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(*Anonymous*)

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Trends in ICT Usage by Small and Medium Scale Enterprises in Ghana

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Abstract

Information and communication technologies (ICTs) have assumed central position in the development agenda of most countries due to their critical roles in facilitating socio-economic development. Their contributions to enterprise development have been recognised and international organisations have called on developing countries including Ghana to develop policies that will integrate ICTs into enterprise development. Ghana has developed a national policy on ICTs which is transform Ghana into a middle income, information-rich, knowledge-based and technology driven economy and society.

In Ghana SMEs dominate the industrial landscape and they exhibit great potential in accelerating economic development which will lead to wealth creating and poverty reduction. It is therefore important to examine how ICTs have been adopted and used by these enterprises in the country to facilitate their economic activities. This paper analyses of survey results on access and usage of ICT facilities and services by SMEs in the country.

It is argued in this paper that the utilisation of ICT services is underpinned by commercial considerations such as cost of investment and the potential returns on business activities. However, one cannot discount the importance of literacy in the use of knowledge-intensive service as internet, but commercial considerations are strong.

Key words: ICT, SME, development, enterprise

1   Introduction

In the past, most political and development planners classified information and communication technology (ICT) as a luxury service, and therefore, ICT did not feature prominently in the national strategies for socio-economic development. However, in the contemporary world, ICTs are increasing seen as key elements for development. The contributions of ICTs to general economic development are varied, but the key ones include:

- Facilitating social change and economic activity

- Improving quality of life

- Bringing cost-benefits in rural social service delivery

Enabling political participation, promoting good governance and transparency (Panos, 2004).

ICT, therefore, has a critical role to play as an enabler of socio-economic development, as well as providing a pivotal support for effective governance of the political system. It also plays an important role to enterprise development. The contributions of ICTs to business development have been pervasive to the extent that it is becoming increasingly difficult for companies to compete effectively in the world market without adequate ICT infrastructures. The reason is that ICTs are revolutionising every activity in the global market, as the various components of ICTs have their significant roles in facilitating business promotion, efficiency and growth. The Internet, for example, has provided the platform for the development of electronic commerce (e-commerce) and offers potential for establishing low cost, open and 'many to many' trading systems (Humphrey et al, 2003). According to Labbè (2006) the Internet has become the global channel of unmatched scope for communication between people and between businesses, and at the moment, with over 80 million websites and over a billion internet users. Therefore, this provides an important medium for increased competition among businesses.

Again business processes such as ordering, transaction, delivery, inventory control and accounting can be streamlined and connected regardless of location through the use of network of computers (UNCTAD, 2005). The same UNCTAD report argues further that the Internet has the potential of improving customer-management relationship and enable firms to customize their services to meet the needs of their different clients. The customized service, according to the UNCTAD report will allow companies to respond to their customers in real time and thereby improving customer confidence. It also helps in monitoring customers preferences and lead to developing targeted marketing strategies. Invariably, the computer-mediated networks will allow these activities to be carried out quickly and efficiently, and contribute to efficiency in the operations of businesses.

Further, computers supported by various types of business software can enhance information and knowledge management within a firm and result in an evolvement of better business processes and performance (OECD, 2004). The use of e-mail system and the Internet can support business communication within the context of business to customers (B2C) or business to business (B2B). Invariably transaction costs may be reduced, result in increased transaction speed and reliability.

Other ICT-mediated services such as e-banking and e-business are dramatically affecting the traditional ways of providing those services and have great implications for many economic activities. However, small firms may adopt e-business and e-commerce strategies when benefits outweigh investment and maintenance costs (OECD, 2004). The report argues further that the use of and investment in ICT requires complementary investments in skills, organisation and innovation and investment and change entails risks and costs. Therefore, effective adoption of ICT services by SME calls for the need for these issues to be addressed

For SMEs which are the dominant economic operatives in many countries, especially the developing, ICTs offer great potential for growth, profitability and competitiveness. Support for SMEs is buttressed by the Action Plan developed at the first World Summit of Information Society held in Geneva, 2003. The Action Plan calls on governments to develop strategies that will facilitate widespread use of ICTs to support the growth of micro, small and medium scale enterprises and boost e-business. The issue is to what extent does the SMEs in Ghana have access and use ICTs to enhance their operations and competitiveness? How can SMEs utilise ICTs to facilitate their economic activities? It is important to address these issues since the country's business landscape is dominated by SMEs and they have great potential in achieving the developmental objectives of the country. This paper is an analysis of the results of a survey on access and usage of ICT services by SMEs in Ghana.

2   Overview of Policy Environment for SMEs

The contributions of SMEs to employment and wealth creation as well as poverty reduction are pronounced. This is buttressed by the fact that the industrial and business sector in Ghana is dominated by SMEs, especially the small enterprises. For example, about 70% of the Ghanaian enterprises are micro to small sized and it is estimated that nearly 40% of Ghana's GNI is attributable to informal sector activity (Ghana Government, 2002). It is believed that these small firms can easily propel growth in the economy than the large ones due to their numbers and niches they occupy in the national economy.

Therefore, the effective development of SMEs has become paramount and should feature prominently on government's development agenda. Fortunately, the government of Ghana has declared a "Golden Age of Business" as part of its development agenda, and has developed a national policy on private sector development with the general objective of strengthening the private sector through undertaking market reforms to support private sector development and sector-specific measures for strategic exports (Ghana Government, 2003a). The private sector development policy is largely to create an enabling environment for business to thrive and this should not be limited to the large busi-

nesses but to the SMEs which form the greater percentage of enterprises in the country.

Further, the country has developed a national policy which is specific to micro and small scale enterprises (MSEs). The overarching objective of the policy is to create conducive playing field for MSEs and to help the development of a vibrant, productive and competitive MSEs sector in the country (Ministry of Trade and Industry, 2002). Under the policy, the government among others is to:

⇒   Promote dynamic enterprise culture for innovation

⇒   Promote employment growth within the informal sector

⇒   Develop MSE to serve as a means to establish linkages between the formal and informal sectors of the economy

⇒   Improve the technology base, product quality and productivity of the MSE sector

⇒   Upgrade the application of indigenous technologies (Ministry of Trade and Industry, 2002)

These strategies when implemented may galvanise the MSEs to play critical roles in national development and help to create and distribute wealth so as to reduce poverty in the country.

2.1   National ICT Policy and SMEs

To propel SMEs to play meaningful roles in the socio-economic development of the country requires the adoption and use of ICTs to organize supplies, link customers, employees, acquire market information including prices and customer preferences, among others. Consequently, inn the late 2003 the government enunciated the National ICT for Accelerated Development Policy (ICT4AD) to prove the framework for utilizing ICTs in every sphere of socio-economic activities of the country. The main objective of the policy is to facilitate an ICT-led socio-economic development process which could transform Ghana into a middle income, information-rich, knowledge-based and technology driven economy and society (Ghana Government, 2003b). The achievement of the objective of the policy entails supporting the development, deployment and exploitation of ICT services by institutions, business enterprises and individuals in the country.

The policy is to position ICTs as one of the tools to enable the government to achieve its development goals as envisioned in the GPRS I and II. In view of this, the ICT4AD Policy has identified 14 priority focus areas which ICTs could play enabling roles to support accelerated national development. Out of this number, four directly relate to business activities of which SMEs dominate. These are:

⇒   Facilitating the development of the private sector,

⇒   Developing globally competitive service sector,

⇒   Modernization of agriculture and development of agro-business

⇒ Developing an export oriented ICT products and service industry.

The achievement of the objective of the national ICT4AD policy entails massive deployment and exploitation of ICT services by all economic operators, especially the SMEs to improve their competitiveness not only in the local market but global as well.

3   Analysis of Survey on Use of ICTs by SMEs

This section discusses the results of a survey on access and usage of ICT services by SMEs in the three main commercial and industrial cities in Ghana; namely Accra/Tema, Kumasi and Takoradi. In all, 280 SMEs across the various business categories were selected. A Formality Index was developed to reclassify the SMEs into various levels of formality – informal, semi formal and formal. Indicators used to develop the formality index include: form of ownership, registration with Internal Revenue Authority and Value-Added Tax (VAT) offices, employees with formal contract of appointment, strict separation of business finances from personal ones, and availability of financial records (Stork and Esselaar 2006).

Using the formality index, 42 percent of the sampled SMEs fell into the formal category, 33 percent belonged to the semi formal and the rest to the informal category (see figure 1).

Indicators covered in the survey among others include; educational level of owners, access to ICT facility and the level of usage of such facilities. Under access to ICT facilities, the study looked at the main CT facilities such as mobile and fixed line telephones, fax, computers and internet service.

3.1   Educational Level of SME Owners

Modern forms of ICTs, especially internet-based services are knowledge-intensive, and therefore certain level of formal education and literacy is required before one could effectively appreciate their potency to support business activities. Table 1 provides a summary of the educational background of the owners of the SMEs sampled.

The majority of the SME operators had had some form of formal education. In all a little over 67 percent of the operators had received secondary and tertiary education, while 15 percent had received vocational training. The relative high literacy level puts the operators in a better position to utilise the more knowledge-intensive ICT services.

Using, the formality index, the enterprises that fell within the formal category had the highest number of owners with tertiary education with insignificant percentage without formal education (see figure 2). Interestingly, the informal category had an appreciable number of owners with secondary education (34.3 percent), while 20 per-

cent had received tertiary education and such operators can easily migrate to the other categories.

3.2   Access to ICT Facilities

The use of ICT services largely depends on accessibility and ownership of ICT facilities, but here the emphasis is on the ownership of such facilities at the business prem-

Figure 1: Business Classification into Formality

Formal 42%
Informal 25%
Semi-Formal 33%

Source: Field Data, 2005
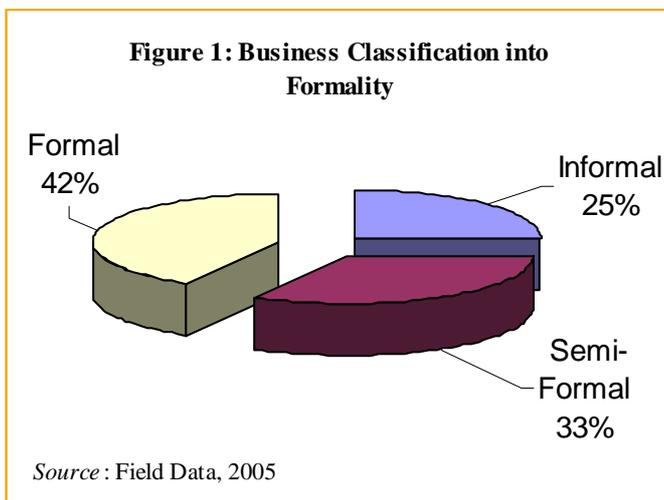
Table 1: Formal educational level of business owners

Type of education	Frequency	Percentage
Primary	43	15.4
Secondary	81	28.9
Tertiary	107	38.2
Vocational	42	15.0
Non	7	2.5
Total	280	100.0

Source: Field Data, 2005

Figure 2: Owner's Highest Education

	Informal	Semi-Formal	Formal
No Formal Education	5	4	1
Vocational	7	22	13
Tertiary	14	26	67
Secondary	24	29	28
Primary	20	12	7

Source: Frempong and Essegbey, 2006
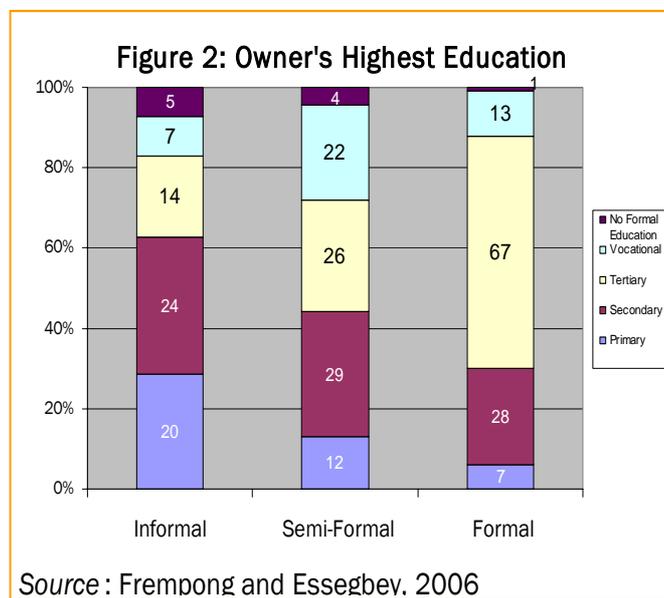
ises. However, cognisance is taken of the fact that in the informal sector in Ghana and other African countries, lack of ICT facility does not necessarily mean lack of access. An informal business operator can use the facilities of a neighbour to meet his/her communication needs.

In figure 3, mobile telephone was the dominant ICT facility owned by the majority of the SMEs with Internet as the least facility. The prominence of mobile telephones is linked to increased   mobile telephone subscription in the country. Since 2002, there have been more mobile telephones in the country than fixed lines. For example, in 2002, the total mobile telephone subscribers in the country were almost 300,000 while that of fixed line was around 275,000. At the end of April 2006, the total mobile telephone subscription stood at 3.4 million, while that of fixed line telephones was 0.34 million (NCA 2006). One of the factors which has accounted for increased subscription to mobile telephone service, in spite of its high cost, is the ease of getting a subscription. One can subscribe to the service within few moments after of purchasing the starter packs, while subscription to fixed line telephone service can take months and even years depending on the availability of the service in the area of the applicant. Therefore, mobile telephone has become important business tool utilised by SMEs in Ghana.

Formality plays an important role in the type of ICT facility used by the SMEs. The ownership of fixed lines, computers, and fax and internet connection was associated more with the SMEs which belonged to the formal category. From figure 4, almost 61 percent of the SMEs which owned computers belonged to the formal category, and was followed by the semi-formal category which registered 28 percent. The formal category relatively had better access to internet at their work place. These firms are more established and relatively resourced to invest in ICT facilities which have high capital outlay.

Mobile telephone was popular with all the categories but more pronounced with the informal enterprises. The reason for this phenomenon is not far fetched. The use of other ICT services required a more permanent, se-

cured business structures and premises. However, most of the informal operators (especially the artisans) operate in temporary and makeshift structures, most often sited at unauthorised places. Therefore, the temporary nature of such structures give credence to the use of more flexible communication gadgets which one can easily carry along when the business has to relocate. This and in addition to others, have made mobile telephones attractive

Figure 3: Level of Access to ICT Facilities
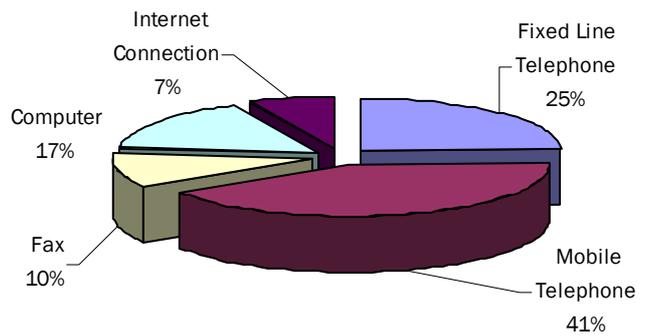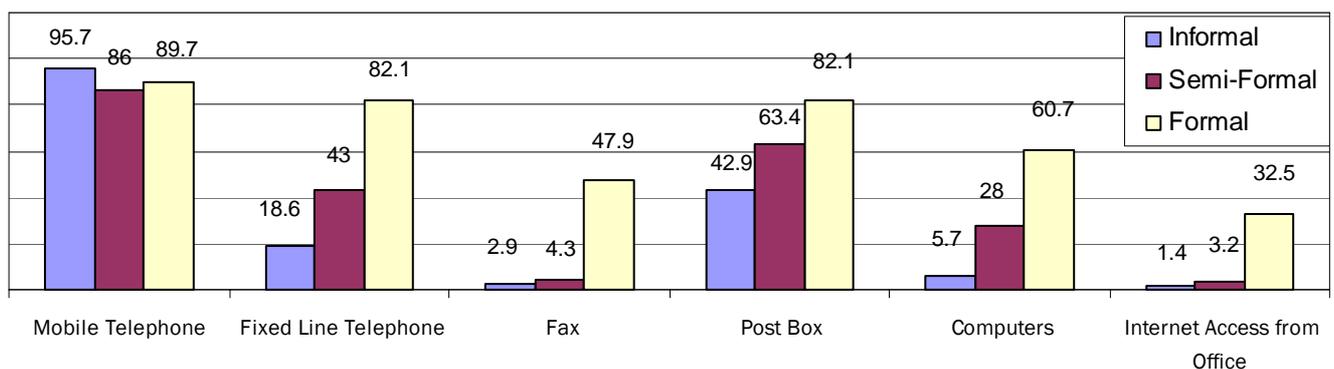
Source : Field Data, 2005

Figure 5: ICT Facility Used Most by Enterprises to Link Customers
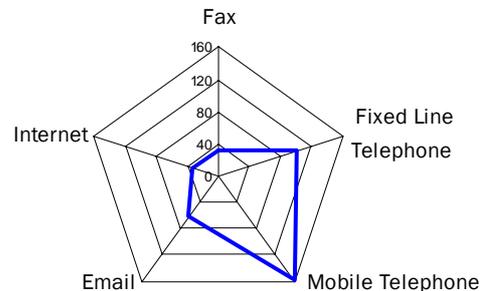
Source: Field Data, 2005

Figure 4: Comparison of share of SMEs with access to Ee-devices across formality

Source : Frempong and Essegbey, 2006

to the enterprises in the informal category. However, one cannot discount the issue of high cost in accessing the other ICT services such as computers, internet and fax, among others. The investments in these facilities are relatively higher and this may discourage many of the informal operators from acquiring them.

