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Information and Communication Technologies for Least Developed Countries (ICTs4LCDs): Exemplified in the Republic of Yemen

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Abstract: Information and Communication Technologies (ICTs) have a major impact on the economy, politics and cultures of western societies. These technologies are a main driving force for societal progress and prosperity within such societies. But this development is still very limited and huge regions of the world are totally cut off from the global information flow and have not yet arrived in the so-called information age. Different kinds of endeavours to bridge this digital divide are undertaken by various institutions, mainly from the first world. These development activities often seem to be taken out in a “retro-colonial” way, which means that western technologies and the fields of their applications are applied to developing countries without taking into account the local conditions and needs. The aim of this paper is to identify sustainable strategies for the use of ICTs especially in Least Developed Countries (LDCs). For this purpose a case study in the Republic of Yemen was examined. Based on interview surveys with Yemeni decision-makers and questionnaires for the general public recommendations for the sustainable implementation of ICTs in Least Developed Countries are formulated.

Keywords: Information and Communication Technologies (ICTs), Least Developed Countries, Digital Divide, Sustainable Development, Republic of Yemen

Introduction

INFORMATION AND COMMUNICATION Technologies (ICTs) are claimed to be a central engine for societal progress and prosperity. So far, only the Western world has benefited from these technologies and especially developing countries are facing the challenge that the already existing tremendous gap between them and the high-income economies in the West may still widen. This paper is the first result of a larger research project, which aims to identify strategies for closing this gap. For this purpose case studies in four countries (Yemen, Guatemala, Malawi and Laos) are carried out, which endeavour to find strategies for the sustainable use of ICTs, particularly in Least Developed Countries (LDCs).

In a first step a brief introduction of the sustainability concept will be given, before, following Christian Fuchs, a more elaborated working definition will be presented. In Section 3 potentials and risks of ICTs in the context of development are discussed, sequenced by a short description of the socio-political situation (Chapter 4) and the telecommunication landscape (Chapter 5) in Yemen. The research questions (Chapter 6) and the applied methodology (Chapter 7) are introduced, followed by selected findings (Chapter 8). In Chapter 9, based on the findings of my survey, recommendations for the sustainable use of ICTs in the Republic of Yemen are formulated, before I sum up in a conclusion.

Sustainability

In Western societies the term sustainability has been en vogue in the scientific, as well as public debate, for the last three decades, especially in the context of ecology. In the course of the upcoming neoliberalism in the 1980s the meaning of the term was broadened. From that time on economy has been included in the sustainability debate, whereas the meaning of sustainability in that sense refers mainly to economic growth and corporate benefits and neglects economic wealth for the citizens. To counter this pure neoliberal understanding, both scientist and politicians, introduced social sustainability as a third pillar (cf. Serageldin, 1995). These components make up the so-called “triangle of sustainability”. In this paper I argue that this triangle still lacks of several constituents, which are crucial especially if one wants to formulate recommendations for sustainable development.

Sustainability Debate

In 1987 the WCED (World Commission on Environment and Development) published the “Brundtland Report“, named after its Chair, the former Prime Minister of Norway, Gro Harlem Brundtland. The report gave much attention to the challenges of overcoming poverty and meeting basic needs, as well as integrating the environment into economic decision-making processes (cf. WCED, 1987). The WCED defined sustainable development as “development that meets the needs of the present without



compromising the ability of future generations to meet their own needs” (WCED, 1987: 43).

In the discourse on sustainability there has been a shift from a focus on ecological issues towards the inclusion of broader societal issues. The “triangle of sustainability” introduced by the World Bank has been very important in shifting discussion on sustainability from purely ecological aspects towards more integrative concepts. Ismail Serageldin, then vice-president of the World Bank, identified an economic, a social, and an ecological dimension of sustainability. “It is not surprising that these concerns reflect the three sides of what I have called the “triangle of sustainability”-its economic, social, and ecological dimensions“ (Serageldin 1995: 17). It has now become very common to identify an ecological, an economic, a social, and an institutional dimension of sustainability (as e.g. the EU and the UN do). A shift of the meaning of the sustainability notion occurred between the time of the 1992 UN Conference

on Environment and Development (“Earth Summit“) in Rio de Janeiro, Brazil, and the 2002 World Summit on Sustainable Development (WSSD) in Johannesburg, South Africa. “At the time of Rio, sustainable development was mainly about protecting nature, but now, in the wake of Johannesburg, it is first and foremost about protecting people” (World Summit on Sustainable Development, 2002: 22).

If sustainability is conceived as a complex phenomenon, then it includes various aspects that need to be achieved in sustainable social systems, such as individual well-being, security, freedom, and self-determination just like collective dimensions such as wealth for all, social security for all, political participation for all, or health and education for all (cf. Fuchs/Blachfellner/Bichler, 2007: 304). Therefore the “triangle of sustainability” must be broadened by including cultural and technical sustainability. These five components make up the “pentagon of sustainability”.

