assistance of a research assistant capable of speaking the local language, Kiswahili, and also capable of reading and writing English. Answers to the questions were noted in the questionnaire in English by the research assistant.

The questionnaire was administered to 14 women's groups, evenly distributed throughout the district and representing a total of 349 women, 1/3 of whom have tertiary (3), secondary (52) or vocational (52) education, while 2/3 have primary (224) or informal (18) education. The questions were categorised into questions on 'sources of information' and 'means of communication'.

Results

Results concerning access to and usage of sources of information were as follows: All 14 groups have a radio and all listen to Radio Sengerema FM regularly. Other radio channels are listened to but not by all groups. All groups state that the most important information on the radio is 'development programs', especially business and agriculture. Concerning TV only one group has an own TV but 10 groups use TV regularly for information, again with 'development programs' as the most important type of information. Three groups, all located within less than 10 km from Sengerema town and the MCT, state that they use the Internet for searching for information about prices and markets.

Results concerning access to and usage of means of communication were as follows: No groups have a fixed line telephone but all 14 groups have mobile phones and in some groups several of the members have mobiles. All members have access to a mobile through each other. The most frequent uses of the mobile are for social networking and for business, 9 of the 14 groups stating social networking as the most important use and five groups stating business as the most important use. Only one group located in Sengerema town has an e-mail for communication and this group states that they use the e-mail for business and for social networking, with business being the most important use.

Results concerning the impact of sources of information are given in the form of some characteristic quotes from the questionnaires, structured according to the source of information.

On radio impact:

> We learn about the modern method of fishing through the radio and we learn the types of fish and at what time a certain fish should be fished. We also know the prices of goods at a certain time.
>
> Through the radio we manage to know what to produce, when to produce and for whom. Our group deals with garden. We manage to get the proper seeds and insecticides.

According to the price fluctuation we control the price of our goods throughout the year. We advertise our work monthly through Radio Sengerema FM, this enables us to get more customers.

By hearing news from the radio sometimes we buy the commodities, particularly rice and maize, when they are plenty and cheap and sell them in a period when they are scarce and at high prices.

On TV impact:

Through TV we manage to discover different designs or fashions, we design and make them. This helps us to get more customers for the case of tailoring.

Through watching TV group members are able to appropriate technology like irrigation, post harvest programs etc.

On Internet impact:

They are able to market their product to Uganda, especially pad (?) and cassava flour.

We have now customers from our district, where they send fishes (fried ones) to other places outside our country.

We managed to get customers from Kenya and Uganda for some rice. Most of them come direct to our group during harvest time.

Results concerning the impact of means of communication are given in the form of some characteristic quotes from the questionnaires, structured according to the means of communication.

On mobile impact:

We manage to meet our goals through simple communication. It saves us time and costs.

Meeting together, business information exchange, reminding ourselves on the responsibilities we have, knowing one another's condition.

We have customer phone numbers among us, most of these government employees, they take crops regularly and pay for a month.

The mobile telephones help us be aware of bad news, particularly thieves. We manage to work as a team through this simple means of communication. We also get more customers through it.

We manage to communicate simply. We also save time for other activities instead of walking far distance to send a message. We get customers through our mobile telephone.

Some of our customers have our mobile telephone numbers. We communicate with them regularly on the production because of the quantity demanded.

Impact of the e-mail:

By sending e-mail the group has got a grant of US$ 6000 from Self-help Fund, USA Embassy, Dar es Salaam.

Discussion of Results

When comparing the above results on access to and usage of ICTs among women in rural Tanzania to the previous more general discussion on access and usage in poor countries, these micro-level findings confirm the overall tendencies in a number of ways. The widespread diffusion of radio is confirmed, as is the widespread use of mobile phones. It might be somewhat unusual that so many women, and many of them rural women, own (or have access to) mobile telephones but this may be explained by the tough competition between the three operators in Sengerema District. Also the usage of TV is rather high, with 10 groups out of 14 using it regularly for information. As mentioned above the three groups using the Internet in the telecentre are all located within less than 10 km from the centre. The study did not go to the individual level and therefore the question of who is actually capable of using the Internet cannot be answered.