To conclude, it is evident that mobile telephone is very important to the activities of the SMEs, especially those belonging to the informal category. The question is, beside voice communication, what other use is mobile telephone put to by the SMEs? Further, access to the other ICT services also depend on the level of formality of the enterprise. The enterprises belonging to the formal category relatively had more access to fixed line telephone, fax, computer and internet access at their offices.

4 ICT Usage by SMEs

The purpose of this section is to discuss the usage of ICT facilities by the SMEs in their business activities. The discussion will focus on ICT services such as internet, e-banking services and short messaging service (SMS).

4.1 Internet Usage

Internet has become one of the pervasive ICT services which is radically changing the traditional forms of trade and providing windows of opportunities which enterprises, especially those from developing countries could exploit. It is becoming increasing important that internet usage should form an integral part of the operations of the SMEs.

From Table 2 it is obvious that internet has not been ingrained into the operations of the SMEs, especially those from the informal and semi formal category. Relatively, its usage is high among enterprises from the formal category. About 39 (about 33.3 percent) enterprises of the formal companies used internet service from their offices, one company (less than one percent) had the internet service at home, while 27 (23.1 percent) enterprises personalized the service from internet cafes. In the case of the informal and semi formal categories the participation rates were 10 (14.3 percent) and 22 (23.6 percent) respectively.

Internet cafes should provide a viable alternative for the

Figure 6. Purpose of using internet by enterprises
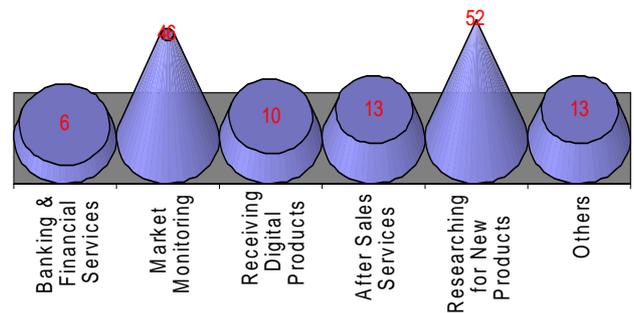
Source: Field data, 2005

SMEs which could not afford individual ownership to gain access to the service. However, table 2 shows that only 14.3 percent and 20.4 percent of the enterprises from the informal and semi formal categories respectively utilised internet cafes. For those who have internet access in their offices, it is possible that the usage might be limited to the management, and thereby preventing the workers from taking advantage of the potential of the service. The low uptake of internet by the SMEs in Ghana is contrasted with the situation in Europe where nine out of 10 SMEs were equipped with computers at the end of 2000 and early 2001, and Internet was routinely used among SMEs (OECD, 2004). Another survey conducted by UNCTAD with the Fundación para el Desarrollo Sostenible en América Latina (FUNDES), in selected Latin American countries (namely Chile, Colombia, Costa Rica, Mexico and Venezuela) showed that 97% of the SMEs surveyed in these countries had computers and 94% had Internet access.

The question is what benefits are the SMEs gaining from their usage of the internet service? Figure 6 provides a summary of internet usage by the SMEs.

From figure 6, the SMEs used the internet mostly for market monitoring and browsing for new products. The other use which was relatively prominent was sourcing for after sales services. These activities, though likely to be limited to enterprises belonging to the formal category demonstrate the awareness of some of the SMEs to the potential benefits of internet to their competitiveness in both local and global markets.

4.2. E-Banking Services

One of the industries being radically transformed by ICTs is banking. ICT- mediated services such as automatic teller machines, electronic fund transfer, electronic smart cards, cell phone banking among others, are transforming the traditional ways of banking and providing competitive edge for banks that provide those services. Consequently, attempt was made to find out the level of utilisation of these services in the country.

Table 2: Internet Usage on Formality Basis

	Informal	Semi	Formal
Office or business	0	3	39
Home	0	0	1
Internet Cafe	10	19	27
No	60	71	50
Total	70	93	117

Source: Survey Data, 2005

Figure 7: Usage of E-Banking Facilities

Source: Field Data, 2005

Figure 8: Business Purposes of Using SMS
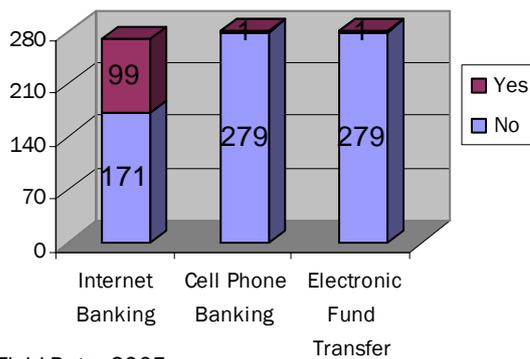
Source : Field Data, 2005

From figure 7 an appreciable number of the enterprises have used internet banking mainly to check their balance and request cheque books. With other services such as cell phone banking and electronic fund transfer (EFT), little use had been made by the SMEs. EFT has been popular in Ghana. Banks like Agricultural Development, Ecobank Ghana Limited, Standard Chartered Bank, Merchant, Ghana Commercial Bank and SG-SSB among others are agents of international EFT companies such as Western Union Money Transfer, Money Gram.

The responses on EFT revealed that it is used in Ghana purely for social purposes – to receive remittances from relations living abroad. It is not being used for business payments for sale of goods and provision of services.

In the absence of wide usage of credit cards, EFT could be used by the informal enterprises to trade in foreign markets, especially with the emerging African shops in Europe and America. These shops are mostly owned by Ghanaians who are domiciled in these countries who normally order small quantities of merchandise from Ghana. Consequently, the effective use of EFT could facilitate trade among these enterprises.

To a question on whether the SMEs have interest in cell phone banking (though almost none had used the service), over 66 percent of the enterprises declared interest to use the service in the future. It is interesting to note that banks such as Standard Chartered and SGS-SSB, and recently Zenith and CAL Banks have introduced the service in the country.

The result of the survey shows that e-banking has not been successful as very few enterprises from the sample had used the service. It could be speculated that issues of security and customer confidence, among others may have constrained the success of the service. What is required is aggressive marketing or promotions of the service by these banks in Ghana. It is hoped that the electronic transaction bill which is under consideration will be passed to provide some protection to users, and this may provide a fillip for increase patronage of the service in the country.
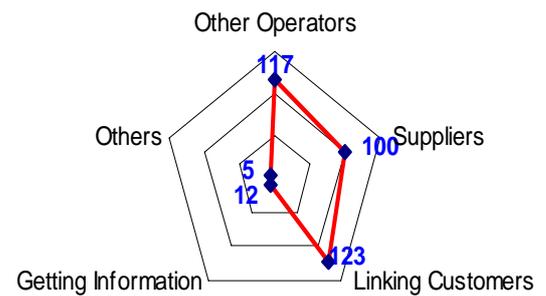
4.3   Usage of Short Messaging Service (SMS)

In Ghana SMS is one of the cheapest ways of communication not only among mobile telephone users in Ghana, but with users outside the country. It is more prolific than email system therefore, it is important to know the use of the SMS service by the sampled enterprises. From the survey results, 48 percent of the respondents had generally used SMS for communication. For business, the purposes of usage of the service were varied and figure 8 illustrates the various uses of the SMS service.

For business purposes, SMS was mostly used by enterprises to contact their suppliers, customers and other operators. Communication with customers was slightly higher than with other operators in the market who are competitors. The question is why that high level of interaction among operators in the same business segment? In Ghana, especially in the informal sector, there is a considerable level of market information sharing among the operators. For example, an informal operator, who had ran short of a commodity, can easily enquire from a 'competitor' if he/she had stock of that commodity, and might even sell on behalf of that competitor. The operators can also consult each other for market information and seek technical advice. The reciprocity which characterised the informal sector might have accounted for that level of interaction using SMS.

5   Discussion

In this section, we shall further discuss some critical issues that emerged from the survey results.

5.1   Mobile Telephones

The analyses have shown the preponderance of mobile telephones in the activities of the SMEs, notably those belonging to the informal category. For this group, the survival and the competitiveness of their economic activities, among others are propelled by the use of mobile telephones. Therefore, the existence of an efficient

mobile telephone infrastructure in the country is cardinal to SMEs development. However, the use of mobile telephones should not be limited to voice communication, but to other services such as banking, internet access and market surveillance, among others. For e-banking, a number of banks in the country have developed services (such as request for cheque book, balance enquiry, request for statement, check transactions) which can be accessed through one's mobile telephone. This has the advantage of reducing transaction cost in terms lost of man hours spent at a bank to request for a cheque book or make balance enquiry.

The adoption of GPRS technology by the mobile telephone operators in the country provides the opportunity for users of the service to access internet using their already acquired handset. Relatively, this has the advantage of less cost of access to the internet for limited usage in the form of sending and receiving emails. With the adoption of this technology, over 5million mobile telephone subscribers in the country could have access to internet through their handsets. Therefore, if the service is effectively utilised, it will considerably increase the total internet subscription in the country

One important use of mobile telephones which has not been exploited effectively in the country relates to advertisement. The increasing mobile telephone subscription provides an avenue for the SMEs to use the service to advertise their products and services. One SMS advert sent by a mobile telephone operator will reach all the subscribers of its service and this may be better than radio or TV advert which one can easily miss if the communication gadget (radio and TV) has been switched off. With the SMS advert, it can be saved for future reference and one can still receive the message later if his/her handset was initially turned off. Though the cost implication is not known, it is important that this service should be explored by the SMEs. It also means that the operators should adopt a competitive pricing system which could attract many potential SMEs to use the service to advertise their products. Therefore, it is important that aggressive marketing promotions (including cost incentives) are initiated by the mobile telephone operators to encourage the use of their value-added services.

5.2   E-banking Services

The discussion has shown that the SMEs have little knowledge and usage of e-banking services. The survey did not explore the rationale behind the use or non use of these services, neither did it enquire about the experiences of the very few enterprises which have used these services. However, it can be speculated that the less patronage of the e-banking services could be linked to the usual problems associated with adoption of new technologies. Adoption and innovation theory has indicated that a number factors namely; channel of communication of the innovation, time of diffusion of the innovation and the community of potential adopters affect the rate of adoption of new technologies or inno-

vations. These factors, in addition to others may have accounted for the poor the adoption of e-banking services. As already mentioned, the critical problems hindering the acceptance of e-banking services are security and absence of legal framework to govern the entire electronic services in the country. Increasing banking fraud is putting off many potential users. It is hoped that actions will be expedited by Parliament on the Electronic Transactions Bill to provide legal framework for e-services in the country.

5.3   Internet Services

Literature is fraught with information on the role internet plays in supporting competitiveness of SME. Therefore, it is important that every business enterprise gain access and use the internet service to enhance their economic activities. The question is, if the stated assertion is true, then why the low level usage of the service in the country, given the relatively high literacy rate among the owners of the SMEs? Is it a question of availability and affordability of the service?

Interaction with an official of the Ghana Export Promotion Council (GEPC) revealed that most of the SMEs, though functionally literate are not computer and internet literate. As a result, the staff of GEPC has to perform internet searches on on-line databases on behalf of these people. Therefore, there is the need for private and statutory bodies responsible for SME development to integrate computer and internet training into their activities. The small number of SMEs using internet services raises the need to developing a policy framework that will sensitize the SMEs, especially the informal and the semi formal to integrate internet into their general operations.

Besides, there are other barriers to the use of internet in the activities of the SMEs, especially the informal ones. These include:

⇒ products/services not suitable for sale on the internet,

⇒ customers or enterprises not ready to participate in e-commerce,

⇒ security problems concerning payments,

⇒ Uncertainty about contracts terms of delivery & guarantees,

⇒ Logistical problems (Frempong and Essegbey, 2006)

Conclusion

The paper has shown the level of ownership and usage of ICT facilities by the SMEs in Ghana. It is evident that the extent and the type of ICT service used are linked to the formality of the enterprise. Mobile telephone was highly used by the enterprises belonging to the informal category while other services such as fixed line telephone, fax and internet were largely used by the formal

and to some extent the semi formal categories.

One striking thing is that internet usage may not be directly linked to the level of literacy, as in spite of the relatively high literacy rate among the SME owners, internet usage was not appreciable. Thus, adoption may be underpinned by commercial considerations such as cost of investment and the potential returns on business activities. Once these are not favourable to the SMEs, their usage of the service may be low. However, one cannot discount the importance of literacy in the use of knowledge-intensive service as internet, but commercial considerations are strong. Though the government has put in place a national policy on ICTs and also is in the process of developing action plans to implement the strategies of the policy, it is imperative that issues of affordability should be addressed critically.

Finally, with the preponderance of mobile telephone usage by all business categories, it is essential that value-added services emanating from the mobile technology are effectively utilised for business considerations.

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Mobile phones as the Missing Link in Bridging the Digital Divide in Africa

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Abstract

The digital divide—or inequalities in access to Information and Communication Technologies (ICTs)—is a familiar concept. Indeed, the earliest ITU statistics on telecommunications (published in 1871 recording data on telegraph operations since 1849) show a clear divide between the Member States of the Union, mainly within Western Europe at that time. Such gaps have narrowed and, in some cases, even reversed over time, but other disparities have arisen. This suggests that:

⇒ The digital divide is a dynamic concept, which evolves over time;

⇒ Older technologies tend to be more evenly diffused than newer ones;

⇒ There is not a single divide, but multiple divides: for instance, within countries, between men and women, between the young and the elderly, etc.

⇒ The main factor causing these divides is differences in wealth, between countries and within countries (between individuals).

African economies, especially Least Developed Countries in sub-Saharan Africa, have historically been among the lowest-ranked economies worldwide in terms of penetration of ICTs, and therefore, on the wrong side of the digital divide.

The Rise of Mobile Communications

However, the prospects of bridging this gap have never seemed brighter. In 2002, ITU made the bold claim in its World Telecommunication Development Report that mobile communications could provide the "missing link" that would help to bridge the digital divide, and to date, this claim has been largely fulfilled. Mobile communications have grown fastest among developing economies. In developing economies, the number of mobile phones rose from a mere 12 million in 1995 to over 1.15 billion in 2005, at a compound annualised growth rate of 58 per cent. Worldwide, the total number of mobile subscribers was 2.17 billion at the end of 2005 and is projected to surpass 3 billion by late 2007 and to reach 4 billion by 2010, with 80 per cent of new growth expected to come from lower-income emerging markets.

Arguably, Africa's greatest success story to date in telecommunications is the remarkable spread of mobile telephony throughout the continent. Africa's mobile market has been the fastest-growing of any region over the last five years and has grown twice as fast as the global market (Figure 1, left). Africa took over a hundred years to accumulate 28 million fixed lines; an average penetration rate of just 3 lines per 100 inhabitants, and still below 1 in many countries. However, the stunning growth of mobile led mainly by private operators resulted in mobile phones overtaking fixed lines in 2001. Mobile phones now outnumber fixed by nearly five to one, with 137.2 million mobile subscribers in Africa in 2005. The ratio of mobile to fixed phones is even higher in Sub-Saharan Africa, where nine out of every ten subscribers with access to a phone are using a mobile. Mobile penetration has doubled from 6.5 per 100 inhabitants in 2003 to 13.1 per 100 inhabitants in 2005. This remarkable growth has been driven by the private sector and is greatest where the mobile market is competitive. Prepaid has also been another major driver of mobile growth, with some 92 per cent of African subscribers using a prepaid package in 2005.
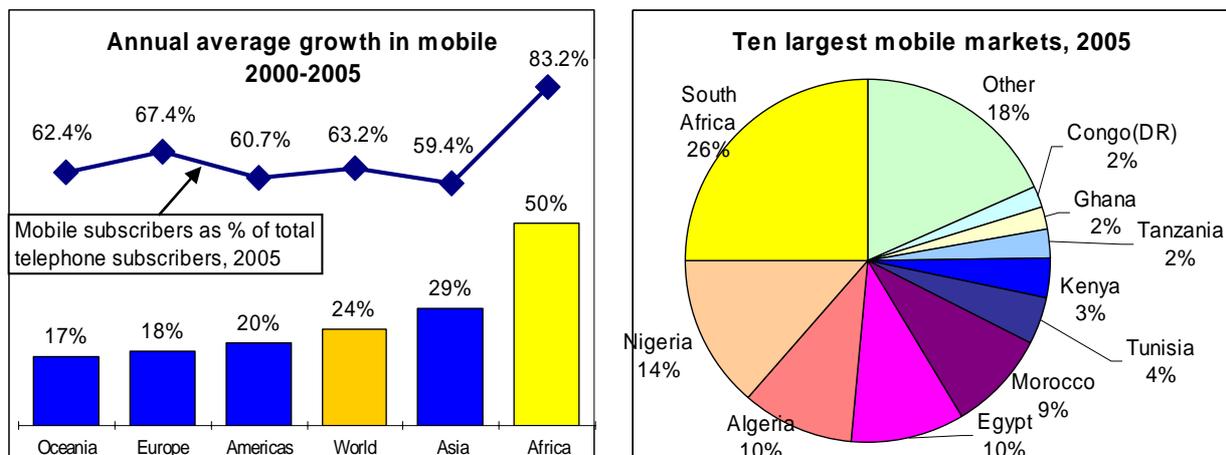
The future growth potential for mobile communications in Africa lies in making mobile telephony more affordable for the huge untapped market of lower-income consumers. Operators that can follow high-volume/low-cost strategies, combined with innovative pricing and payment methods, stand to make big gains in Africa (as the rise of indigenous African strategic investors—such as MTN, Vodacom, Orascom or Celtel—has proven). Making mobile communications affordable includes reducing both the total cost of ownership (for example, by introducing ultra low-cost handsets at below twenty dollars each), as well as addressing cash-flow ("cash-barrier") aspects. If operators can match payment profiles to incomes through micro-financing, shared phones and micro-prepaid schemes (for example, by using low denomination top-ups and balance transfers between subscribers), then rapid growth and large profits can be made in the African market. Furthermore, due to the limited personal finance sector in Africa and low levels of credit card ownership, there are tremendous opportunities for mobile operators in exploring Internet access and financial services over mobile phones, such as m-commerce and banking .