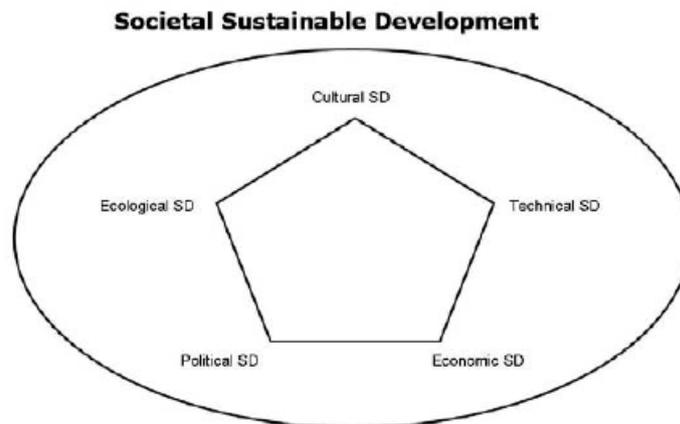


Figure 1: The Pentagon of Sustainability

A Working Definition of Sustainability

In order to advance a non-reductionistic, integrative, complex understanding of sustainability, the following working definition is proposed:

Sustainable societal development satisfies the needs of current and future generations; a sustainable society is a society that is based on ecological sustainability (e.g. ecological conservation, stability in the area of health), political sustainability (e.g. political participation, peace), cultural sustainability (e.g. stability in the area of education, self-determined life-styles), economic sustainability (e.g. material wealth) and technological sustainability (e.g. usability and wise use) (cf. Fuchs/Blachfellner/Bichler, 2007: 304). The question, which emerges is, how can ICTs be used to enhance the sustainability of all five subsystems to ensure societal well-being.

ICTs for Development

In the last ten years an increasing body of literature dealing with the relationship between ICTs and development has been emerging (cf. e.g. Mansell/Wehn, 1998; Braga et al., 2000; Okpaku, 2003, Wilson, 2004). One can identify two central viewpoints: on the one hand the opportunities are highlighted, whereas on the other hand the risks are dominant. Braga et al. for example state for developing countries that “(...) the challenges are substantial. The possibility that the gap already existing between the front-runners of the networking revolution (mostly high-income economies) and those lagging behind (mostly low-income countries) may still grow larger, raises the spectre of a ‘digital divide’. The concern here is not restricted to the issue of connectivity per se; it also includes the implications of connectivity (or lack of it) for economic growth and the broader agenda of sustainable development. The

danger faced by all is that digital divide may reinforce patterns of divergence both internationally and within countries” (Braga et al., 2000: 1). The authors also stress the “digital opportunities”, which go side by side with the challenges for developing countries, when they point out that developing countries “(...) can scientifically benefit from investments in modern information infrastructure in a pro-competitive regulatory environment, and leapfrog stages of development in terms of networking roll-out” (Braga et al., 2000: 1-2). This neoliberal understanding is purely focused on economic benefit resulting out of competition. The idea behind it is that economic development based on free, deregulated markets will automatically lead to societal progress and wealth for all. The developing countries should adopt the Western economic system, monitored by institutions such as the World Bank, which includes large privatisation activities. Of course this modernization theoretical approach is criticised by a number of scholars. For example Ngwenyama et al. conclude that “(...) decades of the IMF and World Bank’s austere policies and the more recent privatization programs on the health, education and civil infrastructure have had a devastating impact on many developing countries” (Ngwenyama et al., 2006: 7).

By the adoption of the Western capitalist’s system a lot of pressure is put on developing countries to join international institutions and agreements. A crucial issue in this context for example is the question of intellectual property rights. The World Intellectual Property Organization (WIPO) is a UN agency with a mandate to harmonise intellectual property rights across the member states. Recently WIPO has developed a plan to harmonise patents, which has tremendous consequences for developing countries. Carlos Correa in his critiques summarises: “(...) harmonized standards would leave little room for developing countries to adapt their patent laws to local conditions and needs; harmonization would take place at the highest level of protection (based on standards currently applied by developed countries, especially the United States and Western