A finding which is not in accordance with the general usage studies reported above is the fact that all groups specify that they consider 'development programs' the most important programs both on radio and on TV. Also, 'business information' features relatively high on the list of uses of the mobile telephone. There may be two possible explanations for this discrepancy: One is that women in general are (considered to be) more serious in their consumption of information, maybe because they do not have so much time to sit and listen to the radio or watch the TV and therefore want to gain something useful from this type of activity. Another explanation may be that the research assistants carrying out the study were assistants of the local 'Business Development Coordinator' for a well known United Nations Capital Development Fund (UNCDF) project in the district and this may have biased the answers towards more focus on business.

In terms of ICT impact on group activities the findings are as follows: The radio is mainly used for innovative purpose, getting information about new ways of doing things, including knowledge about new raw materials and new methods of production. Also, it gives information about prices, both prices of raw materials but also prices of produced goods, allowing the women to achieve higher gains when trading. Some groups use the local radio for advertising their produce and thus attract more customers. The TV is mainly used for getting new ideas, i.e. for innovation, while the use of the Internet seems to be closely connected with identifying and developing markets abroad, in this case in Kenya and Uganda.

The use of the mobile telephone has benefits in terms of saving of time and money as compared to having to use another form of communication, for example, traveling by bus. It also has benefits in terms of communication, both with customers and among the group members themselves. One of the remarks worth noting is the repeated use of the word 'simple' - even these rural women find the mobile technology simple to use.

In the diffusion of innovation model by Rogers the following five attributes of innovations are singled out as important for the rate of adoption: Relative advantage, i.e. whether the innovation is better than what it replaces; compatibility, i.e. consistent with existing values, beliefs and needs; complexity, i.e. the ease with which the innovation can be used by all; trialability, i.e. possibilities for trying out the innovation on a limited basis; observability, i.e. the visibility of being a user of the innovation (Rogers, 2003). Using these attributes some possible explanations may be given to the above findings.

Radio is a well known innovation which became widespread in Tanzania in the first decade of independence when adult literacy programmes were broadcast throughout the country by the national radio, as were speeches by the charismatic first Tanzanian President Nyerere. Thus, it is consistent with existing values. The relative advantage of the local radio as compared to the national radio is the fact that local news of importance to the local community is broadcast on the local radio but not on the national radio. The radio is easy to use (complexity) and sufficiently widespread that everybody has a chance to try out using it before eventually

deciding to invest in an own radio (trialability). Because the radio has been around for a long time and is widespread in the community the observability does not seem to play an important role for the women's groups.

In the case of mobile telephones Rogers states that they "have an almost ideal set of perceived attributes, which is one reason for this innovation's very rapid rate of adoption" (Rogers, 2003, p. 261). This is confirmed in the above study, where relative advantage (saving of time and money), complexity (simple to use) and trialability (borrow from another group member) are obvious from the women's statements. Concerning compatibility and observability the study does not give any information on these two attributes.

Looking at the attributes of the computers and the Internet in the Telecentre, the main barrier to the use of this innovation may be the complexity, as mentioned before. The relative advantage is not (yet) clear to most people in the community since the majority does not have family or friends with an e-mail, nor do they know what information may be found in the Internet. Compatibility with existing values is an important issue, especially in connection with the amount of pornographic sites found on the web, as documented in Mercer's study mentioned above. Yet another barrier is the trialability which the Telecentre has tried to overcome by having free introductory computer sessions every month. Finally, the observability is one positive attribute of the Telecentre - it is perceived as a sign of modernity to be seen using the Telecentre services (Mercer, 2005).

Summing up

Although a small pilot study with no quantitative indicators of impact collected, there seems to have been a positive impact from the usage of the local radio station and from the widespread use of mobile telephones. The impact seems to be mainly in terms of innovation and better information about prices and markets but also the social networking is an important impact. Thus, it is fair to say that the radio and the mobile phone have led to 'development' in Sengerema District, while the computers and the Internet have contributed to 'development' only for a minority located close to the telecentre.