Market competition

The three essential ingredients of telecommunication sector reform, and the recipe for future growth, are market liberalisation, private sector participation and effective regulation. Although Africa embraced reform relatively late, compared with some other regions of the

Figure 1: African Mobile Markets
Annual average percentage growth in mobile network subscribers, Compound Annual Growth Rate, 2000-2005, world regions (left); Ten largest mobile markets in Africa, 2005 (right chart).

Annual average growth in mobile 2000-2005

62.4% 67.4% 60.7% 63.2% 59.4% 83.2%

Mobile subscribers as % of total telephone subscribers, 2005

| Oceania | Europe | Americas | World | Asia | Africa |
| 17% | 18% | 20% | 24% | 29% | 50% |

Ten largest mobile markets, 2005

South Africa 26%
Other 18%
Congo(DR) 2%
Ghana 2%
Tanzania 2%
Kenya 3%
Tunisia 4%
Morocco 9%
Egypt 10%
Algeria 10%
Nigeria 14%

Source: ITU World Telecommunication Indicators Database.

world (for example, Latin America), it is now pressing ahead with telecommunication liberalisation, especially in the mobile sector.
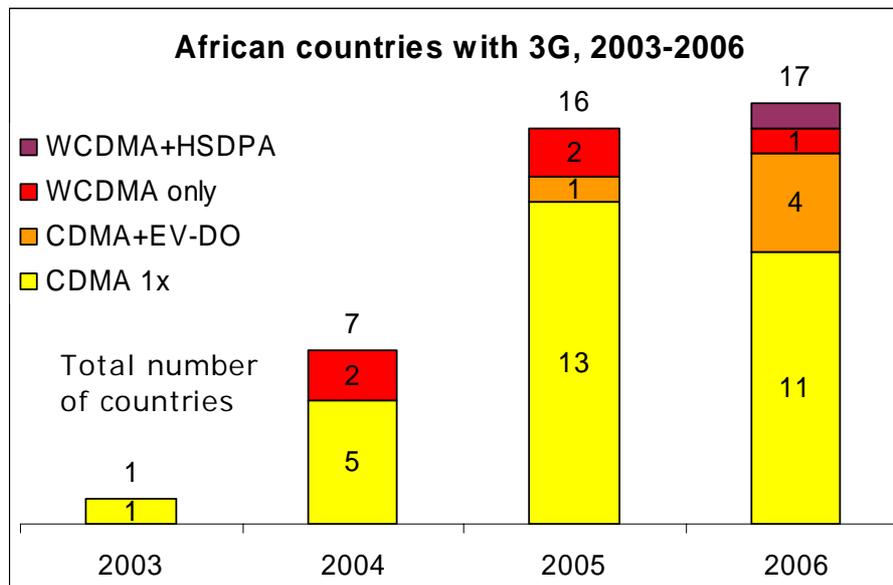
Back in 1995, only four African economies allowed for competition in mobile communications. By 2006, this had increased to 44 out of 54 economies (75 per cent), which is a comparable percentage to the Americas (76 per cent) and Asia-Pacific (78 per cent). Greater competition and private ownership in the mobile sector compared with the fixed-line market are the main reasons for Africa's success in mobile. The liberalisation process needs to go further: for instance, by permitting greater competition in the fixed-line market, in the ownership of private payphones, in the use of very small aperture terminals (VSAT) and/or in the liberalisation of the international gateway. Nevertheless, Africa's experience with mobile communications has been a driving force for transformation .

While access to mobile communications is vital for access to voice services for today's African consumers, in the future, wireless could also provide access to Internet and other data-based services. In this context, it is the ability to upgrade to high-speed or broadband access that will enable Africa to compete most effectively in the global market. Given Africa's headstart in mobile telephony, broadband Internet access is most likely to be delivered over a mobile platform than a fixed line. Third-generation (3G) mobile services with higher transmission speeds and enhanced data services promise a range of new applications for users and new revenues

for operators. ITU recognises the following 3G services as compliant with the IMT-2000 family of standards:

⇒ Wideband Code Division Multiple Access (W-CDMA), which can reach maximum data download speeds of 2 Mbit/s when fully implemented. It is sometimes known as UMTS or 3GSM in Europe;
⇒ High Speed Downlink Packet Access (HSDPA), an upgrade to W-CDMA allowing a theoretical peak downlink rate of 14.4 Mbit/s, although this is not currently widely available on commercial handsets.
⇒ CDMA 2000 1x, which delivers speeds of up to 144 kbit/s. This does not qualify as "broadband" as it is below the threshold speed of 256 kbit/s.
⇒ CDMA EV-DO (Evolution Data Only) enhances 1x speeds up to 2.4 Mbit/s.
⇒ Time Division Synchronous CDMA (TD-SCDMA), which has not yet been commercially launched, but may be the preferred choice for 3G systems in China.

3G services have been commercially available since 2001 worldwide and in Africa since 2003, when the first Wireless Local Loop (WLL) CDMA 1x networks were rolled out in Nigeria. South Africa and Mauritius launched W-CDMA networks in 2004, with South Africa already implementing a HSDPA network in 2006. A total of seventeen African countries now boast IMT-2000 mobile networks (Figure 2). Eleven countries have CDMA 1x networks, while operators in Angola, Cote d'Ivoire, Nigeria and Rwanda have launched EV-DO networks. Further 3G launches are expected in

Figure 2: 3G networks in Africa
(Number of African countries with 3G (IMT-2000) networks commercially available, 2003-2006.)

African countries with 3G, 2003-2006

Legend:
- WCDMA+HSDPA
- WCDMA only
- CDMA+EV-DO
- CDMA 1x

Year	CDMA 1x	CDMA+EV-DO	WCDMA only	WCDMA+HSDPA	Total
2003	1				1
2004	5		2		7
2005	13	1	2		16
2006	11	4	1		17

Source: ITU.

2007, including Etisalat and Vodafone in Egypt (in Q1 and Q3 respectively) and Vodacom in Tanzania.

The future digital divide

As noted at the start of this article, the digital divide is not, and never has been, a stable concept. It continues to evolve over time, both in terms of geography and in terms of the nature of services. Africa is well on the way to addressing some of the disparities in access to basic voice telecommunications, through investment in mobile phones. However, as the world becomes increasingly dependent on ICTs, the digital divide may come to be measured more in terms of the "quality", rather than simply the "quantity", of access to ICTs. Africa has decisively opted for a mobile future in voice communications, and this is likely to be reflected too in its choice of a wireless platform for high-speed Internet access. This suggests that coverage can be expanded more rapidly through wireless platforms, rather than fixed-line solutions (based on fibre optics, copper wires - such as asymmetric digital subscriber lines - or cable modems). However, there will still be an important geographic element to the digital divide, as coverage is initially provided to capital cities and other large urban areas at higher speeds, rather than to rural Africa. That is where the future digital divide will lie.

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A New Logic of Reducing the Global Digital Divide in Sub-Saharan Africa: From Obstacles to Opportunities

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The relationship between Information and Communication Technologies (ICTs) and socio-economic development strategies in Sub-Saharan Africa is commonly associated with the goal of reducing the Global Digital Divide (GDD). Even though this is a noble goal, its implementation under what is defined as the Bridge Logic creates an unsustainable environment in which ICT is understood as an end rather than as a means to tackle the real obstacles of the region. This paper proposes a new logic based on selected best practices extracted from the field: performing specific ICT actions in key sectors such as government, local business and education allows nations to achieve a higher socio-economic level while reducing the GDD as a by-product of the whole process. In the first section, the concept of the Bridge Logic is introduced and its weakness is explained. In the second section, some best practices in the region are reviewed to show that a new logic is possible. In the third section, this new logic is formalized. The fourth section concludes the argument.

1 Why the Bridge Logic does not work?

In the developed world, Information and Communication Technologies (ICTs) are ubiquitous in a wide range of sectors such as business, government, healthcare and education. Often, ICTs are one of the major vehicles for the delivery of services and the sharing of information. ICTs have also proven to be an extremely effective tool for capacity building and, thus, are a key component in entrepreneurial activities. In the developing world, the myriad obstacles that have retarded economic growth and human development have made the implementation of ICTs throughout the various sectors rather challenging as many of the preconditions for the effective and sustainable distribution of new technologies are missing or substandard. The discrepancy between developed and developing countries and also within developing countries in the accessibility and quality of ICTs forms the basis of the Global Digital Divide (GDD), a concept that is debated far and wide.

Much of the debate surrounding this topic is in reference to the appropriate approach to bridging the GDD. There are many who argue that in places such as Sub-Saharan Africa (SSA), where poverty, hunger, malnutrition and lack of employment are so pervasive, the implementation of ICTs throughout society would be the equivalent of putting the cart before the horse. The argument continues by claiming that people with limited access to scarce resources need investments in healthcare, basic infrastructure, education, employment training, etc. and not Internet access or cell phone towers. While this is certainly a very accurate and poignant observation, it is the opinion of this paper's authors that presupposing that ICTs have no place in socio-economic strategies aimed at eliminating the aforementioned problems is erroneous and somewhat short-sighted. Closing the GDD is not a development issue that needs to be prioritized over other more fundamental socio-economic challenges such as reducing malnutrition; rather it is a tool to be utilized in programs to reduce malnutrition.[1]

The Bridge Logic, one approach used to overcome the GDD, implies that there is a need to overcome the socio-economic obstacles so as to be prepared to acquire modern ICTs. Under this logic, the expansion of ICT infrastructure, service and use is a goal and the socio-economic problems that plague many nations are obstacles to reaching it. This approach argues that issues such as hunger, low levels of education and lack of access to economic resources will be overcome by bridging the GDD [13].

Figure 1 graphically depicts the dynamics behind the Bridge Logic. It can be seen that while GDD Reduction is the main development objective that drives the transition from one level of ICT to the other (ICT$_1$→ICT$_2$), in order to do that many GDD programs perceive socio-economic obstacles as a problem that needs to be solved to get to the other side of the bridge. However, if a higher level of ICT service and infrastructure becomes a goal by itself, then it is unlikely that the use of that technology will be sustainable. The reason is that instead of addressing the socio-economic obstacles, the Bridge Logic attempts to jump over them, maintaining the same socio-economic level (SEL$_1$→SEL$_1$), as its

main objective is to get to the other side of the bridge. In doing so, two mistakes are made: 1) the socio-economic hurdles will not disappear just by jumping over them, making the whole GDD program unsustainable, and 2) success is not found on the opposite shore as the main obstacles that prevent development are ignored and left under the bridge.

The Bridge Logic, then, is incorrect in its conception of the relationship between ICTs and development strategies. Instead of being a goal, this paper argues that ICTs should be conceived of as a tool for development and an integral part of poverty alleviation and capacity building programs. ICTs are an extremely important component in development strategies serving as a vehicle for achieving the alleviation of poverty and dislodging stagnated economic growth. However, as with any tool, one needs to know how to use it and, more importantly, in which sectors it would have the greatest impact.

2 Envisioning a new logic through best practices

Three main sectors were identified for the focus of ICT action: government, local business and education. By concentrating ICT development in these sectors, developing countries will be able to take a modern approach to resolving age old socio-economic problems. Since ICTs can improve the efficiency and effectiveness of a wide range of services, it is logical that they are a key component in strategies aimed at increasing economic growth and human development. The proper implementation of ICTs within the larger context of development strategies can result in capacity building for both individuals and institutions. This will ultimately lead to an environment that is more conducive to twenty-first century ideas and technologies and one that will encourage entrepreneurial activities that stimulate growth and development.

Through the review of best practices, the approach of this paper is to look at the key role ICTs play in overcoming development challenges in each of these three sectors. This will be discussed below. Section 3 discusses how these sectors are linked to a number of real obstacles countries in SSA face and formalizes the proposed new logic.

2.1 Government

The integration of ICTs into the government sector has, in many cases, caused a revolution in the provision of services. E-governance, as it has been termed, is being used to improve the delivery of services and the dissemination of information in a way that is intended to improve citizens' access to their govern-

Figure 1: The Bridge Logic to reduce the GDD
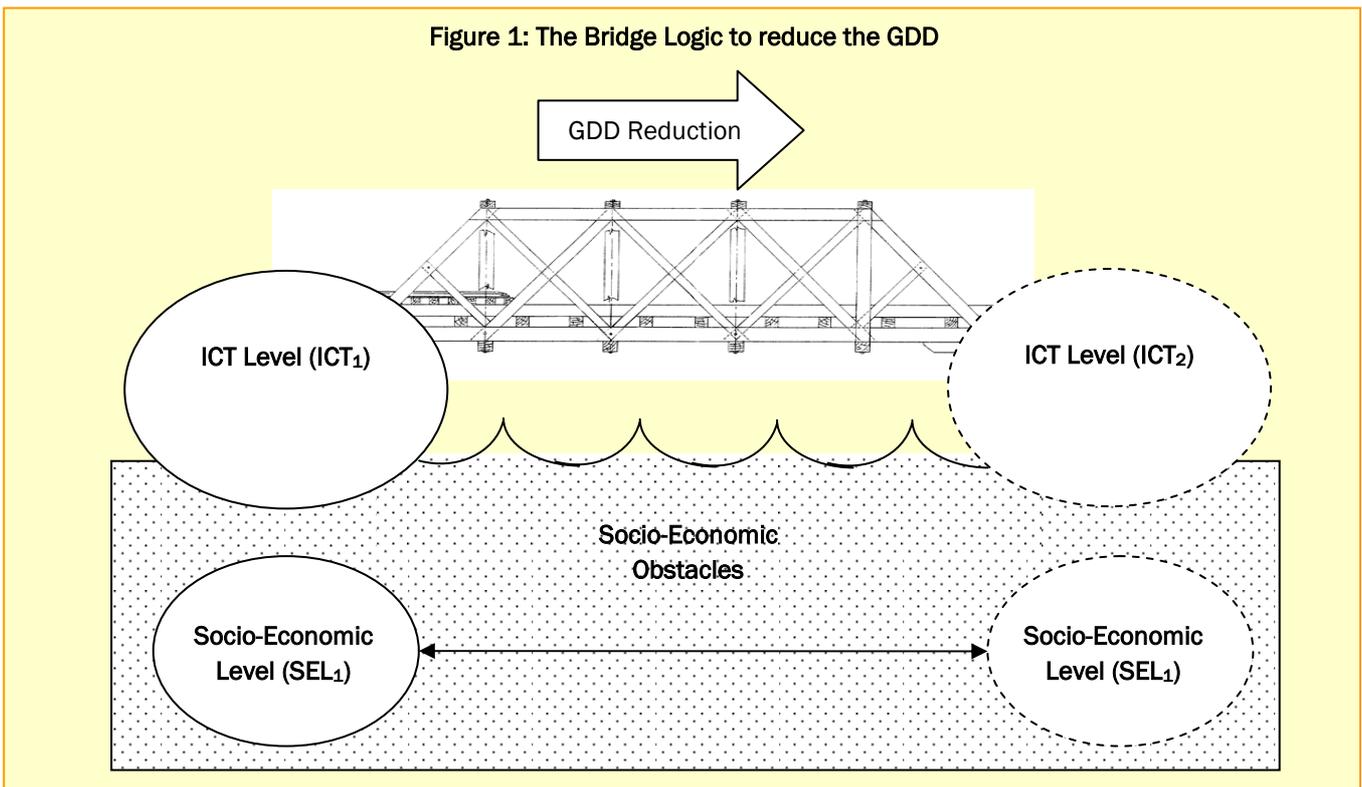
ment counterpart. Services are being provided to the public via the Internet, telephone, public access centers, wireless devices and other communications and information systems. This new format for services and information is helping to expedite the processes that slow down many governments in the developing world that are understaffed and/or are functioning on antiquated systems. By digitizing applications for permits, tax forms, zoning information, etc. governments can save valuable time and resources that can then be utilized for a broad range of social programs and services.

This improved access, in turn, will serve to encourage citizen participation in the decision-making process. UNESCO has been working quite extensively in encouraging the growth and inclusion of e-governance and is promoting it as a way to develop new concepts of citizenship in terms of the needs and responsibilities of citizens. The objective of e-governance, according to UNESCO, is to engage, enable and empower the citizen.[2]

As citizens become more engaged in the decision-making process and are empowered through capacity building programs, a likely by-product will be the growth of entrepreneurial activities. Without access to information and other services, individuals are limited in their ability to develop the small and medium enterprises (SMEs) that are becoming the backbone of economic development in regions such as SSA. In a nation where e-governance is pervasive and not only concentrated in large urban areas, SMEs will be a logical offshoot of the government's efforts to build local capacities and encourage the entrepreneurial spirit.

Government policies and initiatives are necessary support mechanisms for any growth within the ICT sector that will lead to the expansion of SMEs, especially in the rural areas where the lack of basic infrastructure signifies a failure of local governance. In Kenya, government ministries have been promoting ICT programs that focus on particular sectors within the economy. Much of the government's efforts are concentrated on infrastructure development and website content development. For example, a small grant from the World Bank helped create the Kenya Country Business Incubator (KEKOBI) project. This is aimed at supporting small and micro-enterprises by making the government both the adopter and purchaser of ICT products. By expanding the demand for technological products, the government is helping to encourage the growth of small

software firms through its expressed need for products that target government ministries such as an e-water portal for the water ministry, a billing system, an accountancy and finance system, an operation and maintenance system as well as a monitoring and evaluation system [2].