European countries) meaning that the process will exert an upward force on national laws and policies in developing countries resulting in stronger and more expansive rights of the patent holders with the corresponding narrowing of limitations and exceptions. Such higher standards are unlikely to have a positive effect on local innovation in developing countries; and also the danger that the current draft contains standards that are primarily aimed at benefiting the ‘international industries’ and not individual inventors or small and medium size enterprises. (Correa, 2004: 9) It is becoming clear that economic (maybe sustainable) development is in the focus of the debate. Following the understanding of sustainable development argued in this paper, such a reductionistic approach includes several shortcomings. Already in 1998 Robin Mansell and Uta Wehn have introduced an alternative approach in their book “Knowledge Societies. Information Technology for Sustainable Development”. The focus here lays on ICT applications that could assist developing countries to reap the “(...) social and economic benefits associated with extremely rapid innovation in advanced ICT-based goods and services“ (Mansell/Wehn 1998: 82). The authors discuss a number of ICT applications, which they consider to be appropriate to enhance a broader understanding of sustainability. This list of applications includes e-government, e-learning, e-travelling, e-transport, e-health, e-education and e-inclusion. Christian Fuchs is right when he argues: “These are technologies that today are mainly developed in Western countries and benefit the latter.” (Fuchs, 2006: 49) But still, the attempt to broaden the discussion and the formulation of concrete areas of applications points into the right direction. Following Christian Fuchs (2006), I contend in this paper that a sustainable society is based on ecological, political, cultural, economical and technological sustainability. Thus ICTs should be used in a way that fosters the sustainability of each dimension. In Figure 2 promising strategies for the sustainable use of ICTs are assigned to the five dimension of sustainability.

Figure 2: ICTs for Sustainable Development

Dimension	Strategy for ICT use
Economic Dimension	- Wealth for all through new job opportunities - Open Source products instead of Intellectual Property Right patents - Open access to Internet services and applications instead of restrictions (e.g. blocking of websites)
Political Dimension	e-government services in form of involvement of citizens through participation instead of purely providing information
Cultural Dimension	- ICT awareness through education: well directed ICT training programs instead of self-undirected learning by doing - e-learning applications as a chance to bring education to rural areas
Ecological Dimension	Using cognitive and communicative features of ICTs to rise the awareness of ecological conservation and health related issues
Technological Dimension	Improved usability: the design of applications, which are easy to use and appropriate to the region

Republic of Yemen: Socio-Political Context

Following the CIA World Factbook (2006) in July 2006 the Republic of Yemen had estimated 21.456.188 inhabitants. The median age was 16.6 years and the population growth rate for 2006 was expected to be 3.46%. Yemen is one of the poorest countries in the Arab world and belongs to the so-called Least Developed Countries (LDCs). The Economic and Social Council of the United Nations uses three criteria, which a country must satisfy, for the identification of LDCs:

- “a low-income criterion, based on a three-year average estimate of the gross national income (GNI) per capita (under \$750 for inclusion, above \$900 for graduation);
- a human resource weakness criterion, involving a composite Human Assets Index (HAI) based on indicators of: (a) nutrition; (b) health; (c) education; and (d) adult literacy; and
- an economic vulnerability criterion, involving a composite Economic Vulnerability Index (EVI) based on indicators of: (a) the instability of agricultural production; (b) the instability of exports of goods and services; (c) the economic importance of non-traditional activities (share of manufacturing and modern services in GDP); (d) merchandise export concentration; and (e) the handicap of economic smallness (as measured through the population in logarithm); and the percentage of population displaced by natural disasters.” (UNO, 2002-2005: online)

Until 1990 Yemen was divided into South and North Yemen. North Yemen achieved independence from the Ottoman Empire in 1918, whereas South Yemen, which was a British protectorate area, was granted independence in 1967 and adopted a Marxist orientation. The massive exodus of hundreds of thousands of Yemenis from the south to the north resulted in more than two decades of hostility between the states. The two countries were formally unified as the Republic of Yemen in 1990 (cf. CIA World Factbook, 2006: online).

In the course of the Gulf War between 1990 and 1991 about two million Yemeni migrant workers had to leave Iraq, which led to an economic disaster. Nowadays the country's economy depends heavily on oil. The benefits of the oil business are distributed unequally by the Yemeni government. This had led to political tensions and military conflicts with local tribal leaders in the north part of the country (Alsaqqaf, 2007; Personal Interview).

The unemployment rate for 2003 was estimated at 35% and 45.2% of the population lived below the poverty line. Like in other developing countries, access to educational institutions is very limited. In Yemen the literacy rate, which can be understood as a precondition for ICT use, is at 50.2%, along with a tremendous gender divide. Whereas 70.5% of the male population can read and write, 70% of the female population is illiterate (cf. CIA World Factbook, 2006: online).

Yemen's Telecommunications Landscape

In 1996 the first Internet connection was established in Yemen. A study in 1999 done by Mohamed Al Sanabani from Sana'a University suggests that at that time there was one Internet provider (Tele Yemen) offering access for 1900 Internet users in total and the most popular service was E-Mail. Furthermore the Internet was used for commercial purposes and scientific information search. Back then, the very high costs and the instable connection made up the greatest infrastructural access barriers and the very low bandwidth resulted in frustration on the user's side (Al Sanabani, 2007; Personal Interview). In 2002 a second provider, Yemen Net, owned by the government, started a dial-up service and in 2006 they introduced ADSL¹ (Haza'a, 2007; Personal Interview). Until 2003 the very high costs, the subscription fee was 120 US Dollar and the online fee was 2.5 US Cent per minute, excluded most of the Yemeni population from the Internet use. This changed dramatically when the subscription fee (25 US Dollars) as well as the online fee declined and as a direct result 35.000 people subscribed a dial-up connection (Alsaqqaf, 2007; Personal Interview). This is also supported by a study taken out by SOUL²: "A turning point was reached when the one service provider's monopoly was broken open. Rates went down by more than 50 percent, dial-up access through local numbers has (reportedly) become available throughout the country. In the major cities, internet cafes started opening, offering connection time at less cost than that of a private subscription." (SOUL, 2006: 3)