Although Sengerema may not be typical for semi-urban, semi-rural areas of Tanzania because of the location of the Sengerema MCT which is by far the biggest and the most expensive telecentre in the country the results from the study might be useful in planning new ICT4D initiatives in Tanzania, as well as in other poor countries in Africa and elsewhere. This is emphasised by the fact that the results found in the pilot study seem to confirm the overall tendency towards the widespread use of mobile telephones and local radio in rural areas of poor countries. Furthermore, the results are confirmed by the Rogers model of diffusion of innovation.

CONCLUSION AND RECOMMENDATIONS

The main objective of this chapter has been to issue a call for discarding the concept of the 'digital divide' and instead focus attention on bridging the real existing overall world divide, the 'power divide'. The argument for this call was developed through four sections.

After an introductory section the second section discussed the concept of 'digital divide' and documented that this so-called 'divide' is rapidly closing, if not already closed. The origins of the concept were shown to be mainly the powerful telecommunications and computer industry in rich countries, i.e. the supply side rather than the demand side. The two main problematic aspects of the concept of 'digital divide' were pointed out: 1) 'Development' is perceived as a 'one size fits all' process of 'catching up, whether stage by stage or 'leapfrogging' and 2) the technological determinism inherent in the concept focus attention on technical issues and draws away attention from the needs to be fulfilled to alleviate poverty. Finally, it was proposed that if not discarding dichotomist discourses of 'divides' completely then at least

replace the 'digital divide' with an 'information divide' and a 'communication divide' and instead focus attention on overcoming the existing 'power divide'.

The third section discussed universal service and universal access as 'moving targets', based on the three underlying criteria: availability, accessibility and affordability. It was documented that a 'communication divide' is rapidly closing, due to the widespread use of mobile telephony, while an 'information divide' remains to be dealt with. Furthermore, it was argued that the concepts of universal service and universal access should be expanded to include both new advanced technologies and more traditional technologies, for example, radio and TV which are still not universally accessible in poor countries.

In the fourth section the multifaceted and complex concept of accessibility was discussed at some length, showing that it depends upon context and may be likened to literacy. The discussion went on to the concept of usage and presented a selection of usage indicators as well as a number of usage surveys. The conclusion was that so far there is not much evidence of positive impacts of ICT4D initiatives. This brought into focus the concept of impact, including categories of direct and indirect impacts. An important finding concerning the impact of ICTs was pointed out: A range of other activities, such as, skills development, organisational change and innovation, are needed to achieve positive impacts of ICT investments. An ITU proposal for measuring impact, similar to the well known Logical Framework Approach (LFA), was presented and critiqued from a participatory perspective.

The fifth section presented a small pilot study on access, usage and impact of ICTs among 14 women's groups in Sengerema District, Tanzania. The results seemed to confirm the overall tendency towards the widespread use of mobile telephones and local radio as the most influential forms of ICT in rural areas of poor countries. Although it is not claimed that the study location of Sengerema is typical for rural areas of Tanzania the results from the study might be useful in planning new ICT4D initiatives in Tanzania, as well as in other poor countries in Africa and elsewhere.

The two main questions listed in the Introduction to this chapter, repeated here for convenience, were as follows:

- To which extent is the concept of the 'digital divide' part of the solution or part of the problem?
- What strategies should be adopted to achieve the ultimate goal: A free, fair and equal global 'Information Society', benefiting poor and rich people alike?

The answers to these two questions form the main message of this chapter. The answer to the first question is that the 'digital divide' with its associated binary categories is a useless concept which has led to overly focus on advanced technical issues instead of focusing on the information and communication needs to be fulfilled. The use of this concept may well be part of the reason why there is a glaring lack of impressive evidence of positive impacts of the many ICT4D initiatives undertaken over the last fifteen years. Thus, the concept is part of the problem rather than of any solution and therefore, it should be discarded, together with the 'one size fits all' model of 'development'.

Exactly because there is no universal 'one size fits all' model of 'development' there is not one answer to the second question - strategies for successful ICT4D initiatives have to be designed anew for every project and every context. In the following some overall recommendations, useful in any 'development' project, are given.