These business incubator models are based on initiatives that led to robust economic growth in countries such as China, Pakistan, Malaysia and Singapore. In these programs, the government's support of ICT development through the adoption of policies that favor and protect SME growth and expansion have helped to create viable businesses and develop local capacities and have resulted in creating a much more investor-friendly environment. Prof. Atieno Ndede Amadi, KEKOBIL's chief executive officer, says that Kenya's industrialization must be supported by business incubation programs that leave many SMEs (when they leave the incubator) with fully developed managerial structures and business plans. By working through government ministries, KEKOBIL has helped to provide a solid platform for entrepreneurs to engage in capacity building activities while simultaneously developing strong local businesses. [2]

2.2 Local Business

As the example of KEKOBIL's program in Kenya shows, local business development is an irreplaceable aspect of economic growth strategies. Not only are ICT products and services being developed by SMEs, but they are increasingly becoming a critical factor in the advancement and growth of SMEs throughout all sectors. ICTs, when implemented in a sustainable, inclusive manner with the support of public and private investments, can be an equalizer by providing access to economic/financial resources to regions, ethnic groups, etc. that were once marginalized. ICT networks, often supported by government investments in infrastructure, can link SMEs with a larger, global market allowing them to complete business transactions from any location.

The UNCTAD Information Economy Report 2006 argues that poverty alleviation programs must include efforts that enhance the capabilities of the poor and marginalized. In rural areas, governments are providing access to market information—including prices and news regarding competitors—that enables farmers and other entrepreneurs to make informed decisions regarding sales, business plans and overall development strategies. Atkinson and McKay say that a digital economy is more than one

that exists on the Internet; it is an economy where hardware, software, applications and telecommunications are pervasive [1].

Businesses are applying ICTs to their strategies in a wide variety of ways. Everything from standalone ICTs, for example PCs used for billing and financial planning, to networked ICTs that link SMEs to larger markets and provide a medium to promote and deliver services. One critical ICT that is often overlooked and underappreciated by those in the developed world due to their ubiquitous presence is the mobile phone. Just as in the developed world, in developing countries mobile phones help to increase the social networks of entrepreneurs thereby expanding the possibilities for business opportunities.

In Rwanda, the expansion of cellular technology in the years since the 1994 genocide has encouraged the growth of many SMEs and helped to link entrepreneurs with clients and suppliers. The number of mobile lines (in thousands) in Rwanda increased from 5 in 1998 to 290 in 2005 [4]. This rapid expansion has opened many doors for entrepreneurial activity in a wide range of sectors. A baker in Kigali uses his mobile phone to receive orders from clients, call suppliers and to keep in touch with his one employee no matter where they are in the city. This same baker estimated that his sales increased by 30 percent due to his mobile phone [4].

The case of the baker in Kigali, Rwanda is a somewhat typical story of SME growth and development due to ICTs. Throughout SSA, mobile phones and other ICTs are helping build local capacity for would-be entrepreneurs that makes investment in this area a sustainable way to overcome certain socio-economic hurdles. To this end, UNCTAD recommends the integration of ICTs into national and sectoral poverty reduction programs so as to provide an "enabling environment" and encourage "the development of pro-poor ICT networks and organizational capacities" [7].

2.3 Education

ICT use in the educational sector is a topic that has received a great deal of attention as they have become a widely accepted tool in both the formal and informal classroom settings: computers in the classroom for word processing, research and increasing literacy; the Internet as a learning tool to disseminate new, up-to-

date information and to create networks of learners; and training for teachers and administrators. These uses, as well as many others, have been shown to increase both teacher and student motivation and to expand the learner's autonomy during the educational process. As a result, socio-economic programs aimed at reducing poverty and increasing access to educational resources necessarily must include ICTs as a vehicle for the attainment of goals and objectives.

Developing human capital serves social as well as economic development goals. A strong knowledge base is critical to improving not only productivity and efficiency and but is also the key ingredient to building capacity among citizens. As such, governments are continually seeking solutions to improve on the educational environment within their borders. When educational programs are implemented in an equitable fashion they are the first step towards an expanded economy. Modern technologies provide the perfect tools for teaching learners how to process information, make more informed decisions and develop the skills necessary for creating SMEs that supply goods and services on both the local and regional levels.

The World Links program, a non-for-profit initiative that was created through support from the World Bank, has been working throughout the developing world since 1997 providing capacity building, sustainable, school-based ICT solutions. In response to the rapid growth of Internet usage in Nigeria—a 2400 percent increase since 2000, the majority of which is in the urban areas—the World Links program has been attempting to increase access throughout the often neglected regions of the country [5]. In the Akwa Ibom state, the World Links program offers education, training and information resources to students, youth no longer attending school and adult community members. By running school- and community-based internet learning centers, the World Links project has been playing a role in generating economic and social opportunities for the citizenry. The goal of the program has been to help equip community members with the skills necessary to compete in the workforce and to develop business models for SMEs that ensure continued access to ICTs and other technological services [16].

ICT presence in the educational setting is a key aspect to developing entrepreneurial activities as they help to encourage the growth of twenty-first century ideas. A sustainable program supported by both government and

non-governmental partners helps to develop human capital and prepare individuals with the skills and knowledge necessary to successfully manage SMEs and other business ventures. Using ICTs in education creates a model that mirrors the rapidly changing business environment of today thereby preparing students to be productive members of society.

3   From Obstacles to Opportunities

Conceiving ICT as an enabler of socio-economic development, rather than a bridge we are forced to cross over, has many benefits. However, socio-economic development is not going to happen automatically just by stimulating local businesses, reforming the government to facilitate entrepreneurship or improving the educational level of the population, as these success stories shows.

Most SSA countries have real obstacles that are usually ignored in GDD programs that, when acknowledged, can bring about the success of a project. But when they are not identified and included in a strategic plan, those very same obstacles may be magnified and may actually result in a lower level of socio-economic development [13].

Personal Rule: As many other goods in SSA, ICTs are still treated as a private good instead of a public good. Among other things, this implies that it is conceived to be traded, and the government uses it as an economic and power source. Thus the GDD program must be profitable for both the foreign technology partner and the personal ruler. Take the example of *Simputer*, an Indian product intended to be a sub-USD 200 device, which ended up costing around USD 400 in most Sub-Saharan countries. The difference is not just transportation or intermediation cost, but government and private (usually foreign) profit.

Enclave Economies: ICT does not only emerge in urban areas but also in enclave economies all over SSA. The reason is that "Business" follows the pattern of the concept introduced in the previous section. If you want to implement advanced technology, you will do it in places where the infrastructure is ready, know-how can be easily obtained, FDI has proven to be profitable and government support exists. In most SSA countries, these places are the enclaves where most of the successful projects that introduce ICTs into the continent reside. One of the most important examples of this is the government investment in developing the "National

ICT Backbone" in Nigeria in order to provide international access to their growing oil business.

If you want to implement advanced technology, you will do it in places where the infrastructure is ready, know-how can be easily obtained, FDI has proven to be profitable and government support exists.

Civil Conflicts: ICT penetration, if not properly managed has the potential to increase inequality and tension. GDD has two dimensions: the digital divide between SSA and the rest of the world and the digital divide among SSA countries. However, a third dimension might be added: the digital divide within the country. In a very revealing article, Steve Onyeiwu shows important variations in the way ICT evolved in SSA countries, but in the cases where ICT growth was concentrated in the enclaves (such as the cases of Congo and Nigeria with an above-average ICT index for SSA) it did not help to improve democracy, participation and economic integration as was the intention [9]. In a fragmented country, ICT might have the opposite effect and could potentially widen the gap among the information-haves and the information-have-nots.

Among others, these three obstacles found in most SSA countries need to be seriously considered when deploying GDD programs, as they often reach deep into the structure of a nation and necessarily must be overcome first in order to minimize other challenges such as urban bias, lack of infrastructure, low levels of education and political instability.

The view proposed in this paper as to how to tackle the GDD explains why certain GDD programs really improve a nation's socio-economic level while others do not. By mapping the three areas of ICT action identified in the previous section (education, local business and government) with these obstacles, one can see the path by which the situation in SSA can be improved by reaching a more efficient socio-economic level.

First, stimulating entrepreneurship and improving local business is a mechanism that debilitates enclave economies. As enclave economies are usually owned by the government or by foreign companies that find very advantageous conditions, the generation of local business under fair rules generates competition and innovation, thus creating an environment totally incompatible with enclave economies.

Second, to make this environment possible and enforce fair rules, the government needs to be involved. But first,

Figure 2: A New Logic for Reducing the GDD
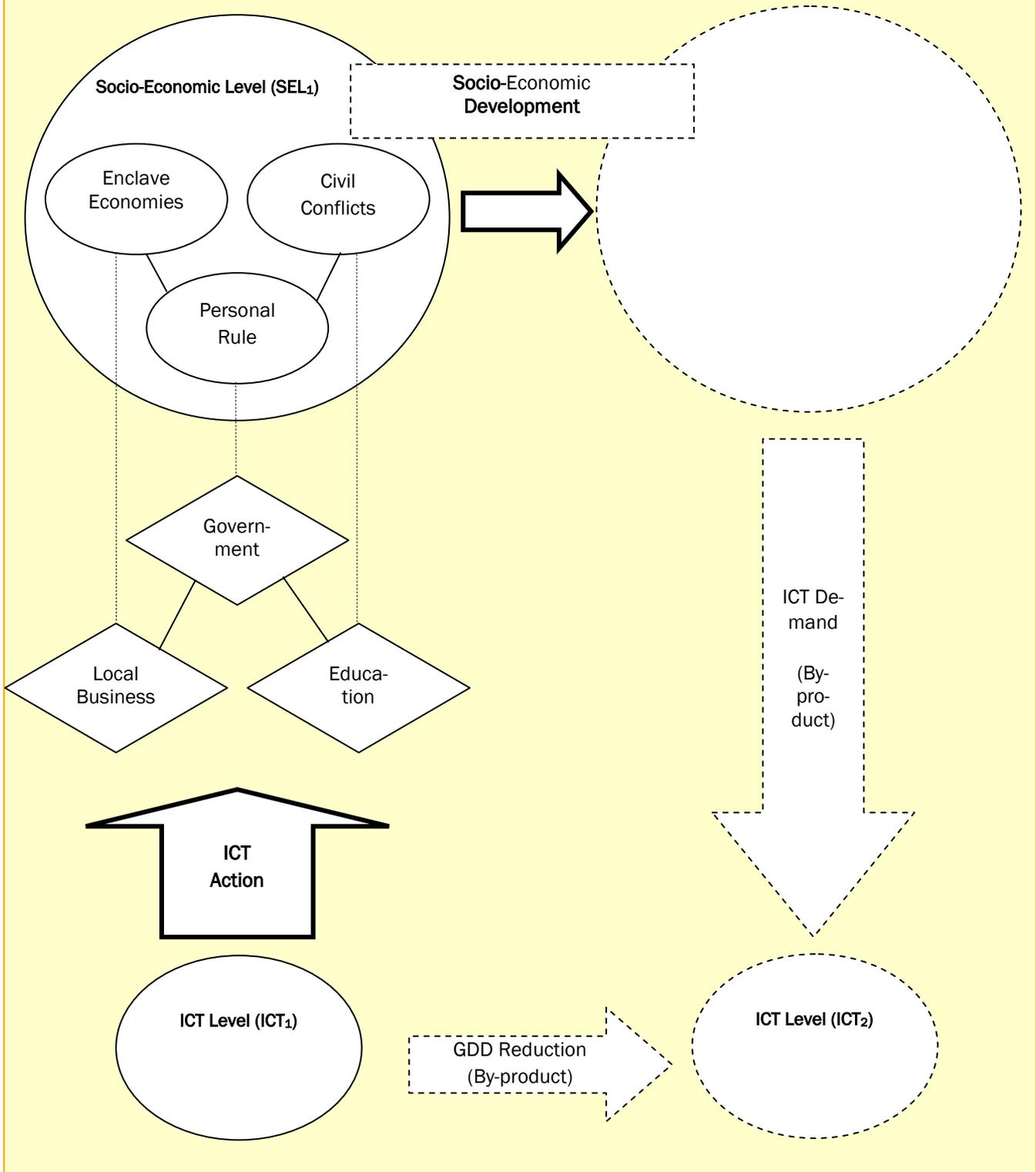
it needs to be exposed. Creating a more transparent government is a way of exposing its activities to citizens, making personal rule difficult to sustain in political terms. The government is probably the only actor capable of fully understanding the proper rhythm of ICT introduction within its borders and it is also the one institution that can balance the profit-seeking impulse of internal and external actors within the very aggressive Information Technology and Communication industry [13]. Therefore, as discussed in the previous section, the government is essential as a facilitator of the socio-economic development process.

Third, education is a very important stimulator and component for capacity building. This is true not only in the sense that local entrepreneurs need to have ICT skills in order to do business, but also in the sense that effective educational practices supported by transparent and accessible public institutions increase citizen participation and develop a sense of shared responsibility within the community. In a society where these values become accepted, the dissolution of personal rule behavior reduces the benefits of trying to get to power no matter the cost, thus diminishing the likelihood of civil conflict.

Figure 2 illustrates how to implement ICT actions in specific areas (following the best practices covered before) in order to achieve a higher socio-economic level. From the model in Figure 2, one can see that socio-economic development does not happen solely as a result of ICT presence, as is implied in the Bridge Logic. It will only happen by performing specific actions in certain areas that are connected to the "real" obstacles of Sub-Saharan Africa. Additionally, as explained in the previous section, the new ICT Level (ICT_2) is not the main objective as it is in the Bridge Logic. Rather, it is to reach an improved socio-economic level (i.e. reduce child mortality, improve access to economic resources, etc.). ICT_2 is reached as a by-product of the new socio-economic level ($SEL_1 \rightarrow SEL_2$) through an increase in the demand of new technologies and infrastructure. In this way, the Global Digital Divide issue can be solved without realizing it.

Conclusion

The increasing use of ICTs in Sub-Saharan Africa to reduce the GDD created an approach that was identified as the Bridge Logic. This vision considers reducing the digital divide as a stand-alone objective of development programs, understanding the reduction of that bridge as a goal in itself. Within that logic, overcoming different socio-economic obstacles are considered a means to that end. It was found that there is a problem with this logic, as socio-economic levels often remain the same, thus creating an unsustainable environment for new ICT levels as a result of not addressing the real obstacles of the region.

A new approach is suggested by reviewing three different sectors that are currently the target of many ICT actions: government, local business and education. In this new logic for reducing the GDD, it was found that best practices on these sectors can actually be linked to three main obstacles of most nations in Sub-Saharan Africa: enclave economies, personal rule and civil conflicts. Within this new vision, transforming these obstacles into opportunities implies focusing development projects on reaching higher socio-economic levels while leaving both the increase of the demand of ICT and the reduction of the GDD as by-products of the whole process.

Further research is needed to empirically demonstrate the linkages between the sectors presented in this paper (as well as other sectors) and the real development obstacles that SSA countries have. It is not under discussion the tremendous role that ICT has in improving these sectors, even though the underlying socio-economic effects of successful "ICT for Development" initiatives have yet to be fully discovered. The new logic presented here will provide a framework within which future research on the dynamic relationship between ICTs and development may be conducted.

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This article:

Notes

1. See the online article "Using technology in rural areas" for an example of how smartcard biometric technology is being used in a food security program in Lesotho. http://www.developmentgateway.org/ict/rc/filedownload.do?itemId=1080866

2. See the UNESCO Portal at www.unesco.com for an extensive discussion of the uses of e-governance and its capacity building potential.

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How does ICT work for development? A review of the challenges and opportunities

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Abstract:

The paper reviews the current international efforts to harness information and communication technology (ICT) for development. Whereas computers and internet broadband connections have not yet penetrated the African continent to a significant extent for various reasons, mobile phone services, telecentres and business incubators are broadening access to information that is of relevance to local entrepreneurship and social empowerment. The paper argues that it is the 'long-tail' phenomenon that has been created by the internet that is increasing business opportunities for entrepreneurs also in poor developing countries. PCs and broadband connections may eventually follow suit to give more room to local languages and political participation.

Introduction

It is a truism that ICT can support human and economic development. ICT helped the developed world to significantly reduce business transactions costs by providing much wider and cheaper access to relevant information, knowledge, services and means of communication cheaper. There is no indication that the effect on developing countries would be any different. Especially, the use of ICT to get more and faster information on the demand and supply of specific markets is crucial for the competitiveness of small and large enterprises. For developing countries, ICT may offer even more opportunities and make development in general more efficient. [1] The UN showed a clear commitment to realize these opportunities through Goal 8 of the Millennium Development Goals (MDG) that aims to *"develop a global partnership for development"* and, *"in cooperation with the private sector, to make available the benefits of new technologies, especially information and communications technologies"*. [2]

The statistical data on ICT use in developing countries is however still meagre [3] and the data available is mainly highlighting the digital divide [4]. This paper will first discuss the evolution information and communication technology for development (ICT4D) [5] (II.) and then examine the status quo of ICT with regard to universal access (III.) and the development of local content (IV.) and finally address the potential of developing countries to take advantage of the emerging long-tail (much wider access to information that is of local or niche group relevance (VI).

The record of foreign investment and aid to developing countries regarding information and communication technology is largely driven by self-interest. Be it individual communication via telephone or mass communications via radio and television broadcasting – private sector investments and western governmental aid would materialize only if profits are in reach or if it contributes to a favourable image in public back home. A comprehensive landline telephone infrastructure for Africa was never build, due i.a. to unattractive investment policies put forward by national governments and the subsequent reluctance of private business to invest. In this context, the rapid rise of mobile phones in Africa is largely a response to the institutional bottlenecks associated with fixed lines.