In 2004 Yemen had 798.100 main telephone lines and 166 Internet hosts in use. The number of Internet users increased to 220.000 in 2005 (cf. CIA World Factbook, 2006). Today there are 150.000 registered dial-up subscribers and approximately 500.000 Internet users in Yemen, whereas 60.000 users are located in the capital Sana'a. Internet cafés, as a main access point, increasingly emerged especially in Sana'a. In total there exist 800 Internet cafés in Yemen, whereas 600 are located in the capital. Taking this distribution into consideration the divide between urban and rural areas becomes obvious. The next planned infrastructure development step for 2007 will be the implementation of wireless local area networks (WIFI) in commercial centers, selected hotels and airports (Haza'a, 2007; Personal Interview). For 2004 the CIA World Factbook assumed 1.072 million mobile phones. The mobile revolution also hit Ye-

men and until 2007 the two private (Spacotel and Sabafon) and one governmental (Yemen Mobile) mobile phone network providers have sold about 3 Million Sim Cards. Interestingly, only 700.000 mobile phones have been sold, which indicates that the majority of devices is unofficially in use and therefore the phones have been smuggled into the country. All three providers potentially offer access to the Internet via GPRS³, but the number of users is considered to be marginal (Alsaqqaf, 2007; Personal Interview). Furthermore, as Mohamed Al Sanabani stated, there is no competition between the different providers because "(...) they decide together what to do; how to steal the people. Yemen Mobile is governmental, but they cannot do anything; they are forced by the two companies to keep the price high" (Al Sanabani, 2007; Personal Interview). Women, especially have benefited from the mobile phone technologies, which enable them to communicate freely and privately at any time.

The implementation of the telecommunication infrastructure was interestingly not, like in other developing countries, mainly driven by the Western world. The influence of Western investments can be considered as extraordinarily low (Al Sanabani, 2007; Alsaqqaf, 2007; Haza'a, 2007; Personal Interviews). In the early stages the British telecommunications company Cable & Wireless acted as a partner of Tele Yemen and was active in building up the Internet infrastructure. Today Tele Yemen, which belongs to the Ministry of Telecommunication, holds hundred percent of the company and therefore both providers, Tele Yemen and Yemen Net, are hundred percent Yemeni owned. Raidan Alsaqqaf editing manager of the Yemen Times subsumed the situation as follows: "There is rarely any foreign investment in the sector of telecommunications. First of all it was restricted; there was this policy not welcoming investments in Yemen, especially in telecommunications. The government likes to keep an eye on what you are doing." (Alsaqqaf, 2007; Personal Interview) On the issue of whether foreign Western capital would improve the infrastructure situation of Yemen, there are two contrary positions. For Raidan Alsaqqaf Western investments "(...) would help tremendously. At the moment there is, due to regulations, hardly any investment. The government wants to keep it controlled" (Alsaqqaf, 2007; Personal Interview). By contrast Abdu A. Shaban, Information Collection Director of the National Information Center-Yemen, is in favour of a solely Yemeni owned model.

Concerning the Internet situation in Yemen the SOUL study concludes: "Overall, internet access in

¹ ADSL (Asymmetric Digital Subscriber Line) is a fast data transmission technology (commonly known as broadband)

² Society for the Development of Women and Children; a Yemeni NGO

³ GPRS (General Packet Radio Service) is a mobile data transmission technology available to users of GSM (Global System for Mobile Communications)

Yemen remains limited mostly to residents in or nearby the major cities. Private internet access remains unaffordable to many potential users, and availability of public internet cafes is therefore an important facilitating factor.” (SOUL, 2006: 3)

Research Questions

1. Who is using the Internet in Yemen? What are the user’s demographics, backgrounds and education?
2. What kind of Internet services and applications do the Yemeni use?
3. What are the major problems concerning Internet use?
4. What does the Internet use in Yemen tell us about the potentials of the Internet for sustainable development?
5. How can ICTs in Yemen be used to foster sustainable societal development?