Firstly, well intentioned project planners and so called experts should stop considering the intended project beneficiaries, most often poor people, as

> *... generic subjects ... [who] have, for the purposes of the planning exercise, no gender, no tastes, no history, no values, no opinions, or original ideas, no traditions, and no distinctive personalities to contribute to the enterprise. They have none of the particular, situated, and contextual attributes that one would expect of any population and that we, as a matter of course, always attribute to elites.* (Scott, 1998, p. 346).

Instead of 'one size fits all' models suitable only for non-existing generic subjects, the cultural complexity and diversity of poor people and their context, including their information and communication needs, should be acknowledged and appreciated. In order to manage this complexity in ICT4D initiatives, the poor people themselves should be given a strong voice and real responsibility in initiatives focusing on providing information and communication services for poverty eradication. This means that poor people should have decision making power and be involved at all levels and all stages of the 'developmental' project cycle, from identification of information and communication needs to be fulfilled, via planning and design of ICT solutions, implementation through installation of carefully selected ICT equipment to maintenance and repair. In other words: Participatory design and participatory 'development' are key words in a strategy for achieving positive impact of ICT4D initiatives.

In emphasising participation it is, however, important to not be blinded by the "homogenous blob syndrome" (Guijt & Shah, 1998, p. 8) or, in other words, to recognise that in any community there are issues of power imbalance, inequities and social hierarchies. Thus, there is a need to engage with conflict, ambiguity and uncertainty and to acknowledge and accept that change is depending not only upon planned processes but even more so on informal and non-linear unplanned processes (Earle, 2002).

Secondly, in the selection of technology to satisfy identified information and communication needs, the full and broad range of useful technologies, from the very traditional, such as books and the radio, to the very advanced, such as computers and the Internet, should be considered, and appropriate choice of technology, including technological blending wherever possible, should be made, based upon the context and the end user's needs. One issue which has not been discussed very much above is that information and communication technologies which will allow poor people to have a voice and to make their voice heard in the global community should be given preference. Giving poor people voice and letting them become information providers will help overcome a very pressing problem of lack of relevant 'developmental' information content, especially in the Internet but also to some extent in other sources of information, such as commercialised radio and TV.

Thirdly, instead of designing costly grand schemes of ICT4D project planning should follow the simple rules of thumb proposed by Scott *"Take small steps ... Favor reversibility ... Plan on surprise ... Plan on human inventiveness"* (Scott, 1998, p. 345). These simple and elegant rules do not encourage the use of elaborate LFA planning processes with burdensome reporting demands and pre-determined criteria for success. They rather call for integration into the project plan of time and space for collaborative review and reflection, allowance for failure and ample opportunities for learning and innovation by all stakeholders, individually as well as collectively, in networks and in communities of practice.

Fourthly, attempts to dismantle the unequal power balance between North and South, between donor and beneficiary, should be pursued to the greatest extent. If this power imbalance could be dismantled it would have far reaching consequences for 'development' projects, as stated by Robert Chambers in this concluding quote:

> *The drive to disburse, the rushed visits, top-down logical planning, upward accountability, and many deceptions would diminish or disappear. Each level would empower and trust the levels below to exercise discretion, to foster diversity*

> *and to learn from mistakes.* (Chambers, 1995, p. 212; here quoted from Earle, 2002, p. 14).

It is hoped that the above discussion may challenge researchers and development practitioners alike to be(come) critically aware of underlying assumptions and to give up the divisive dichotomies, in discourse as well as in practical work. Instead, we should embrace cultural complexity and diversity and let user participation be a guiding principle for new ways of creating innovative ICT for development initiatives, thereby achieving the overarching main objective of bridging the global 'power divide' in the strive for a free, fair and equal global 'Information Society', benefiting poor and rich people alike.

REFERENCES

Benjamin, Peter & Dahms, Mona (1999): *Background paper on Universal Service and Universal Access issues.* Paper prepared for the Telia Telecommunications in Society 1999 Seminar. Kalmar, Sweden: Telia. Online at: http://cbdd.wsu.edu/edev/edp/benjamin-dahms-1999.pdf (accessed 25/7-2008).