In face of the big challenges to make ICT work for development, the International Telecommunications Union (ITU) [6] and the former UN-Secretary General Kofi Annan in his so-called challenge to Sillicon valley [7] initiated the process leading to the World Summit of the Information Society (WSIS). While the WSIS' multi-stakeholder approach is overbroad it has implications for the present topic.

The second phase [8] of the WSIS was held to find solutions, reach agreements in the fields of Internet governance and arrange for financing mechanisms. The Tunis Agenda translated the eleven key principles identified at the first meeting in Geneva into action lines, three of which are relevant to this paper:

⇒ "ICT Infrastructure: an essential foundation for the information society (C2)" aiming at improving access, especially in developing countries, by means of all available technologies.

⇒ Creating an "Enabling Environment (C 6)" by making national governments and at the private sector cooperate in various fields, i.a. regarding infrastructure (root server; international domain names) and conducive ICT policies that encourage entrepreneurship, innovation and investment.

"Cultural diversity and identity, linguistic diversity and local content (C8)" is meant to reduce the language-based disadvantages in ICT use in general so as to eventually transpose the world's cultural diversity onto the internet.

Prior to the WSIS, numerous NGO and private sector initiatives in the field of ICT4D had already been in place. They might also coincide with or complement one or more of the three action lines.

The Tunis Agenda invites UN agencies and other intergovernmental organizations to facilitate activities among

different stakeholders, including civil society and the business sector, to help national governments in their implementation efforts. [9] The ITU is expected to support infrastructural activities (C2). The different facets of the enabling environment fall in the shared competence of ITU, UNDP, UN regional commissions and UNCTAD, while UNESCO is the facilitator when it comes to diversity issues and local content.

At the WSIS follow-up inaugural Internet Governance Forum (IGF) of November 2006 in Athens "Internet Governance for Development", entire sessions were devoted to the issues of universal access and diversity, however without any resolve to facilitate real action.[10]

In 2006 the Global Alliance for ICT and Development (GAID), the successor of the United Nations ICT Task Force [11], a global multi-stakeholder forum was created to enhance the ICT-based achievement of internationally agreed development goals, notably reduction of poverty. While the IGF is a forum for discussion, dialogue and policy development, the GAID is funding specific projects. The GAID is funded by a Trust Fund to which voluntary contributions can be made.

Whether the different stakeholders working in the field of ICT4D will be better off under the umbrella of the IGF remains to be seen. It is doubtful whether the coordination function of the IGF will actually be able to accelerate the penetration of ICT in developing countries, and Africa in particular.

The first and foremost condition for development via ICT – be it for the creation of or the mere reception of content – is access. As of today a little more than one billion people on the globe have internet access. [12] Consequently the remaining majority is not able to use the blessings of internet applications – stretching from e-mail, e-commerce to e-learning and much more.

Universal access is not a theme confined to the subject of ICT. It was used with regard to other resources such as education, health services or satellites slots. In the seventies satellite technology played an important role in information and entertainment business, a technology which almost only first world countries could afford. While the rich north demanded to allow for the free flow of information, poor countries feared a cultural colonisation if they did not receive the financial help needed to complement the western media programmes with content of their own. [13] The good news is that scarcity of frequencies is not an issue with regard to the Internet and Internet access is more affordable than satellite slots. However there are multiple cost-intensive conditions for the economic and cultural potential of the Internet to become accessible for people in developing countries.

Internet access includes very different things such as access to electricity [14], a dial-up, wireless or landline broadband internet connection, as well as the necessary hardware and software. [15] Universal access as it is advocated by the Working Group on Internet Governance (WGIG) [16] has three components: availability, accessibility and affordability. Further requirements for

internet access are peering and interconnection agreements [17] and spectrum policy. [18] We will look at the types of internet connection and receiving devices in more detail as they are elements where entrepreneurs may be able – depending on the circumstances – to actually choose from different possible solutions, in spite of the fact electricity supply and the conclusion of peering agreements may be beyond their reach.

1. Access to the Internet

Only about 6 of 100 individuals have access to the internet. [19] The ways of accessing the internet are manifold. A first distinction can be made between fixed lines (coaxial cable, fiber optic or copper wires) and wireless access.

1.1 Fixed Line Option

The fixed lines encompass telephone cable and glass fibre cable which can be used for broadband access. Glass fibre is superior when it comes to transporting high bandwidth over long distances. [20] In view of poor telecommunications infrastructure and broadband access, the most typical form of access in developing countries are still dial up via telephone cables, using a type of modem. The inconveniences of this model are obvious, considering that in rural areas the telephone is often a scarce resource which is needed for outgoing and incoming urgent telephone calls of an entire community. Glass fibre is expensive due to labour costs. These costs are however lower in developing countries. [21] Consequently it seems very unlikely that the existing fixed landline infrastructure will remain the premiere and exclusive strategy for securing internet access up to the last mile. Fixed landlines will be the technology for connecting cities, while smaller communities will eventually have to rely on wireless access.

1.2 Wireless Access Option

The other component of access is thus wireless technology. Due to its ability to cover wide geographic areas (max. 70sqm) efficiently, it is beginning to provide the most efficient solution for innovative and high-speed broadband services to consumers in remote and underserved areas. There are different technologies for wireless internet *broadband* access. The most well known are WiMAX (Worldwide Interoperability for Microwave Access), WiFi as well as satellite WiBro, UMTS-TDD, HSDPA and Satellite.

WiMAX is best described as a standards-based technology enabling the delivery of last mile wireless broadband access as an alternative to cable and DSL (Digital Subscriber Line). It is especially a viable alternative where broadband access has been economically unavailable. [22] While WiMAX may offer a high bit rate (70 Mbit/s) over a long distance (up to 70 miles) under ideal circumstances, in urban environments it is likely that users may only receive 10Mbit/s over 2km. With WiMAX one can either have high bandwidth or long reach, but not both simultaneously. The other feature to consider with Wi-

MAX is that available bandwidth is shared between users in a given radio sector, so if there are many active users in a single sector, each will get reduced bandwidth. The technology is thus very suitable to low density environments and easily installed via an antenna on a roof top which might serve about 1000 users. [23]

WiFi is a brand name originally licensed by the Wi-Fi Alliance to describe the underlying technology of wireless local area networks (WLAN). WiFi technology operates in an unregulated band of radio spectrum designated 802.11. This is an unlicensed band of spectrum that is shared and available for use by anyone. Up to now it was most commonly used for personal appliances, such as a microwave oven or a cordless home phone, and for specialized purposes such as the radar "gun" used by law enforcement to read the speed of a moving vehicle. A typical Wi-Fi setup contains one or more wired access points and one or more clients using wireless devices. WiFi is becoming popular in large cities allowing wireless internet access for free on park benches or in train stations. Costs for a ten square mile WiFi network "cloud" amount approximately US$ 150,000 or more – a fraction of the price for wired broadband access. Smaller "clouds" are a lot cheaper. [24]

The other options for wireless Internet broadband access, e.g. access via satellite, constitute for the time being no suitable alternative for access in developing countries mostly because of the high costs [25] involved for access and/or devices.

1.3 Achievements and Obstacles

There hasn't been a real breakthrough yet and the ICT situation regarding broadband access in rural areas of developing countries is very much unchanged.

As mentioned above one the central institutions for ICT4D after the WSIS is the Global Alliance for ICT and Development (GAID) [26]. One of its flagship projects, "Broadband for Africa", funded by the World Bank and other organisations involves three interrelated elements:

The first step is the completion of sub-marine cable that is to surround the African continent. [27] The final piece from South Africa to Sudan called the 'East Africa Submarine Cable System' (EASSy), should be completed by the end of 2007 and connect up to 20 points on the African coastline which should serve as basis for connections to locations inside the continent. It is originally an initiative of "New Partnership for Africa's Development (NEPAD). [28]

In a second phase, the Regional Communications Infrastructure Project (RCIP) will be based on the coastline access points created by EASSy and connect Kenya, Burundi and Madagascar via fixed land lines. Not all East African states, however, are committed to the EASSy-project as African newspaper reports suggest. [29] Kenya for example has voted instead for a solution where first 'The East African Marine Systems' (TEAMS)

will be in charge of connecting Kenya with Fujairah in the Gulf of Oman via Mombasa [30] and, second, India's Reliance Communications got a contract to connect Kenya, Mozambique, South Africa, Tanzania, Madagascar and Mauritius via a submarine and land cable. [31] Afterwards, it is planned to connect Zambia, Botswana, Ethiopia, Djibouti, Malawi, Uganda, Ruanda, Lesotho, Zimbabwe and Somalia.

Already the responsible multi-stakeholder group within WGIG in 2005 came to the conclusion that the primary governance mechanism for telecommunications networks is through national governments. [32] While some infrastructures are privately owned, they often happen to be the monopolistic successor to a former government agency, or duopolies [33] having to fear only weak competition. Therefore the WGIG suggested that the national regulator should secure the equal distribution of resources through mechanisms such as universal agreements and the encouragement of investment. [34] This lesson is further evidenced by the SAT3 experience: This submarine cable connects African countries on the western coast to the Internet. The conditions for access did not considerably improve because the services do not reach institutions and individuals in developing countries as prices for broadband internet access in many SAT3–connected countries have remained prohibitive. [35] National governments need to liberalise the telecommunication markets and to allow price reducing competition. [36] Unfortunately, the experts on the pertinent IGF panel on access complained – again – that the staggering number of those having access especially in developing countries is still due to national monopolies over infrastructure in the local loop and lacking competition. [37]

A similar threat faces wireless access. A couple of African governments are considering to levy or have already implemented so called licensing fees for the creation of hotspots or the use of the radio spectrum [38] in order to compensate losses expected in the event of increasing broadband usage. Such license fees will i.a. raise prices for consumers and reduce the leverage this technology could have for universal broadband access.

As far as access via mobile devices is concerned, the content available, e.g. over Wireless Application Protocol (WAP) additional costs through licensing regimes or taxes might become obstacles to widespread adoption [39]. The mobile segment of the telecommunications sector in Africa has however been subject to more liberalisation.[40]

2. Receiving devices

In developing countries, the availability of devices that may be connected to the Internet is still below a ratio of 5 for 100 individuals.[41] Even though there are today about 20 times as many PCs than 17 years ago, the predominant increase of PC in urban areas as opposed to rural areas must be taken into account.[42] Even in agglomerations an SME using ICT may do that only in one of the many Internet Cafés. There are currently two main

strategies on how to raise the number of devices able to connect to the Internet in developing countries.

2.1 Cheap PCs

One strategy is to produce and distribute cheap computers that are adapted to the typical environment of users in developing countries. The best known initiative carries the ambitious name of "One Laptop per Child" or "XO-Children Machine" and was launched in January 2005. [43] The laptop has been designed by a team around Nicholas Negroponte, formerly Professor of the Massachusetts Institute of Technology (MIT), and the cost of its production amounts to about 100 U.S.$. Solid and colourful, it provides for nearly all common uses and runs only open source software. Millions of these laptops are expected to go into production late in 2007, with Thailand, Brazil, Uruguay and Rwanda, among others, signed up for the launch.[44] Over a wireless local network the laptop will connect to a school server containing educational material. Internet access will depend on whether cable or wireless access is available.

A similar product, a Linux-based desktop for 150 $, is ready for sale by a Chinese firm called YellowSheepRiver Municator.[45] In contrast to the MIT laptop it is not primarily aimed at children, but at all kinds of people that need an affordable computer. It will primarily be sold in the rural area of western China as well as Southeast Asia. [46] A list of other low-budget hardware products has been published by the Information for Development Program [47] of the World Bank.

2.2 Mobile Phones

The second strategy tries to benefit from the much higher adoption rate of mobile phones in developing countries compared to any other ICT-device. In Africa, less than 15 % of the population own a mobile phone [48], but it is still the most prevalent ICT device.[49] At the Consumer Electronics Show in February 2006, Microsoft showed off a prototype of a "Cellular PC" that used a TV screen as a display and a keyboard for input. Both peripherals would be connected to the phone via special adapters. According to Microsoft, cell phones make more sense as a basis for inexpensive computers: they are common, relatively cheap, and the infrastructure exists for their usage already.

Fortunately even less sophisticated telephones have become a viable alternative to Microsoft's cellular PC and PCs in general. Entrepreneurs already access to the internet via their mobile phones. Mobiles of the second generation are able to use Internet services via the General Packet Radio Service (GPRS) or Enhanced Data rates for GSM Evolution (EDGE) standard. Third generation mobiles will be able to benefit from the much faster Universal Mobile Telecommunications System (UMTS) or the High-Speed Downlink Packet Access (HSDPA) standards. The coverage of these standards in developing countries is continuously being expanded. [50] Even if the mobile

phone user misses the broadband experience, the form of access is sufficient for many development furthering forms of information and communication.

2.3 Advantages and Drawbacks of both solutions

The 100$ laptop initiative leaves many questions open: Why is the project primarily designed for educational use and not for business purposes? How will the machine be integrated in a local primary school curriculum? One may wonder, whether a PC is the essential tool for providing better education to children in developing countries, where classrooms and qualified teachers may be *the* lacking resource. In reality the 100$ laptops will certainly be used by whole families for different, even business purposes and thereby benefit larger communities beyond the initiative's intentions.

There are of course a couple of problems with Microsoft's idea as well. First it may require an external display. Although TVs are an obvious choice for an inexpensive external display, they are not terribly common in a lot of the places where the 100$ laptops will be distributed. In addition, a TV's is not adapted to being used as a monitor.[51] The second issue is that a Microsoft product is likely to run Windows/Vista as an operating system, which is very uncommon for mobile phones and would put them well out of the reach of the MIT program's budget.[52] Up to now there is as regards affordability a lack of alternatives to cheap PCs such as the 100$ Laptop with its multiple possible applications. [53]

If however the mobile is not expected to replace a PC with high speed internet access and premium content on a big screen, mobile technology is very attractive from a business point of view. Even if GPRS and EDGE telecommunications providers still charge downloading content by kilobytes [54], leading to extraordinary prices for very little information and even if with GPRS and EDGE voice traffic is given priority over internet traffic thus extremely slowing down transmission: mobile telephony is mobile, is more common, more familiar and less demanding with respect to literacy and language skills. [55] The initial investment in infrastructure for users and providers is lower and prices for telephones as well as telecom services are continually going down. [56] The mobile therefore is currently *the* ICT device for the rural poor that don't have access to internet cafés.

3. Interim Findings

The central results of this section can be summarised as follows:

⇒ Internet broadband access is or will be shortly available and in coastal areas even accessible to the general public. However access is in many places

not affordable, due to monopolist pricing of network owners or license fees on running a wireless network. National regulations in the telecommunication sector especially with regard to the fixed line segment are the core obstacle in making the internet broadband access broadly accessible. Commitments in telecommunications services were first made during the Uruguay Round (1986-1994), mostly in value-added services. In extended negotiations thereafter (1994-1997), Members negotiated on basic telecommunications services in the Negotiating Group on Basic Telecommunications. [57] Since then, new commitments have been made either by new Members, upon accession, or in a unilateral fashion by an existing Member. The Doha Round has so far not produced any significant results. African countries have not committed themselves to significant liberalization as the unilateral reforms of their markets took place after the negotiations. [58] WTO-members are often afraid that foreign providers will successfully compete in the profitable sectors of the market, while they will not assume the role of a universal service provider.

⇒ Broadband access is not a primary concern as long as people at large cannot afford devices able to connect to broadband.

⇒ It is possible to lower the costs for PCs. In many instances they are subsidised or donated for a specific purpose which limits their entrepreneurial use. Moreover they rely on fixed lines or wireless access points for internet access which are not affordable for the broad majority.

⇒ Internet access via a mobile phone to a limited type of applications is already a possibility for those who own one. However the price for the data downloaded is still unaffordable for many. This option is currently being pushed by interested investors and governmental and international institutions. [59] Because of the high mobile penetration and the familiarity with the technology access by mobile phones is the most promising technology even if users will not enjoy all attractive applications of the internet. As the WiMAX standard will spread at least in agglomerations broadband access there could become a lot cheaper and faster, especially if mobiles supporting WiMAX become available.

4 Prerequisites for Local Content Creation

In order for ICT to become a tool for development it is important, but not sufficient to supply the necessary technology. The internet is adopted [60] by people only if it also contains locally relevant information. [61] Even if a lot of useful global content is available on the Internet, content related to their daily needs is what users are most interested in.

4.1 What is local content and do developing countries need it?

What is local content? [62] This question triggers very different answers depending on who is being asked and where the person lives. For the inhabitant of a first world agglomeration it may be the opening hours of local shops and museums, dates for waste disposal, bus schedules and availability of certain goods, stock exchange news, information on local public construction works and national as well as local political debate, satire, job offerings in the area etc. In many developing countries up to date local content may not yet be in place. It is however from an entrepreneurial point of view easy to imagine that reliable local business news on the availability of goods and services as well as quality and prices in countries where transportation is rather longsome will save enormous amounts of time and/or money. In rural areas where up-to-date newspapers are rare or inexistent or do just not contain the relevant information, checking on market sales prices, job offerings, and new local goods and services opens new opportunities.

4.2 Technical equipment

Local content will be created by local people. The creation of content requires better technical equipment than just a mobile phone. With regard to this aspect the connection to internet broadband access and the availability of PCs mentioned above are therefore indispensable. In response to this need, the follow-up institutions of the WSIS, namely the aforementioned GAID coordinate a second flagship project named Telecentre 2.0. [63] The aim of the project is to move beyond simply providing access but also include e-learning, training and skills development, local content generation, financial services, e-government and others services relevant to the local community. Partners rallying under the GAID/telecentre.org banner [64] will work in four areas:

1) building telecentre networks;

2) developing content and services;

3) documenting knowledge and learning; and

4) convening events for telecentre leaders.