Methodology

The study combines quantitative and qualitative methods. The primary data were drawn from a survey of users in nine Internet cafés in the Yemeni capital Sana’a in February 2007. Internet cafés were chosen because the Internet penetration in Yemen is with 1% of the total population⁴ very poor and therefore Internet cafés seemed to be the ideal place to find out about the Internet habits of those who actually use the Internet. The Internet cafés Pioneer Internet, Ebhar Net, International Telecommunication Center, Arabnet, Stand by Café, Click Internet café, Abo Bashaar Internet Café, www Internet and SpiderNet Internetcafé as well as the respondents were chosen randomly distributed over the new part of Sana’a. The Internet cafés were quite equally equipped, providing headsets and web cams. I handed out 201 questionnaires personally to exclusively male Internet café visitors. Furthermore with the help of the United Nations Development Program (UNDP) and the Society for the Development of Women and Children (SOUL) I got the opportunity to distribute 66 questionnaires to Yemeni women.

Similar to a study taken out by Peter G. Mwesige in Ugandan Internet cafés the questionnaire contained both open- and closed questions that were tested in a small pre-test study at the ICT&S Center of the University of Salzburg. Besides using the questionnaires to find out about quantitative aspect, they were also used in a qualitative way, focusing on different forms of Internet use. To do so, I applied the tripleC model to map the stage of ICT development in each

subsystem of society. Following this approach introduced by Wolfgang Hofkirchner (2002), knowledge is a threefold process of cognition, communication, and co-operation: A single individual (cognitive level) connects itself by using certain mediating systems to another individual and a feedback is established (communication). From communication processes a system of shared or jointly produced resources can emerge (co-operation). Based on this understanding of knowledge, Christian Fuchs distinguishes three forms of the Internet as a global networked system for knowledge production, diffusion, and use (cf. Fuchs, 2008).

“The era of web 1.0 was dominated by text-based websites, although there were of course also communicative features the Internet was dominated by the phenomenon that everyone could publish his information online and embed it into the global web. Web 1.0 was predominantly a system of cognition. Since the millennium the character of the web has been successively changing. With the rise of new heavily frequented platforms such as MySpace, YouTube, Facebook, Wikipedia, Friendster, etc. communication and co-operation have become more important features of the web.” (Fuchs, 2008)

According to the three aspects of information a web dominated by cognition is termed Web 1.0, a web dominated by communication Web 2.0, and a web dominated by co-operation Web 3.0⁵. One can say that around 2005 Web 2.0 fully emerged and the web has entered a new phase of development. Web 3.0 is not-yet existent, but it shines forth in online co-operation systems such as Wikipedia, wikis, Writely, or Google Docs & Spreadsheets. Social software is a term that can be used for the totality of Web 2.0 and Web 3.0 applications. All software can be considered as social in the sense that it is a product of social processes, it is produced by humans in social relations, objectifies knowledge produced in society, and is applied and used in social systems (cf. Fuchs, 2008).

Instead of purely focusing on infrastructure related aspects, this approach enables a non-technological deterministic way to measure the development of ICTs.

In addition Expert-Interviews with Yemeni decision-makers from governmental institutions, Universities, business companies and NGOs were carried out to gain a broader picture.

To round the research off, six Internet café managers were interviewed on their views of the Internet in Yemen. These interviews were very fruitful to gain a deeper understanding about the Internet situation in Yemen, especially concerning the usage.

⁴ Source: internetworldstats.com, 2007

⁵ The idea of Web 3.0 as co-operative Internet was coined by Wolfgang Hofkirchner in co-operation with Christian Fuchs, Celina Raffl, Matthias Schafranek and myself on December 21st, 2006.

The researcher also acted as a client in the selected Internet cafés. This enabled different observations concerning the cafés' equipment and the nature of the clients. The combinations of all these research techniques facilitated the researcher to gain a comprehensive understanding of the ICT situation in Yemen, especially regarding the Internet.

Findings⁶

Demographics

The results of the survey suggest that 85% of the respondents had used the Internet. Although all of the male participants were interviewed in Internet cafés, interestingly 9.5% had not used the Internet. It seems that Internet cafés also function as a social activity and accessing the Internet is not the only reason to visit the cafés. As mentioned earlier the UNDP and SOUL handed out the questionnaires for the female respondents. 80% of the female respondents had used the Internet. That sounds quite impressive, but one has to take into consideration that in my study 23% of the female Internet users had graduated from University and another 33% attended secondary school. Bearing in mind that around 70% of the female population is illiterate this finding refers, in addition to the already noted gender divide, to a deep education divide as well. The typical Yemeni Internet user is a 24,5 year old single male with no children who has completed secondary school at the very minimum. 75% of the respondents were male, 74% were single, 76% had no children and the median age was 23. Eighty-five percent of the respondents were under 30 and less than 4% were over 40. Seventeen percent of the respondents earned less than 100 US Dollar per month, 38% earned between 100 and 300 US Dollar, while only 14% had a net income higher than 400 US Dollar. 28% of the survey participants had no source of income.

Eighty-nine percent of the respondents had completed secondary school, 50% had graduated from or were attending university, 7% had completed a vocational training center, 4% had attended a Koran school and another 7% had graduated from or were attending some other tertiary institution.