Chambers, Robert (1995): The primacy of the personal. In Edwards, Michael & Hulme, David (Eds.) *Non-governmental organisations - Performance and accountability. Beyond the magic bullet.* London: Earthscan.

Chambers, Robert & Pettit, Jethro (2004): Logframe - A Critique. Adapted from Chambers, R. & Pettit, J.: Shifting Power to Make a Difference. In Groves, L. & Hinton, R. (Eds.) *Inclusive Aid: Changing power and relationships in international development.* London: Earthscan.

Dahms, Mona (2001a): *No Cause for Afro-pessimism - a Study of Information, Communication and Technological Innovation in Sengerema District, Tanzania.* Paper presented in the International Workshop on African Innovation Systems and Competence-Building in the Era of Globalisation, Aalborg University, Denmark. Unpublished conference paper.

Dahms, Mona (2001b): *Telecentres: Connecting Africa?* Paper presented in Session 13: Telecentres for Connecting Africa, ITU TELECOM Africa Forum 2001. Unpublished conference paper.

Dahms, Mona (2002a): No Cause for Afro-pessimism. A Study of Technical Innovation in Sengerema District, Tanzania. In Muchie, M., Gammeltoft, P. & Lundvall, B. (Eds.) *Putting Africa First. The Making of African Innovation Systems,* 321 - 335. Aalborg, Denmark: Aalborg University Press.

Dahms, Mona (2002b): Data samfundet på vej i Afrika (The Data Society underway in Africa). In *Den ny verden* (The New World), Vol. 2, June 2002, 122 - 141. Centre for Development Research, Copenhagen.

Dahms, Mona & Faust-Ramos, Edla (2002): Development from within: Community Development, Gender and ICTs. In Floyd, C., Kelkar, G., Klein-Franke, S., Kramarae, C. & Limpangog, C. (Eds.) *Feminist Challenges in the Information Age. Information as a Social Resource.* Opladen, Germany: Leske + Budrich.

Dahms, Mona (2004): *Information or communication - is there a preference?* Presented in the domain: Using ICTs to meet the UN Millenium Development Goals, ITU TELECOM Africa Forum, Cairo, Egypt. Unpublished conference paper.

Deane, James (2005): Not a telecoms, nor a digital, but an information divide. In Milward-Oliver, Gerald (Ed.), *Maitland+20. Fixing the Missing Link.* Bratford on Avon, UK: The Anima Centre Limited.

Earle, Lucy (2002): *Lost in the Matrix: The Logframe and the Local Picture*. Paper for INTRAC's 5th Evaluation Conference: Measurement, Management and Accountability?, the Netherlands, March - April 2003.

Etta, Florence Ebam and Sheila Parvyn-Wamahiu (Eds.) (2003): *The experience with community telecentres.* International Development Research Centre, Ottawa, Canada and Council for the Development of Social Science Research in Africa, Dakar, Senegal: IDRC.

Fink, Carsten & Kenny, Charles J. (2003): W(h)ither the Digital Divide?. *info* Vol. 5, Issue 6, 15-24. Emerald. Online at: http://charleskenny.blogs.com/weblog/files/finkkenny.pdf ((accessed 25/7-2008).

Fuchs, Richard (1997): *If you Have a Lemon, Make Lemonade: A Guide to the Start-up of the African Multipurpose Community Telecentre Pilot Projects.* International Development Research Centre, Ottawa, Canada: IDRC. Online at: http://www.idrc.ca/fr/ev-8785-201-1-DO_TOPIC.html (accessed 25/7-2008).

Gammeltoft, Peter (2002): Bygger vi broer eller biveje? Om den globale digitale kløft (Are we building bridges or by-ways? On the global digital divide). In *Den ny verden* (The New World), Vol. 2, June 2002, 142 - 166. Centre for Development Research, Copenhagen.