Until 2010, 100.000 telecentres in at least 20 countries should be functioning. Visits to telecenters have however been below expectations in several countries. [65]

4.3 Languages

Another issue often mentioned in connection with local content is the availability of local languages as means of communications. Information and its reception depend to a high degree on language. Even if looking for sounds or images, basic knowledge of the internets site's language or at least its script is highly desirable. [66] About 72% of the WWW pages are in English, twelve privileged languages account for 98% of all webpages. [67] A further obstacle for people mainly from less developed countries to receive and add information is thus apparently the language. [68] While

learning one of the dominant languages is certainly a giant step forward, it is being argued convincingly that processing information and knowledge – also on ICT – is best accomplished in one's native language. [69] To create local content in underprivileged languages requires however sweeping and very expensive measures: Creating [70] the linguistic resources [71], elaboration of an internet terminology, elaboration of the necessary resources such as a the system of script [72] and a spelling and their representation on the computer, mapping the symbols into a digital table [73], establishment of standardized fonts of characters, hardware manufacturing (especially keyboards) and software development etc. This Sisyphus work [74], while certainly a desideratum for political discourse on the internet, it is not prerequisite for applying ICT as a tool for development.

It may be true that ICT usage and the non-conformity of devices to the linguistic needs have an impact on the local language or the use of the local script [75], it should be noted however that with regard to receiving and imparting entrepreneurially relevant information via mobile phones fluency and literacy in English or another dominant language is not a must. The ICT language and script applied can therefore not be considered a relevant factor as long as the focus lies on the purely entrepreneurial use of internet content available via mobiles. [76] If ICT is to be used in an educational context, languages become more of an issue. [77]

5   What are the current entrepreneurial opportunities?

ICT is a tool that can be used for wide range of development enhancing purposes. The applications as everywhere else range from e-government, to medical support and various types of counselling related to education and e-commerce. The following paragraphs demonstrate three different types of ICT related entrepreneurship.

5.1. Providing access to ICT

While the numbers of devices that can connect to the internet are steadily on the rise, many individuals are unable to afford devices and telecommunications services on a permanent basis. Entrepreneurs have therefore taken to enabling access via PCs in internet cafés or kiosks as well as at public PCs in rural areas and offering airtime on mobile handsets a profitable business.

Internet cafés are a frequent business in large cities; they are open 24 hrs and sell the seats before the screen by the hour. [78] This obvious business model has its precursors in, legally speaking, renting telephones, fax machines or other devices which not everybody can afford. Development aid projects have adopted the model and donated public PCs or mobile handsets that can be used for setting up a business. The GSM Association's Development Fund supports i.a. within the Shared Voice Project, the supply of mobile handsets to entrepreneurs that sublet them to third persons. [79]

The internet and its applications partially replace older sets of communication and information gathering, but also offer totally new forms of usage. While owners of fax machines will have less clients and people search the internet instead of library catalogues for useful information, many people will do things via internet and other ICT applications, which they have never done before. An example may be to search on the internet for the local supply and demand of certain products and services and, depending on the price, participate in the bidding process. This helps reducing transaction costs and increase opportunities for entrepreneurs.

The business of providing access to ICT has thus not just shifted from one technology to another. The sector in general is growing as more and more locally relevant information becomes available over the internet and people become aware that it is an extremely useful resource for them.

At least in more densely populated areas internet cafés on the one hand and renting out a mobile telephone on the other hand, must each be considered as competing services. However the often uniform pricing for either broadband internet access via PC or mobile phone access to WAP-content [80], gives not much leeway to local providers of access devices when it comes to pricing. Intermediaries as local access providers are therefore an ephemeral phenomenon and will vanish as soon as more and more people themselves own devices and are able to afford internet access.

5.2 ICT as enhancing traditional business

One of the more durable models for enhancing entrepreneurship through ICT is to integrate it in operations of traditional business.

When mobile telephones are introduced in low-income economies, two main types of effects occur. The first is that the cost and time of collecting information to support economic decisions are reduced. [81] The result is quantitative and qualitative – an individual can make more transactions in a given time thereby reducing transaction cost, and each decision is based on better and increased availability of affordable global and local information. In both cases, value is added. The other effect is the network effect. As the number of users in a communication network increases, the number of possible connections increases with the square of the number of users. This effect accelerates the creation of value added. [82]

In addition to that a traditional business with ICT support may see the barriers to entry lowered and be able to uncover new sources of revenue.

5.2.1 Production of and Trade in Goods and the 'Long Tail'

While it is technologically conceivable to integrate in the traditional production (automated irrigation, textile industry), such sophisticated ICT applications are capital-intensive and thus rarely used to upgrade labor-intensive

industrial processes in developing countries. The main use of ICT in traditional business may be in the field of optimizing communication and information availability on the relevant markets.

A first example for this is TradeNet [83] which went into operation in early 2007. The site which is also accessible via mobiles offers a platform for farmers and traders in agriculture where they can place an advertisement on what they want to buy or sell, including price per unity, amount available, quality modes of delivery and payment as well as a contact. The platform allows farmers and traders to find the economically most advantageous deal and eliminate or reduce the role of intermediaries in the value chain. Perishable goods may be more likely to find a buyer in time than the traditional systems of established trading partners and places. As a consequence of real-time information on where to sell perishable goods, the palette of goods sold might actually be adapted. More access to information about actual market prices also increases transparency and makes farmers less vulnerable to intermediary traders that take advantage of asymmetric information about prices.

A second ICT application has been created for traditionally working fishermen in Senegal. The platform which is also accessible to mobiles is part of an aid project which has been supported by the U.S.-based Information for Development Program (infoDev) and carried out by an NGO called Manobi [84]. Via the platform fishermen can firstly see in real time which types of fish currently sell best and direct their work accordingly; they secondly receive a weather forecast and thirdly can send an alert in case of emergency at sea. While the service was available for free it now costs a minor fee.

Those applications can be considered a tentative manifestation of the so-called 'Long Tail' thesis [85]. ´This thesis holds that more and more widely available information, knowledge as well as content, products and services can be selected by the user from a wider variety of choices than with traditional ways of communication, and enables niche consumers to self-select. [86] In those sectors where inventory storage and distribution costs are insignificant, it becomes economically viable to sell otherwise relatively unpopular products and services; however, when storage and distribution costs are high, only the most popular products can be sold. For audiovisual media the result is that instead of only 'blockbuster' content being viewed, with choice constrained by the advertising budgets of major TV networks or film studios, the internet companies that make 'Long Tail' of creative content available allow consumers to bypass the gatekeepers (TV networks) and directly tapped the pool according to their particular preference. Hence P2P networks which began by trading large volumes of popular music tracks increasingly trade smaller volumes of niche music, some of which becomes popular through such trading. Popular bands are starting to emerge due largely to their presence on the Internet, without the need of initial filtering and marketing by a music company.

With regard to agricultural products the tail may not be as long. Substitutes to basic foodstuff are not as numerous as music products, storage may be costly and there may be fewer niches type products. But still – farmers and traders in agricultural products experience an incredible increase in choice in where to buy in which quality. It will become easier for producers and distributors in all kinds of sectors to assess the actual demand of customers – be it among developing countries or in the North. There are countless niches that were never served, containing each an opportunity for someone to build a micro-business. A micro-business has then also the opportunity to do cheap marketing for its products via a website that displays the products on sale. However, actual delivery will then be another challenge if orders come from beyond the immediate local environment. Seting up a website is however still very costly and only well endowed firms with an export business may be able to afford such a marketing channel and the moment. Regarding mobile telephone access the first platform, BangO [87], where enterprises can do marketing has recently gone into business with prices beyond what many SMEs from developed countries could afford.

The new opportunities may however also destroy existing buyer-seller relationships which will possibly replaced by relationships where ICT is used on both sides. However consumption and trading in general will be enhanced if earlier separate markets begin to interact. A question mark however is whether the physical delivery of corporal goods will function satisfactorily since means of transportation have not become ICT enhanced. A different issue are products that can be delivered in digitised form, such as software, music, brochures which will be treated below.

5.2.2 Services

The third example refers to banking. [88] Internet and especially mobile phones are an excellent way to introduce banking. Several companies offer so-called M(obile)-Banking which makes banking available to many new clients. In early 2006, the mobile phone became the first communications technology to have more users in developing countries than in developed ones. WIZZIT is a start-up mobile banking provider [89] that offers a banking account accessible via mobile phone and debit card and without charge for initial registration. Physical contact with the bank is only necessary to set in savings. Customers can use their mobile phone to make person-to-person payments, transfer money, purchase prepaid electricity, and buy airtime for a prepaid mobile phone subscription. The banks earns upon transactions fees only, which vary from bank to bank.

M-banking not only allows individuals to manage the few resources they have in a safe way, it also enhances local entrepreneurship since money can be transferred without risks. Especially loan repayments and utilities payments [90] can be made regularly without necessitating a displacement on the part of the customer. In cases where the bank collaborates with telecommunications

providers, loans [91] to SME may become less risky for banks and thus more frequent as they can always threaten to cut off the mobile.

5.3. Building new ICT based business models

The most promising type of ICT enhanced entrepreneur-ship is the one that uses ICT not only as tool for commu-nication and information gathering, but actually creates tools and other digitised products and services. The most common examples are music, videos, and soft-ware supplied over the net, and services such as stock broking or financial or medical advice, home page de-sign, back-office work for banks and insurance compa-nies. With qualified human resources in place such en-terprises in developing countries have tremendous po-tential for offering competitive global services. Yet, such type of enterprise heavily relies on broadband internet access and PCs and this may still be bottleneck in ef-forts to offer these services in poor developing coun-tries.

The need of broadband connection for ICT based busi-ness is being taken into account by the so-called busi-ness incubators which have been funded by the World Bank. Such incubators exist in several African countries and bundle office space, internet broadband connec-tion, as well as legal and financial counselling and make it available to promising ICT based SMEs. The tenants of an incubator project in Mozambique offer services that range from juridical services online, an national search engine, web development services, an online sport magazine, the tourism portal of Mozambique and an enterprise for "Mobile" education.[92]

TradeNet is also a typical example of an ICT based busi-ness model. It relies on the first three years on public funding, but should then be able to sustain itself. The platform will offer advertisement space for free offers, but if contacts are made, users will be asked to pay a fee.[93] If it became more affordable to promote enter-prises via mobile phones to design this would also be an interesting field of business.

5.5. Interim Findings

The examples show that existing traditional business can be greatly enhanced thanks to ICT even at the pre-sent level of their development. It has to be noted how-ever, that a mainly mobile phone based form of ICT fails to connect to the global internet for reasons of mobile capacity and affordability. Most entrepreneurs will con-tinue to operate at a local or regional level even if their products could be sold in developed countries because they remain invisible on the internet.

The chance for even small entrepreneurs in developing countries provided by the 'Long Tail' will be to identify and serve niche-audiences with niche products and ser-vices on a world market for traditional and local goods, innovations and services. Craftsmen could also take to produce tailor-made products on demand for a price

premium. To locate demand for a niche product on the world markets requires the entrepreneur to browse the internet, something which can't be done by mobile phones. The availability and affordability of PC-based broadband internet access is therefore desirable if the full potential of the 'Long Tail' shall be realised.

Conclusion

Keeping in mind that ICT is certainly not the only tool for development, the WSIS analysis of the ICT-situation in developing countries remains valid: Universal broad-band internet access is not yet realized and local con-tent of developing countries is underrepresented on the internet. The paper shows however that thanks to contri-butions of different stakeholders the lacunae identified by the WSIS are being addressed.

Different initiatives have been undertaken with regard to affordable broadband access, via landlines or the mobile phones. The Kenyan example shows that an in-ternationally led top-down initiative as the GAID within the EAssy is not always welcome. The use of physical infrastructure and frequencies is unfortunately often subject to a licensing regime. In the more liberalised markets of mobile telephony revenues are being taxed. The success of the initiatives depends therefore mainly on individual national governments to create a competi-tive business environment, where access becomes an affordable option to any average citizen. The WTO Doha Development Round could bring momentum as the par-tial unilateral telecommunications market liberalisation, which has taken place after Uruguay could be translated into commitments. The persisting conflict over agricul-tural products keeps WTO-Members from making com-mitments in that area. [94] It is therefore not in the near future that broadband may come to everyone's door-step. The latter is true for PCs which are still to costly and would rely on the often deficient broadband access.

As far as providing access via mobile or PC are con-cerned and the ICT support of traditional business ICT even at this early stage must be regarded as a strong language-neutral tool for enabling entrepreneurship. The local or regional trade platforms that feature real time economic data, accessible via mobile phones con-stitute a giant step forward for entrepreneurs as does the widely available M-banking. They might be consid-ered a tentative application of the 'Long Tail' thesis.

ICT-based business still relies to a large extent on a high standard of technical equipment and therefore requires often private of public funding as in the case of Busi-ness Incubators. Realising the full potential of the 'Long Tail' will also require an increase in PCs and affordable internet broadband access. If entrepreneurs from devel-oping countries conceive not just the global web-community but also the slowly emerging local web-communities in the neigborhood as their possible con-sumers, at least minimal knowledge of one of the domi-nating languages as well as increased investment in ICT user relevant education may also become necessary.

Reference

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2. On MDG see: http://www.un.org/millenniumgoals/ (visited 11.3.2007).

3. See UNCTAD's press release on a new statistical website for key information on ICT data collection and dissemination, UNCTAD/PRESS/PR/2007/007 of Feb. 15, 2007.

4. See Cameroon as the only African country in a 2005 UNCTAD chart on the ICT use of business, http://new.unctad.org/upload/Data/Core%20indicators%20on%20use%20of%20CT%20by%20businesses%20and%20on%20the%20ICT%20sector_1.PDF.

5. An exhaustive detailed overview can be found on Wikipedia, http://en.wikipedia.org/wiki/Information_and_Communication_Technologies_for_Development (visited 31.3.2007).

6. Resolution 73 of the International Telecommunication Union (ITU) taken in Minneapolis in 1998, http://www.itu.int/council/wsis/R73.html, resolved to instruct the ITU Secretary-General to place the question of the holding of a WSIS on the now

    called United Nations System Chief Executive Board - CEB and to report to the ITU on the results of that consultation. It was decided that the Summit would be held under the high patronage of the UN Secretary-General, with ITU taking the lead role in preparations.

7. Published November 5, 2002, http://news.com.com/2010-1069-964507.html?tag=lh, (visited 31.3.2007).

8. The first phase took place in Geneva in December 2003; the second phase in Tunis Conference was held in November 2005.

9. Tunis Agenda for the Information Society, WSIS-05/TUNIS/DOC/6(Rev.1)-E, of November 18, 2005. 10. para. 103

10. The IGF is the Tunis (2005) compromise on the institution in charge of internet governance. While the U.S. wanted to keep the pre-2005 status, many southern countries supported a UN administration of the Internet, the root servers and the naming system which lies with the U.S. based ICANN (Internet Corporation on Assigned Names and Numbers).

11. Http://www.unicttaskforce.org/.

12. See the numbers presented at the IGF in November 2006: Regarding broadband 60 % of Europeans and Americans have access, 40 % in Asia and 0,1% of Africans, http://www.intgovforum.org/IGF-Panel5-011106.txt, (visited 9.3.2007).

13. Menghetti, E. (1992) Die völkerrechtliche Stellung des internationalen Satellitenfernsehens im Spannungsfeld von Völkerverständigung und Propaganda, Zürich, 185 ff.

14. Access to electricity is a problem in the rural areas of developing countries. In 2000 the percentage of individuals without access to electricity amounted to a third of the population in developing countries. The electric grids of bigger cities in developing countries tend to collapse if a bigger number of users go online, see Gopinath, K. (2006) Mobile Web and Developing Countries, Contribution to the W3C Workshop on the Mobile Web in Developing Countries December 5-6, 2006, 4, http://www.w3.org/2006/07/MWI-EC/PC/gopinath.pdf

(visited 27.3.2007). The designers of MIT's 100$ laptop had this problem in mind when they equipped it with a hand crank. The Chinese product equally consumes very little power. Another way to free users from unreliable power supply are commercially available solar powered PCs, even if at high prices, see https://www.solarpc.com/catalog/, (visited 27.03.2007). Other than device-connected solar power requires still too costly and pose the problem of storing energy, see Wikipedia, http://en.wikipedia.org/wiki/Solar_power (visited 31.3.2007).

15. As to the preconditions for using the internet (in one's own language), see Pimienta, D. (2005) Models and Approaches Linguistic Diversity in Cyberspace – Models for Development and Measurement, in: Measuring Linguistic Diversity on the Internet, UNESCO, Paris 2005, 13.

16. WGIG: Cluster 4 Assessment Report, April 25, 2005, http://www.wgig.org/docs/WGIGPaper-Cluster4-development.pdf (last visited 13 December 2006), 1.

17. Interconnection standards and agreements including peering agreements are critical to the successful functioning of the Internet and for maintaining its end-to-end and cost-effective availability and reliability. In so-called peering agreements the internet service providers in developed countries agree to accept traffic from one another's customers. The agreements are concluded between the different owners of the physical infrastructure and mostly confidential by nature. No data is available on whether the applicable ITU recommendation D.50 is actually being implemented. Since the internet traffic is not very dense and few users mail to developing countries, internet service providers (ISPs) from developed countries have no business incentive to enter a shared-cost peering agreement with ISPs from developing countries. The agreements concluded instead are so-called transit agreements where the ISPs from developing countries pay for inbound and outbound traffic[], thus subsidizing providers of the developed world. Unfortunately this is not only the case for international communication; even inner-African traffic might have to be routed via the U.S., because of the

lack of so called Internet Exchange Points (IXP) within the developing part of the world.