These findings are very similar to the findings made in other studies in developing countries. (cf. for example Mwesige, 2004; Robins, 2002). Especially the findings from the study "Cyber elites: a survey of Internet Café users in Uganda" carried out by Peter Mwesige are surprisingly coincident with my own results. The typical Internet user is well educated, pecunious and male. For women, Internet use in public (such as in Internet cafés) is culturally hardly acceptable in the Republic of Yemen. In

Sana'a I found two Internet cafés with a special "family section", which actually means a small room with up to five computers exclusively for women, separated from the male clients. I tried to hand out questionnaires in these "family sections", unfortunately without success. The Yemeni women were totally ignoring my questionnaires and me and in one instance two women got very angry and aggressive at me, due to the questions concerning family status, age and children. In the Yemeni culture there is a strict separation of the male and the female living sphere and therefore a foreign person addressing a Yemeni women is not really culturally tolerated. This has, as I am going to argue, tremendous consequences for the gender divide relating to ICT use.

Use of ICTs

My survey suggests that 39% of the average Yemeni Internet users are online on a daily basis. 33% use the Internet several times per week, while only 15% use the Internet several times per month or rarely. The Yemeni survey participants were furthermore asked for how long they had been using the Internet. The mean Internet experience of the respondents was three years. Only 15% had used the Internet for more than six years. It is emerging from the research that engagement with the Internet in Yemen is still in the early stages, especially when taking into consideration that the survey was taken out in the capital of the country. In rural areas the situation is of course different and the Internet penetration has to be considered very low. One has to bear in mind, that the main access point to the Internet in Yemen, this applies to developing countries in general, is the Internet café. In the case of Yemen this instance is even more problematic when considering that 600 Internet cafés out of overall 800 existing in Yemen are in Sana'a (Haza'a, 2007; Personal Interview). The high importance of Internet cafés also manifests in my survey, where 73% of the respondents accessed the Internet in Internet cafés or Telecenters, while 29% had access at their workplace, 14% had other avenues of access, such as access at a friend's place or public wireless access, and only 24% accessed the Internet from home. Even though 75% of the participants in the study had a landline phone, another 63% had a computer at home and further 59% had a computer at their workplace, the main access point to the Internet was the Internet café. Astonishing 82% of the respondents owned a mobile phone. This finding could potentially support the leapfrogging thesis, which states that developing countries can overleap certain stages of development by using mobile technologies (cf. Castells et al., 2006: 216). In the case of Yemen, the early findings suggest that this is not

⁶ The findings concerning Internet use are based on the number of people actually using the Internet

yet shining through due to two main reasons: on the one hand the technical infrastructure is not yet prepared for the introduction of e.g. UMTS (Universal Mobile Transfer System) and on the other hand the public awareness, based on the low standard of education, is not yet given. Moreover, as soon as the technical basis is realised, the question of affordability for a broader public still remains open. Also SOUL agrees on that: "While the use of mobile phones has exploded in Yemen, particularly after GSM became available by 2001, it is believed that internet access through WAP phones remains marginal. The cost of these phones and WAP-access are strong deterrents, as are the inconvenience and limited choice of browsing WAP-enabled internet sites on a mobile phone." (SOUL, 2006: 3)

The findings concerning Internet access in educational institutions are somehow alarming: just 7,5% of the respondents had access at universities and only 4% at schools. This is not surprising; the "University of Sana'a" for example is not yet connected to the Internet, but Professor Al Sanabani is optimistic: "We plan to get a connection hopefully this year. We have to teach the students how to use the Internet properly; how to get the right information from the Internet." (Al Sanabani, 2007; Personal Interview)

It seems that in Yemen ICTs are not yet considered a central element of education. By contrast only 15.5% of the survey participants learned their computer skills at school or university, just 20% attended a training program, mainly non-governmental ones, 24% were trained by relatives or friends and the majority of 40% learned it by doing. The situation concerning how to use the Internet is even worse; barely 12% got their Internet skills at school or university, 14% took part in training programs, in 29% of the cases the skills were conveyed by relatives or friends and again the majority 45.5% are self taught. These findings reflect the attitudes of the political decision makers, who do not see the need to establish effective training programs. Abdu A. Shaban, who is the Information Collection Director of the National Information Center-Yemen stated: "(...) I think it is easy to use the Internet. In Internet cafés people show their friends how to use the Internet and they make access." (Abdu A. Shaban, 2007; Personal Interview) These findings are strongly supported by SOUL: "Prevailing logic has it that use of the internet requires use of a computer, and therefore computer literacy. Irrespective of the validity of this logic, its consequence is that potential internet users are those who have had some form of computer training or at least hands-on experience with computers. This effectively excludes anyone passing through Yemen's public education system, as IT is not part of the standard Yemeni curriculae. Nor could it be, given current levels of teachers' salaries, operational funds,

and available infrastructures in Yemeni public schools. In private schools the situation is somewhat better, in the sense that many of them have a 'computer lab' and someone who 'teaches computer'. Regrettably, this is usually for students in higher grades only. Teaching materials often date from the late 1980s, in the ill-guided belief that these are appropriate to teach students 'basic computer concepts'. With five to ten students per available computer it is too much to expect actual 'hands-on' experience. While many private schools claim that their students may use the computer lab to access the internet, there always seem to be various reasons that prevent students from actually doing so." (SOUL, 2006: 3-4)