Gillwald, Alison (2005): Introduction. In Gillwald, Alison (Ed.), *Towards an African e-Index. Household and individual ICT access and usage across 10 African countries.* Research ICT Africa, LINK Centre, Graduate School of Public and Development Management, University of the Witwatersrand, South Africa.

Gillwald, Alison & Esselaar, Steve (2005): A comparative analysis of ICT access and usage in 10 African countries. In Gillwald, Alison (Ed.), *Towards an African e-Index. Household and individual ICT access and usage across 10 African countries.* Research ICT Africa, LINK Centre, Graduate School of Public and Development Management, University of the Witwatersrand, South Africa.

Heeks, Richard (1999): Information and Communication Technologies, Poverty and Development. In *Development Informatics, Working Paper Series*, No. 5, Institute for Development Policy and Management (IDPM), University of Manchester, UK. Online at: http://www.sed.manchester.ac.uk/idpm/research/publications/wp/di/documents/di_wp05.pdf (accessed 25/7-2008).

Heeks, Richard (2005): Overestimating the Global Digital Divide. In *eDevelopment Briefing* No. 7, Development Informatics Group, University of Manchester. Online at: http://www.sed.manchester.ac.uk/idpm/research/publications/wp/di/short/DIGBriefing7Divide.pdf (accessed 25/7-2008).

Hudson, Heather E. (1984): *When Telephones Reach the Village. The Role of Telecommunications in Rural Development.* New Jersey: Ablex Publishing Corporation.

ITU (1984): *The Missing Link.* Report of the Independent Commission for World-wide Telecommunications Development. Geneva: International Telecommunication Union.

ITU (1994): Remarks by U.S. Vice President Al Gore prepared for delivery at *First World Telecommunication Development Conference (WTDC94).* International Telecommunication Union, Buenos Aires, Argentina. Online at: http://www.itu.int/itudoc/itu-d/wtdc/wtdc1994/speech/gore.txt (accessed 25/7 2008)

ITU (1998): *Universal Access. World Telecommunication Development Report 1998.* International Telecommunication Union, Geneva, Switzerland:ITU.

ITU (2004): *The Application of Information and Communication Technologies in the Least Developed Countries for Sustained Economic Growth.* International Telecommunication Union, Geneva, Switzerland:ITU.

ITU (2005): Partnership on Measuring ICT for Development. Core list of indicators. Online at: http://www.itu.int/ITU-D/ict/partnership/material/set_core_ICT_indicators.pdf (accessed 25/7-2008)

ITU (2006): *Measuring ICT for Social and Economic Development. World Telecommunication/ICT Development Report 2006.* International Telecommunication Union, Geneva, Switzerland:ITU.

James, Jeffrey (2005): Technological blending in the age of the Internet: A developing country perspective. *Telecommunications Policy*, Vol. 29 (2005), 285 - 296. Elsevier. Online www.sciencedirect.com

Mahmood, Khalid (2005): Multipurpose community telecenters for rural development in Pakistan. In *The Electronic Library*, Vol. 23, No. 2, 2005, pp. 204-220. Emerald Group Publishing Limited.

Maitland, Donald (1992): *The missing link" - still missing 8 years later?* Presentation in Seminar on telecommunications and its role in socio-economic development, DANIDA, Copenhagen.

Maitland, Donald (1998): Speech to the *Second World Telecommunication Development Conference (WTDC98).* International Telecommunication Union, Valette, Malta. Online at: http://www.itu.int/newsarchive/press/WTDC98/maitlandaddress.htm (accessed 25/7-2008)

Maitland, Donald (2005): An interview with Sir Donald Maitland. In Milward-Oliver, Gerald (Ed.) *Maitland+20. Fixing the Missing Link.* Bratford on Avon, UK: The Anima Centre Limited.

Markus, M. Lynne (1987): Toward a "Critical Mass" Theory of Interactive Media. Universal Access, Interdependence and Diffusion. In *Communication Research*, Vol. 14, No. 5, October 1987, 491 - 511. Sage Journals On-line.

Mercer, Claire (2005): Telecentres and transformations: Modernizing Tanzania through the Internet. In *African Affairs*, Vol. 105, No. 419, April 2006, 243 - 264. Oxford, UK: Oxford University Press.