As peering agreements rely on a "critical mass" of customers of each of the contracting ISP it is difficult to imagine how African ISP should be able to gain this critical weight if prices remain high and new customers cannot be won easily. IXP-Construction is needed to reduce the cost for inner African or South American traffic.

18. Wireless access via WiMax, WiFi or GPRS relies on spectrum policies, management and availability. The subject has therefore been on the agenda of international organisations. Unfortunately the developing countries which could profit the most of this affordable technology are only insufficiently represented in standard setting bodies such as a professional organisation called Institute of Electrical and Electronics Engineers, Inc. (IEEE).

19. Computer and Internet Penetration Rates ITU (2004) http://www.itu.int/ITU-D/ict/mdg/, (visited 9.3.2007).

20. Tongia, R. (2005) 95.

21. Id..

22. http://en.wikipedia.org/wiki/WiMAX.

23. V. Haarhoff (2006) Uganda gets WiMax network, ITWEB, June 1, 2006, http://www.itweb.co.za/sections/telecoms/2006/0606011040.asp?A=SME&S=SME&O=FPIN, (visited 3.7.2007).

24. Levy, A. (2003) Creating Affordable Universal Internet Access, TechKnowLogia, January - March 2003, http://www.techknowlogia.org/TKL_active_pages2/CurrentArticles/main.asp?IssueNumber=19&FileType=HTML&ArticleID=475.

25. On satellite access see, R. Tongia (2005), 93.

26.   It is a multi-stakeholder cross-sectoral platform and forum that brings together all stakeholders representing relevant constituencies such as governments - development cooperation, foreign policy, finance, social, sectoral (health, education) and regulatory agencies; in the private sector - industry and workers associations, producers and consumers of ICT, the media; in civil society, NGOs, foundations, scientific, academic and ICT communities and individuals providing advocacy and oversight on Information Society issues and implementing programs addressing MDGs.

27.   The western side of Africa is connected via SAT3. To give it its full name, SAT3/WASC/SAFE Consortium is an international fibre that goes from Portugal to South Africa and out across the Indian Ocean to Asia. The cable system is divided into two sub-systems, SAT3/WASC in the Atlantic Ocean and SAFE in the Indian Ocean. The combined length of the SAT3/WASC/SAFE system segments measures 28 800km. It has 36 members who put up US$600-million to build and operate it for the life of the cable over the next 25 years. Of the African continent it connects Senegal, Côte d'Ivoire, Ghana, Benin, Nigeria, Cameroon, Gabon, Angola and South Africa. As the members of the Consortium are monopolists in their countries and liberalisation slow broadband access is still expensive in certain areas; see BBC New: Warning over African internet cable, March 15, 2006, http://news.bbc.co.uk/2/hi/africa/4787422.stm (visited 7.3.2007). Unconnected countries such as Namibia have trouble getting access, Jensen M. (2006) Open Acess: Lowering the Cost of Bandwidth in Africa, Association for Progressive Communications (APC), 8, APC Issue Papers Series 2006, APC-200610-CIPP-I-EN-PDF-0027.

28.   The NEPAD arose from a mandate given to the five initiating Heads of State (Algeria, Egypt, Nigeria, Senegal, South Africa) by the Organisation of African Unity (OAU) to develop an integrated socio-economic development framework for Africa, http://www.nepad.org.

29.   Vechiatto, P. (2007) Eassy (N)BINned, Feb. 20, 2007, ITWEB, http://www.itweb.co.za/sections/telecoms/2007/0702201600.asp, (visited 7.3.2007). For news coverage on the matter see, Fibre for Africa – Opening up Affordable Bandwidth in Africa, http://www.fibreforafrica.net

30.   Oyuke, J. (2006) Kenya signs undersea cable pact, The Standard, Nov. 21, 2006, http://www.eastandard.net/hm_news/news.php?articleid=1143961365, (visited 7.3.2007).

31.   "Kenya-SA fibre route planned", Jan. 14, 2007, Balancing Act, http://www.balancingact-africa.com/ (visited 7.3.2007).

32.   WGIG Assessment of Governance Arrangements for Cluster 1 a Issues (Telecommunications infrastructure, broadband access, VoIP, Peering and interconnection, spectrum policy and technical standards) April 12, 2005 at I.4., http://www.wgig.org/docs/WGIGPaper-Cluster1aFinal.pdf (last visited 13 December 2006). See also, Dufborg, A. (2005) in: Open Access for Africa, Challenges, Recommendations and Examples, S. Danovsky (ed.),, UNESCO 2005, iii.

33.   Keck, A./Djiofack-Zebaze, C. (2006) Telecommunication Services in Africa: The Impact on Multilateral Commitments and Unilateral Reform on Sector Performance and Economic Growth, Working Paper, 7

34.   Id. at I.5. (b).

35.   Malcalm, E. (2004) Flattening The World -The Prospects for Fiber Optic Technology in Africa http://www.iconnect-online.org/Resources/Flattening%20The%20World_Ebenezer%20Malcolm.pdf/download (11.3.2007).

36.   See Chinn, M. D. and Fairlie, R. W. (Sept. 2006) ICT Use in the Developing World: An Analysis of Differences in Computer and Internet Penetration, NET Institute Working Paper No. 06-03, available at SSRN: http://ssrn.com/abstract=936474, who emphasise that a similar level of legal development is important to bridge the digital divide, 28.

37. See IGF Inaugural Meeting November 2006, Minutes of the Access Panel, Bagiire, V.W,. Colaboration on International ICT Policy for East and Southern Africa, Uganda; Dempsey, J., NGO Center for Democracy and Technology, U.S.A.; Woodcock, B., Packet Clearinghouse, U.S.A., http://www.ingovforum.org/IGF-Panel5-011106.txt, (visited 8.3.2007).

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40. Keck, A./Djiofack-Zebaze, C. (2006), 7 (supra note).

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57. The WTO Basic Telecommunications Agreement ("BTA") is a plurilateral agreement, meaning that although only a subset (roughly 84) of the WTO's 144 members have made specific commitments for basic telecommunications, all are entitled to take advantage of the trade benefits conferred by those commitments. Most countries making specific commitments under the BTA did so as part of the negotiations concluding in 1997, but countries may continue to make new (or improved) commitments in variety of ways: (1) when joining the WTO; (2) as part of a formal "round" of negotiations unilaterally. Very few African countries made commitments see http://www.wto.org/english/tratop_e/serv_e/recap_e.xls; or (3) (13.3.2007).

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64. International Development Research Centre (IDRC, Canada), http://www.idrc.ca/index_en.html; Microsoft; Swiss Agency for Development and Cooperation (http://www.sdc.admin.ch); the Malaysia based Global Knowledge Partnership (GKP), http://www.globalknowledge.org/; dozens of local or regional networks.

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70. Håkansson, A.-K. /Deer, K. (2006) Indigenous ICT Taskforce, IGF-Contribution, p. 2, http://www.intgovforum.org/Substantive_1st_IGF/IGF_contr.f.doc (last visited: august 18, 2006).

71. For a detailed description of the incredible work that has to be done, Diki-Kidri, M. (2006) L'accès au cyberspace des langues peu dotées, Presentation for Union Latine of UNESCO at the ITU an UNESCO Global Symposium on Promoting the Multilingual Internet, Geneva, 9-11 May 2006, p. 4, http://www.itu.int/ITU-T/worksem/multilingual/papers/sintro-paper-diki-kidiri.pdf (last visited August 18, 2006). Especially the analysis of sounds must happen with great delicacy otherwise the language's richness and oral local variations will be lost. Håkansson, A.-K. / Deer, K, 2. Already writable languages have lost such variations; only terminology, but not a specific spelling depicting the articulation will reveal whether an American or and Englishman has written a text.

72. Preferably a script proper to a dominant well-known language spoken in the area should be chosen so as to avoid that people who know how to read have to learn another script.

73. The Unicode standard assigns a unique number to each character used in the written languages of the world. The storage of these numbers in text processing comprises another topic; problems result from the fact that much software written in the Western world deals with 8-bit or lower character encodings only, with Unicode support added only slowly in recent years. Consequently, the fact that a character has been encoded by UNICODE standard does not mean working with it becomes directly possible. On its homepage Unicode provides a list of Unicode enabled products, www.unicode.org/onlinedat/products. html, (visited 31.3.2007).

74. It should be noted however that great efforts have been undertaken already prior to the WSIS to bring minority languages to the internet, see the e.g. the B@bel Initiative of the UNESCO launched

75. Millions of SMS are exchanged in Hindi, but spelt phonetically in Latin script since mobiles with a Devanagiri touchstone set are not so widely available. It could be said that exclusive availability of mobiles with Latin characters will erode the otherwise well established writing and reading in Devanagiri, see Balakrishnan, A. (2006) A future with Hindi in English script? Oct. 27, 2006, http://www.rediff.com/money/2006/oct/27ab.htm, (visited 6.3.2007).

76. A Bangladesh based project of The Development Research Network (D.net) is about to use Smart Phones instead of regular mobiles because although web browsing is not convenient for the users, as the screen is very small, See (2007) Evolving "Mobile Lady" into "Info lady": A Solution to the Financial Sustainability to the Telecentres, Innovative Solution Series 1, http://www.dnet-bangladesh.org/main.html, visited (9.4.2007)

77. The 100$ laptops will provide the possibility to write in the locally most prevalent language.

78. An especially successful example is Busyinternet in Ghana, http://www.busyinternet.com.

79. The distribution of computer under the sister project "Shared Access" took place in Kenia. Nigeria is the target country for distributing mobile handsets. For more details see http://www.gsmworld.com/developmentfund/projects/voice.shtml.

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81. Tanburn, J./Singh, A.D. (2001), 3.

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89. For other examples see Wishardt, N. (2006) Micro-Payment Systems and their application to mobile networks, International Bank for Reconstruction and Development/The World Bank, Washington D.C.

90. Ibid., at 43.

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What type of national ICT policies maximize ICT benefits?

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Abstract

There is a general agreement that policies are needed to bring the benefits of information and communication technologies (ICTs) to developing countries. This paper argues that the benefits of ICTs lie in the opportunities it offers developing countries to learn, innovate and create ICT-based jobs, products and services. ICT policies that are tailored to realize these opportunities are likely to enable individuals and organizations to fully participate in and contribute to the global information society while those policies that focus largely on "needs" may fail to lay the foundation for future growth of the information society.

The paper looks at Africa's current ability to harness the opportunities ICTs offer. It uses the growth of the mobile phone in Africa and strategies of a number of countries to identify key policy elements and gauges the Korean and Zambian ICT strategies against these elements. It concludes that strategies that seek to realize ICT opportunities often generate clear ICT visions and action-oriented, focussed and measurable targets than those that focus on needs.

Introduction

It is often taken for granted that "policy matters". However, the effectiveness and performance of a particular policy depends largely on the 'opportunities' it offers key stakeholders rather than the "needs" to be met. Policies that focus on opportunities market the dividends that all key players stand to gain if they invest their resources, technologies, time and skills in the strategy. It is these opportunities that attract the interest of all the players and lays the foundation for future growth .

Policies that emphasise tend to focus on the supply-side of ICTs and thus catalogue the extent of the problem, identify those who are in need (e.g., users) and responsible (e.g., service providers), and then design measures to correct the imbalance (e.g., taxes). They Ignore the demand-side and curtail the emergence of a vibrant ICT industry, discourage investment and knowledge development, all of which a vital in bridging the digital.

In practice, most countries' policies fall in between these two extremes. In Africa, countries that have followed the National Information and Communication Infrastructure (NICIs) scheme designed by the African Information Society Initiative (AISI) (e.g., Ghana, Malawi, Rwanda and Zambia) seem to adopt ICT policies that emphasise "needs" while countries that develop their own policies (e.g., Egypt, Mauritius, Morocco, South Africa, and Tuni-

sia) seek opportunities. [1]

The countries that follow the NICI process conduct an extensive search for national priorities and needs, sensitize the community, develops ICT frameworks and write policy documents, action plans and legislations and develops implementation and monitoring bodies, among others. [2]. The other group of countries focus on the development of the building blocks for the information society (human resources, infrastructure, effective government, ICT financing and streamlining investment laws etc). The countries that develop their own policies are said to have been more successful in Africa. [3]

The difference seems to lie in the perception and strategies rather than in intentions of the overall policy. One set of policy makers realize that the only way to effectively bridge the digital divide is to "... create an environment in which entrepreneurs can flourish, in which minds can expand, in which technologies can reach new frontiers". [4] It is the individuals, firms and organizations that will develop and use ICTs to deliver services, create jobs and wealth for the country. This strategy seems to work.

The other set of policy makers view the poor as victims caught on the wrong side of the digital divide and are denied the benefits of ICTs. In this case, identifying the needs and providing quick-fixes (e.g., cheaper gadgets and networks etc) that are specifically designed for the poor forms a large part of the solution. In poor countries, the list of needs could be endless and conflicting. Experience shows that this strategy, so far, is not successful in narrowing the digital design.

Part of the challenge resides in the fact that many strategies drawn from policies that focus on needs are often designed as an "end" (standalone mini projects) rather than to serve as foundations for future development. This could stall development. Mark Bernett, who helped make Zambia become the fifth African country to get onto the internet, summed it up as follows: "*By 1993, we had decided that we wanted "the real thing".. full Internet access, .. There were plenty of people who said that Africa had other priorities - after all, wasn't Fidonet (e-mail) working - or that Africa needed its own systems of communication...but with the relevant bits of string and sticky tape, ..[Africa] has gone from Zambia being one of the only countries with a connection to no country being without*" [5].

Although there were 4 donor-sponsored, email-based projects that the University of Zambia had successfully executed by 1993, no donor was interested in financing

full internet access. Thanks to the lack of support, the University devised its plans, got a loan and developed Zambia's first internet service provider (ISP) and demonstrated to other players that internet services were not a privilege for advance countries. [6]

It may seem bizarre that donors that were interested in connecting universities and health centres were not interested in internet connectivity. In reality, the email-based projects were designed to be a success in themselves and not to build capacity needed to join the internet revolution. And yet, it is such ISPs that have formed the backbone of the current internet-based businesses, community, government, and individual services without which the divide would have been much wider.

A national ICT policy should address these challenges by providing the basic building blocks, streamlining its legal and regulatory policies to stimulate learning, creativity and innovation. For example, the Uganda Communication Commission (UCC) has provides grants and waives the licensing fees for internet cafes, telephone centres, postal and courier facilities in rural areas. Since 2003, it has supported the development of 20 telecentres, 54 ICT training facilities, 50 internet cafes, 316 pay centres and 25 rural postal service offices in rural Uganda. In addition to expanding the ICT services to rural areas, it has created entrepreneurs, jobs and technology awareness and wealth. It is a strategy that maximizes opportunities and benefits for all key stakeholders. Therefore, it is possible to see the digital opportunities in the digital divide even for the poor.

The first part of the paper looks at the ability of Africa to harness the opportunities ICTs present and second looks at the key ICT strategy elements needed to realize the opportunities it offers. The third section gauges the ICT strategies of Korea and Zambia against the elements.

1. Harnessing opportunities and perception of policy makers.

1.1 Can Africa harness the opportunities ICT offer?

ICTs contribute to economic development in two ways: 1) the effective use of ICTs in production, distribution and marketing of products and services, and 2) the production, assembly and export of ICT products and services. [7] The use of ICTs by firms, institutions and individuals is expected to results in increased productivity while the production of ICT products and services helps expand the economy and increase and diversify exports.

Some would argue that Africa is already harnessing the opportunities that ICTs offer. There are now many African people connected and others who are employed in the ICT sector directly or indirectly. Africa is saving time and resources by putting reliable and faster communication tools in the hands of its people, firms and institutions.

In comparison to other regions, even when one considers the level of economic development, Africa appears to be

Figure 1. ICT opportunity Index of African countries

Source: ITU
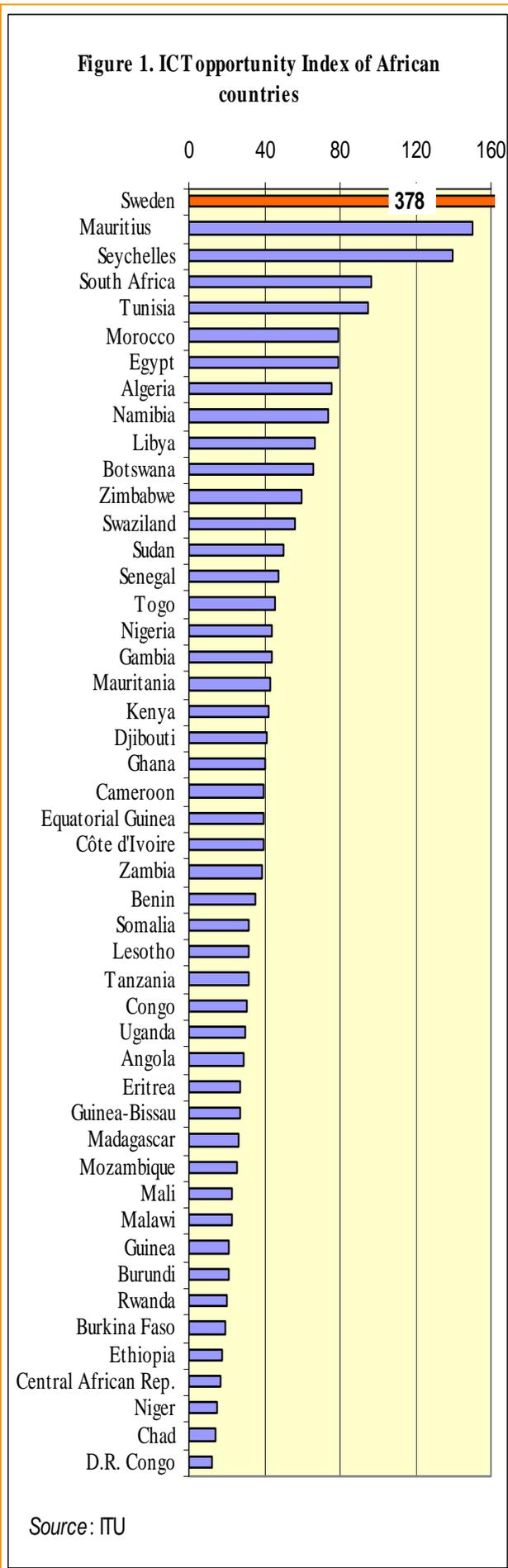
lagging behind.