For those, well educated, who use the Internet the survey suggests that infrastructure related problems are dominant, for example for 39% of the respondents the slow connection, for 14% the availability of computers and for another 13% the non-existence of an Internet connection were the major problems. Even though the Internet café costs were very low, normally 1 Rial per minute, which is 0.0037 Euro, 20% counted the cost factor among the biggest barriers. Eight percent noted other problems, such as the language barrier, which refers to the domination of the English language. 52% of the respondents used Internet services in Arabic and remarkable 46% in English. Again the correlation between education and Internet use becomes obvious. To use the full potential of the Internet it is necessary to know at least basic English.

Applying the tripleC model in order to map the stage of development, one can deviate that Yemeni Internet users are already on the way to the communication level. Purely cognition-based use already seems to be a marginal aspect, since only 16% of the respondents stated that they had used the Internet for surfing (e.g. reading news online) and solely six percent played games online. In contrast to that, fourteen percent communicated via instant messengers, another fourteen percent used chat services, five percent each were engaged in blogs and bulletin boards, six percent used mailing lists and another five percent made phone calls over the Internet (voice over IP). E-Mail turned out to be the most popular service with 23% using it. In this case, the questionnaire only provides half the truth. Based on interviews with Internet café managers and intensive observations it has become obvious that the possibility of getting pornographic material via the Internet plays an important role regarding the male Internet use. The (entirely cognitive) activity, watching pornographic photos or videos, as well as the production and distribution of such material, is rigorously forbidden by law. In the Pre-Internet era it might had been possible to control this to a certain extent, whereas in the decentralized Internet era the state

control over the so called adult content is more and more vanishing. Four out of five interviewed Internet café managers said that their clients were most interested in pornographic content. This correlates with my own observation. The government is trying to take action against this development by applying three different strategies:

1. The government tries to block websites with any sort of erotic content, evidently without great success, as Abdu A. Shaban had to admit. This proved true when I entered www.porn.com and I was able to access the site without any restrictions.
2. The Internet café managers had to implement a surveillance system, which enables them to track the clients' online activities. As soon as a client tries to access an explicit website, the manager is called upon to stop him. In reality

this is not going to happen, since the Internet café manager profits economically from long online times, particularly when the user wants to download a porn movie at the given very low bandwidth.

3. In addition, in 2005 the dividing walls between the computers in Internet cafés were demounted in order to facilitate a better surveillance of the clients. My observation indicates that the users are not very impressed about that and furthermore since the introduction of this law it has become possible to rent the whole Internet café for private purposes.

However, Web 2.0 applications (communication level) are already, as the results of my survey indicate, used and this has the potential to lead to tremendous changes within the Yemeni society (see Table 1).

Table 1: The use of Web 2.0 in Yemen

Application	I know	I use	I contribute	I don't know
wikipedia.org	18%	11%	8%	63%
www.myspace.com	15%	12%	6%	66%
www.youtube.com	13%	16%	6%	65%
www.flickr.com	12%	5%	4%	79%
www.digg.com	9%	2%	4%	85%
www.43things.com	8%	6%	2%	84%
www.last.fm	11%	7%	4%	78%

Traditionally the parents decide for their children and give their son or daughter in marriage to someone at a very early age, normally already when they hit puberty. The assumption is that at this age sexual desires come up and therefore it is better to put the adolescents in marriage, in order to prevent extramarital sexual relations. Typically, due to the separated living spheres, the marriage partners don't know each other and meet quite often for the first time at their marriage. With the diffusion of communication applications such as instant messengers, chats, voice over IP, as well as E-Mail, the spouses to-be get the possibility to meet and talk secretly in cyberspace. Therefore, they potentially get the opportunity to decide by themselves if they are going to

marry or not, based on norms and values negotiated in communication processes. Of course, this is still a very limited phenomenon, exclusively reserved for wealthy and well-educated people who live in urban areas. But societal changes quite often emerge out of certain elites and as soon as such services will be widely accessible outside urban centres and people know how to use them the relation between women and men in Yemeni society could take a fundamental turn.

The significance of the communicative aspect of the Internet also manifests in the purposes of use, where the category "remaining in contact with friends or family" is the most important one (see Table 2).