Müller, Jens & Bertelsen, Pernille (2001): *Changing the Outlook. Reconciling the Indigenous and the Exogenous Systems of Innovation in Tanzania.* Paper presented in the International Workshop on African Innovation Systems and Competence-building in the Era of Globalisation, Aalborg University, Denmark.

Narayan, D., Chambers, R., Shah, M. K. & Petesch, P: (2000): *Voices of the Poor. Crying Out for Change.* World Bank, New York, USA: Oxford University Press.

Nielsen, I. H. & Thomsen, F. (2008): *Integration af IKT i dansk udviklingsbistand* (Integration of ICT in Danish Development Assistance). Master's Thesis, Design, Communication and Media, the IT-University, Copenhagen. Unpublished Master's Thesis Report.

Nielsen, K., Nielsen, H. & Jensen, H. Siggaard (1990): *Skruen uden ende - den vestlige teknologis historie* (The Screw without ending - the history of Western technology). Copenhagen, Denmark: Teknisk Forlag.

Pilat, Dirk (2004): The ICT Productivity Paradox: Insights from Micro Data. In *OECD Economic Studies* no. 38, 2004/1, 37 - 65. Organisation for Economic Cooperation and Development.

Rogers, Everett M. (2003): *Diffusion of Innovations*. Free Press, A Division of Simon & Schuster, Inc. New York.

Sardar, Ziauddin (1999): Development and the Locations of Eurocentrism. In Munck, R. & O'Hearn, D. (Eds.). *Critical Development Theory – Contributions to a New Paradigm.* 44 - 62. London, UK: Zed Books.

Scott, James C. (1998): S*eeing Like a State*. Yale University Press, New Haven and London.

Shih, Eric, Kraemer, Kenneth L. & Dedrick, Jason (2008): IT Diffusion in Developing Countries. In *Communications of the ACM*, February 2008, Vol. 51, No. 2, 43 - 48. Association for Computing Machinery On-line Publication.

Tanzania (1999): MCT Project Document on the Establishment of Pilot Multipurpose Community Telecentre (MCT) at Sengerema District, Mwanza, Tanzania. Tanzania Commission for Sciences and Technology, Government of Tanzania.

Thompson, Mark (2004): Discourse, 'Development' & the 'Digital Divide': ICT & the World Bank. In *Review of African Political Economy,* Vol. 31, No. 99, 103-123. ROAPE Publications Ltd.

Uimonen, Paula (2006): *ICT User Study at Bagamoyo College of Arts.* Report prepared for Bagamoyo College of Arts and Sida/Embassy of Sweden, Dar es Salaam, Tanzania.

UNDP (1999): Human Development Report 1999. United Nations Development Programme, New York, Oxford, Oxford University Press.

UNDP (2001): *Making new technologies work for human development, Human Development Report 2001.* United Nations Development Programme, New York, Oxford: Oxford University Press.

UNDP (2005): *ICT for Poverty Reduction. Necessary but insufficient.* United Nations Development Programme's Asia-Pacific Development Information Programme (UNDP-APDIP), APDIP e-Note 6, 2005. Online summary at: http://www.apdip.net/apdipenote/6.pdf - and full analysis at: http://www.apdip.net/resources/ict-poverty-reduction/21paperreview.pdf (accessed 25/7-2008).

Wade, Robert Hunter (2002): Bridging the Digital Divide: New Route to Development or New Form of Dependency?. *Global Governance,* Vol. 8, Issue 4, 443-466.

Warschauer, Mark (2002): Reconceptualizing the Digital Divide. *First Monday, Peer-reviewed Journal on the Internet.* Online at: http://www.firstmonday.dk/issues/issue7_7/warschauer/ (accessed 25/7-2008).

Wilson, Merridy (2003): Understanding the International ICT and Development Discourse: Assumptions and Implications. In *The Southern African Journal of Information and Communication,* Issue No. 3. LINK Centre, Graduate School of Public and Development Management, University of the Witwatersrand, South Africa.