Table 2: Purpose of Use

Purpose	Percentage
Remaining in Contact with Friends or Family	14,8%
Using Internet for training and educational purposes	13,5%
Downloading Music/Movies/Software	11,8%
Research for School/University	11,0%
Using Internet to seek health information for myself or others	9,3%
Getting Political Information Online	6,2%
Conducting Administrative Procedures Online	5,3%
File sharing	3,9%
Online Dating	3,5%
Business	3,5%
Networking	3,5%
I maintain my own website	3,3%
Online Shopping	2,9%
I maintain my own blog or online profile	2,2%
I produce online content or software myself	2,1%
Gambling	0,7%
Online Banking	0,6%
Co-ordinating Political Activities Online	0,5%
Other	1,6%

According to the table above, online dating seems to be marginal activity; again, this does not represent the whole picture. All of the interviewed Internet café managers have agreed that online dating, in form of chatting and instant messaging, belongs to the predominant online activities. This is also supported by my own observations. My interpretation is that due to cultural/religious constraints the Internet users try to keep online dating secret.

Conclusion and Recommendations

My study shows that those Yemeni who are using the Internet are quite experienced and by applying the tripleC model Yemeni Internet users can already be placed on the cusp of the communication level. Furthermore, the diffusion rate of mobile phones is extraordinarily high and that includes a remarkable emancipation potential for Yemeni women. However, the number of those benefiting from the upcoming information age in Yemen has to be considered very low and at the moment the Yemeni political and cultural decision-makers do not do much to improve the situation. The potentials of ICTs for societal progress have not yet been recognised. Based on my theoretical understanding of sustainability and the results of the survey, I propose recommendations for the following areas:

Economy: Open access to Internet services and applications for all Yemeni citizens is essential. This means on the one hand that the government has to allow for moderate costs and on the other hand access for women must be guaranteed, either by fostering the public awareness for the need to open up the Internet café for both sexes or by implementing much more designated sections for women. The extension of women sections might be a more realistic scenario for short or medium-term goals. Open access is a pre-condition to benefit from the new job opportunities promised by the ICT industry.

Politics: Only six percent of the respondents get political information from the Internet, another five percent conduct administrative procedures online and just 0,5% use the Internet to co-ordinate political activities. This is not only because people are not educated to use the net for political participation, but also there are hardly any e-government applications existing. ICTs offer a great potential to enhance, at least, partial political participation. Following Patemann one can distinguish two forms of participation:

1. Partial participation is “(...) a process in which two or more parties influence each other in the making of decision but the final power to decide rests with one party” (Patemann, 1970: 70)

2. Full participation is “(...) a process where each individual member of a decision-making body has equal power to determine the outcome of decision” (Patemann, 1970: 71)

Full political participation is not even realised in the Western world and therefore won't be the primary goal in Yemen. But partial participation, in form of providing political information online and offering the opportunities to communicate with others over such issues, should be placed on top of the political agenda. Furthermore, political decision-makers have to re-think the practice of blocking certain websites. Before the last elections in September 2006 the government blocked four political websites (Alsaqqaf, 2007; Personal Interview). Censorship, be it pornography or politics, is highly endangering the development of a stable democratic system. Instead of forcing people to behave in a certain way by using governmental power, one should strive for problem awareness through education.

Culture: There is an urgent need to re-think the educational strategy. It has been shown that solely 15.5% of the survey participants got their computer skills and barely 12% their Internet skills at school or university. Moreover, only 20% attended a computer-training program and only 14% a course dealing with Internet use. Important educational institutions, like Sana'a University, are not even connected to the Internet. My strong recommendation is to implement the necessary infrastructure on the one hand and establish ICT training programs in schools and universities as well as in the area of out-of-school education on the other hand. The initiatives of SOUL, an independent NGO dealing with issues concerning

Yemeni women and children, point into the right direction by trying to establish community centers for ICT education (Al-Deram, 2007; Personal Interview). The community center model is in my opinion highly promising. Such initiatives are locally situated and instead of educating people in a colonial way by Western development workers, the trainers/teachers come from within the community. Before it, the trainer/teacher attends a train-the-trainer program. This kind of projects can also help to bridge the digital divide between urban and rural areas.

Ecology: Like in every other developing country waste is a huge problem in Yemen. ICTs can be used to raise the public awareness by providing information on how to handle this problem. Ecological issues must also be part of any e-government strategy, where interactive, participatory features are desirable. The same applies for health related issues. Both, information focused applications and particularly interactive communication tools will make a substantial contribution for development in the area of health, especially in rural areas where a lack of doctors is ubiquitous.

Technology: My survey shows that the low bandwidth is considered to be one of the biggest Internet use barriers and hence, increasing it seems to be absolutely essential. But also new services, which meet the local needs, are necessary. Farmers for example could make use of the well-established mobile phone infrastructure by accessing economic information via mobile phones. The market prices for certain commodities can be found out on a daily basis and this would make a substantial contribution to economic development like experiences from other developing countries, such as Ghana or Kenya, demonstrate.

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