World Bank (1994): *Infrastructure for Development. World Development Report 1994.* World Bank, New York: Oxford University Press.

KEY TERMS AND DEFINITIONS

1. Power divide: the existing divide between rich and poor countries in terms of influence on global affairs, including trade conditions,

2. Participation: involvement of beneficiaries in all stages and at all levels of project planning for 'development'

3. Divisive dichotomies: categorisation into only two categories of countries and people, thus artificially creating binary simplicity out of complex diversity

4. Learning: equivalent to 'development', i.e. the (positive) change in behavior of project stakeholders as a result of project activities

5. Universal service: a teledensity (= percentage of households with a telephone) above 90%

6. Universal access: every person within easy access of a telephone

7. Availability: telecommunications network coverage

8. Accessibility: non-discriminatory access to telecom services

9. Affordability: pricing of services that most users can afford

10. Usage: a user making use of available and accessible ICT

11. Impact: positive change in livelihood of ICT4D beneficiaries

12. Diffusion: the spreading, adoption and integration into a given society of an innovation

13. Technological blending: mixing old traditional ICTs with more modern and advanced ICTs for better impact

14. Logical Framework Analysis - a preferred tool for project planning which has wrongly been applied also for project evaluation and impact meqasurement

ENDNOTES

[i] The calculations below are based on figures from the ITU World Telecommunication Development Report 1996 and the ITU World Telecommunication/ICT Development Report 2006.

	Pop (mio)	GDP/cap (US$)	Mobile subs. (,000)	Mobile subs. per 100 inhabitants	Internet users (,000)	Internet users per 10,000 inhabitants
Tanzania 1996	30.80	177 (1995)	9.0	0.03	0.5	0.16
Tanzania 2004	37.67	282 (year ?)	1,640	4.35	333.0	88
Denmark 1996	5.26	32,990 (1995)	1,316.6	25.02	300.0	570.13
Denmark 2004	5.41	39,412	5,168	95.51	3,269.0	6041
Absolute difference 1996 (1)	-25.54	32,813	1,307.6	24.99	299.5	569.97
Absolute difference 2004 (1)	-32.26	39,130	3,528	91.16	2,936	5,953
Growing absolute digital divide (4)			**2.7**	3.6	**9.8**	10
Total growth % Tanzania (2)	22.3 %	59.32 %	18,122 %	14,400 %	66,500 %	54,900 %
Total growth % Denmark (2)	2.85 %	19.46 %	293 %	282 %	990 %	960 %
Average annual growth rate % Tanzania (3)	2.78 %	7.42 %	2,265 %	1,800 %	8,313 %	6,863 %
Average annual growth rate % Denmark (3)	0.36 %	2.43 %	37 %	35 %	124 %	120 %
Shrinking relative digital divide (5)			61	**51**	67	**57**
Shrinking relative digital divide 1996/2004 (6)				**From 834 in 1996 to 22 in 2004**		**From 3,563 in 1996 to 69 in 2004**
Stock per GDP Tanzania 2004 (7)			5816		1181	
Stock per GDP Denmark 2004 (7)			131		83	
Inverse digital divide 2004 (8)			**44**		**14**	

(1): Calculated as (Number of ICT stock Denmark - Number of ICT stock Tanzania)

(2):Calculated as ($Country_{2004}$ - $Country_{1996}$) divided by $Country_{1996}$ and multiplied with 100%

(3): Calculated as (Total growth country) divided by 8 years.

(4): Calculated as (Absolute difference 2004) divided by (Absolute difference 1996).

(5): Calculated as (Average annual growth rate Tanzania) divided by (Average annual growth rate Denmark)

(6): Calculated as (ICT stock per 100 (10,000) inhabitants Denmark) divided by (ICT stock per 100 (10,000) inhabitants Tanzania) for the years 1996 and 2004, respectively (ITU, 2006, p.1).

(7): Calculated as (Number of ICT stock) divided by (US$ GDP per capita).

(8): Calculated as (Stock per GDP per capita Tanzania) divided by (Stock per GDP per capita Denmark).