Most African countries are in the bottom ranking of the International Telecommunications Union (ITU) ICT Opportunity Index (ICT-OI) for 2007 (see Figure 1). The indicators used in constructing the index include networks, skills and usage. [8] Based on this index ranking, Sweden scores about 378, the highest in the World, and Mauritius (the highest in Africa) scores only about 150. There are only four African countries with a score of above 80 while the rest are in the bottom range of the list.

The average score hides an even poorer score in ICT networks index (fixed lines, mobile phone and internet bandwidth). For instance, Sweden scores about 605 in the network index while Mauritius scored a paltry 142. The gap between the two countries is wider than given by the ICT-OI. Indeed, Africa's bottom 10 countries have an ICT-OI score of less than 26 but a network score of less than 16!

Africa's ICT-OI may be very low but the usage figures are even lower. A survey of ICT usage in 14 African countries revealed that the most commonly used communication tool by formal and informal sectors in Africa is currently the mobile phone (see Figure 2). Tools such as the internet and computers ranked even lower than the postal mail box (for the informal operators). Even in the formal sector, the use of internet is about half that of computers and phones. In the case of Tanzania, only 20% of firms that have computers used them for basic business functions, such as, invoicing, and only about 30% of those that had internet access frequently used it. About 13% of firms ranked Internet as an important marketing tool. [9]

In countries with relatively more advanced ICT networks, the usage of modern tools by SMEs is much higher. A poll of about 6000 owners of SMEs in South Africa in 2006 found many SMEs to be "satisfied with the availability of information and communications

technology but still wrestle with the challenge of securing the skills and expertise necessary for sustained performance." [10] About 76% of entrepreneurs surveyed regard ICTs as important tools for business.

Taken together, there are at least three major issues that African policy makers need to address if the continent is to harness the opportunities offered by ICTs: 1) look at ICTs as development tools that can transform sectors, add-value to services and basis for new industries, 2) lay the foundation on which such transformation of Africa economies could be based and 3) design support measures that specifically target the emergence and growth of an ICT industry. Africa has everything to gain and nothing to lose: we cannot get worse than we are (We pick up these points in the next sections).

1.2 Policy and the growth of the mobile phone services in Africa.

The mobile phone growth in Africa has been spectacular and the mobile network coverage has extended beyond the reach of both landline phones and electricity networks. The number of subscribers to mobile phone networks in Africa increased from about 652,000 in 1995 to about 38 million in 2002 (see figure 2). This number is estimated to have reached about 188 million (20% of the population) at the end of 2006 and expected to triple by 2011. The rapid growth of mobile phone subscribers has beaten even the most optimistic projections made by ITU in 2003. ITU estimated that mobile subscribers per 100 inhabitants was going to reach 7.6 in 2005 (see figure 3) while the actual figure was about 13 per 100 inhabitants. [11]

It is estimated that the mobile phone industry revenue alone contributed about 1.4% of Africa's gross domestic product (GDP) in 2002. This figure is thought to have risen to 2.2% in 2004. [12] In Kenya, Tanzania, Rwanda and Uganda, the mobile phone contributed between 3.5

Figure 2. Access and usage of ICTs by formal and informal SMEs
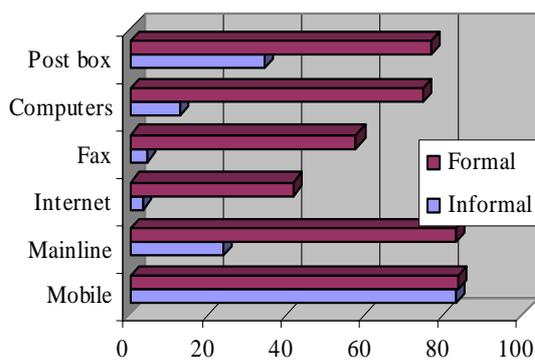
Source : Research ICT Africa,

Figure 3. Suscribers/users per 100 inhabitants in Africa
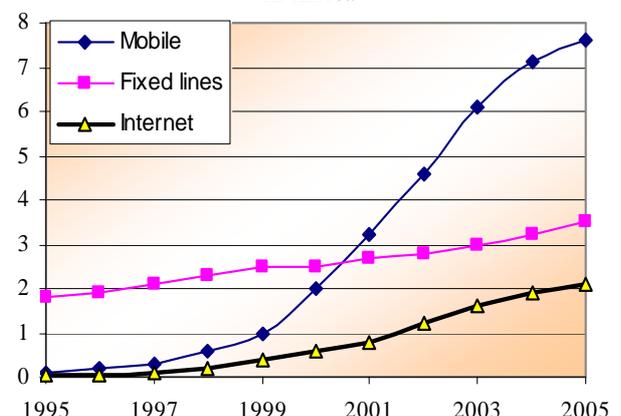
Source: ITU, 2007

NB: 2004 and 2005 figures are estimates

and 5% of GDP, employed about 500,000 people and accounted for more that 93% of telecommunication connections.

This growth has been driven by at least three major factors: (a) innovation, (b) demand and utility, and (c) regulation. Together, they provided opportunities for investors, operators, users and the governments.

a) The industry has developed innovative services that have made mobile phones meet some of Africa's challenges and avoided the hurdles that landlines face. Over 80% of the subscribers are pre-paid. It is flexible for resource poor users. The cost of top-up cards (airtime credit) ranges from $100 to $0.5. Such cards are affordable and creates an illusion that credit is cheap and yet they probably spend just as much or more on the service.

A recent report suggests that the "key changes [in African mobile phone business] are represented by the launch of lower entry points, through top-ups, scratch cards, credit transfers and e-top-ups". [13] Estimates now suggest that the lowest price for electronic top-up is about $0.41 and the average revenue per user has fallen to as little as $3. It is thought that over 95% of all mobile phone subscribers in Africa are prepaid.

In addition, some mobile operators have introduced the sharing of credit among subscribers. For example, Celtel Zambia offers a service called "Me2U" for pre-paid customers to send a portion of their units (airtime) to any other Celtel users in one short SMS. Such a system suits Africans, perhaps the most generous poor people, very well. It is also faster, safer and more convenient to send airtime than cash to a friend, child or other relatives. Even where such a service is not available, an SMS or a "beep" could tell a wealthier relative to call back. In Ghana its called "flashing" and in Zambia "paging".

In Kenya, Safaricom, the country's largest mobile phone operator is running a money transfer system- called M-PESA. It allows users to transfer money by SMS within the country, make deposits, withdrawals and check account balance. The customer simply buys electronic money (e-money) that could be sent to others. It is estimated that about $100,000 was transacted through the M-PESA system within one month of its launch.

M-PESA is not the only electronic mobile phone based money transaction service. Celtel launched Celpay - a mobile phone platform that allows individuals to access their account and pay bills and buy mobile top-ups. In Congo D.R., where years of corruption and economic mismanagement followed by civil wars, left few viable banks intact, Celpay registers about 3 million transactions a month. Celpay is also available in Zambia and is accepted mode to for paying for fuel, utility bills and member shops. [14]

In a nutshell, Celpay operates like a debit card. The mobile phone operators provides the subscriber with a more secure and user-friendly card that is linked to the subscribers account at a participating bank. Given the risks of carrying cash, distance to banks and the availability of mobile networks, Celpay type of services may provide an opportunity even for banks to expand to rural areas without huge investment in manpower, infrastructure and utility bills (e.g., electricity and water).

There are also efforts by the private sector to work together to provide an improved services to their clientele and grow their networks. For example, three mobile operators in East Africa (MTN-Uganda, Safaricom-Kenya and Vodacom-Tanzania) are launching a borderless network to charge about $0.26 per minute. In effect, they are creating a near roaming-free regional network. If successful, they would provide an excellent example to the European Union concerning roaming charges.

b) The growth of the mobile phone in Africa may seem surprising at first glance but it should have been expected since there is no other competitive communication system. The functionality of the mobile phone itself (calendar, calculator, camera, email, internet, video and watch), though not discussed here, has transformed it from being a business tool to a personal item and comes in handy.

The demand for telephone services that are reliable and affordable was very high. As of 1994, about 1.7% of the Africans had a telephone subscription. Even where the lines were available, the service was not at all guaranteed. Heavy rains and vandals easily cut off the connection and bills may be incorrect. [15] Mobile phones have overcome some of these challenges.

c) Regulations have also played a role in the development of the mobile phone. The 1990s were the time when most African countries were liberalizing their economies and democratizing. The telecommunication sector was largely opened up to the private sector but competition was largely in the mobile telephone services. The number of countries with monopoly mobile operators dropped from 32 in 1997 to 14 in 2004. Therefore, it is not surprising that mobile operators have been service-oriented.

However, there are feelings that the regulatory environment is still far from meeting best practices. It is estimated that an additional $4.8 billion investment in mobile phone industry in SSA would have been made by 2005 (sufficient to connect an additional 25 million subscribers) if the best practices in administrative and regulatory regimes were in place. Some of the key obstacles include the lack of basic skills by regulators to assess the economic and social impact of policies, the lack of clear objectives and targets to guide the industry and the absence of predictable, consistent and transparent guidelines in the industry.

For example, the tax policies of many African countries seem to contradict government pronouncement about digital divide. A study of 33 African countries by Deloitte in

2006 revealed that taxes account for about 20% or more of the cost of owning a mobile phone in 11 African countries and between 15-20% in another 9 countries (or 20 out of 33 with taxes higher than 15%). [16] Although balancing the needs to collect the appropriate revenue due to government and encourage mobile phone coverage and use may be a challenge, tax levels of above 15% indicate that some governments treat mobile phones as luxury services rather than a tool to empower the poor or bridge the digital divide. This leaves demand, competition and technology as the drivers of the growth of the mobile phone in Africa.

2. Perception of the role of ICTs and ICT policy.

There are three major views on how to mobilize ICT for development:

(a) Some view ICTs as a major development tool for the poor if only they can have access. Thus ICTs are seen in the same vein as other development tools such as roads, bridges and railway lines. From this perspective, penetration of or access to ICT tools (e.g., percentage of population connected) becomes a measure of development by itself. It is therefore not surprising that most of the global statistics focuses on access. The assumption is that the tools will eventually empower individuals to realize their own opportunities.

(b) Others think it is not merely access but the concrete use of ICTs that matters. Although access is important, the focus is on the extent to which ICTs are used to produce and deliver goods and services. From this perspective, the benefits of ICTs are not assumed to follow automatically from access to the tools but rather through active use. Rather than a focus on broadband penetration, attention is drawn to services and business transactions made possible through the new communication tools and their diffusion.

(c) There are also others who view ICTs as an industrial development opportunity or 'technological niche', where even countries lagging behind could catch-up with leading nations in the use, development and economic exploitation of the technology. The focus here is not just to have access but to participate in the development, commercialization and production of ICT products and services.

2. 1   ICT Policy elements

The perceived benefits of ICT by a country may influence the nature and importance attached to the sector. As shown in table 1, Mauritius and Malaysia have high-level ICT ministerial committees that are chaired by their respective Prime Ministers. On the other hand, Ghana has a committee that is Chair by the President of the University of the Future. The decisions and recommendations

that the respective committees are likely to make will have varying political weight.

The declared missions and targets of the ICT policies become more specific, measurable and focus as one moves (across table 1) from Ghana to Malaysia. For example, the telephone penetration density of 25% in urban areas and 10% in rural areas that Ghana seeks to attain by 2010 is likely to be attained even without its current policy. It also explains why the Ghana policy is relatively technology neutral.

In general, there are at least 6 key elements that ICT policies, as a minimum, have to address:

2.1 Designing a clear vision

Why does a poor country like Zambia or a rich country like Sweden need an ICT policy or ICT Commission, respectively? Why don't they promote all aspects of ICTs through their broadcasting, telecommunication, technology and industrial policies? The answer forms the mission of the ICT policy.

The mission or theme of the ICT policy needs to be clear and focused, and conceived at the high-level or at least with a direct participation of high-level officers (e.g., cabinet level). It should be (or at least sound) ambitious, inspirational and simple for politicians to support and market. Broad visions may be all-inclusive but they are often overly ambitious, unrelated and expensive to implement especially in countries with limited resources.

No policy should be designed simply because other countries have one or donors/international institutions are seeking to help develop one. The reasons for developing a policy should be guided by national interests if it is attract support, perform and meet the set goals.

2.2   Specific and action-oriented targets

Political support of a policy may depend on how well technocrats have framed or defined the targets. The targets should provide clear answers to: what activities will be undertaken, when, by who, at what cost and what will be the benefits to the country or stakeholders? Governments, especially poorer ones, have limited budgets and are very sensitive to vague promises with a high initial investment costs. Focusing on the factors that appeal to industry, government and public institutions as well as those that use existing institutions may be favourable. In other words, the targets should be inspirational, clear and forward-looking if support is to be maintained.

In countries such as Zambia, the number of targets should be modest and short-term even when the vision is long-term. For example, developing an IT infrastruc-

ture capable of delivering data, voice and video to every district in 5 years is an ambitious vision by itself (consider that the policy alone took 4 years to complete). In this case, the targets would narrow down to the technology (e.g., fibre, satellite and radio), sequencing (which districts first and what technology for which region), when and who will undertake it, how much will it cost and how other players will use it (e.g., ISPs, municipalities, schools, mobile operators and broadcasters etc). Unclear and overly ambitious targets may scare

other stakeholders, especially politicians.

2.3 Regulations and support measures

The regulatory regime of an ICT policy could be divided into three main categories: 1. the general guidelines or laws that govern the conduct of players, 2. regulations designed to promote technology development, transfer, rollout and commercialization and 3. the administrative and support measures that indirectly promote the growth of the ICT sector. The first group of regulations

Table 1. A comparison of political support, visions and targets of three national ICT strategies

	Ghana (2004)	Mauritius (2004)	Malaysia
High level Committee	Committee within the ministry of information chaired by the University President	A ministerial committee chaired by the Prime Minister	Ministerial Council chaired by the Prime Minister
Vision	Provide every citizen and resident access to high quality and affordable ICT services to transform Ghana into a knowledge-based and technology-driven economy	Make ICT the fifth pillar of the economy (after sugar, textile, tourism and offshore services)	Enhance the existing investments in information, communication and multimedia services (ICMS) infrastructure that will support future growth of ICMS services.
Targets	1. Universal access for all communities to internet, telephone and multimedia by 2010 2. Telecom service penetration to reach 25% in urban and 10% in rural by 2010 3. Connect all schools, clinics and public offices to advanced telecom services 4. Fully open, private, competitive markets for all telecom services 5. Streamlined, efficient and effective regulations of the industry that are technology neutral, fully transparent and competitive 6. Affordable prices for telecom services, especially for the poor 7. Profitable investment opportunities for business in all segment 8. Ghana as a first-class hub for investment, jobs and development, leader in transformation of Africa.	1. Increase fixed telephone density from 28% to 35% by 2005 2. Increase mobile cellular telephone density from 37% to 50% by 2005 3. Extend broadband connectivity to all business hubs within the country by 2006 4. Provide at least 30% of household with broadband connectivity by 2008 5. Provide at least 50% of household with Internet connectivity by 2008.	By 2008: 1. High Speed Broadband : 2.8 million subscribers; 2. 3G and Beyond: 1.5 million subscribers 3. Mobile TV: 75% mobile users adopt mobile TV 4. Digital Multimedia Broadcasting: 60% household coverage for DTTB. 5. Digital Home: 500,000 homes Interwork with external networks 6. Short Range Communications: Extensive usage in the supply chain management, Local manufacturing of RFID chipset 7. VoIP/Internet Telephony: Residential & business service revenue constitute RM 1 billion 8. Universal Service Provision: Increased broadband Internet individual access
Technology the policies seek to support	Technology neutral	1. Global mobile personal communications by satellite, 2. Internet telephony, 3. Mobile cellular, 4. Fixed wireless, 5. Mobile wireless 6. Multimedia 7. Cable	1. High Speed Broadband 2. 3G & Beyond 3. Mobile TV 4. Digital Multimedia Broadcasting 5. Digital Home 6. Short Range Communications (e.g. RFID-based) 7. VoIP/Internet Telephony 8. Universal Service Provision

Sources: http://www.gov.mu/portal/goc/telecomit/files/finalntp.doc, http://www.ict.gov.gh/Telecom%20policy/Ghana%20Telecom%20Policy%20Final.pdf andhttp://www.cmc.gov.my/Admin/WhatIsNew/55077762MyICMS%20final%20191205.pdf

sets out the general ground rules: competitions, standards, nature of service and licensing arrangements etc.

The second set is a collection of discretionary regulations that government may use to promote growth in one part of the industry. The industry and its partners may also lobby government for support from time to time to help meet a given target or survive, such as taxation, licensing fees, incentives etc. This group of regulations may change annually (with national budgets). The third refers to support provided elsewhere that helps the industry development. For instance, science and engineering education, start-up funds for SMEs, labour and market flexibilities, competition policies and contracts etc. Effecting change in other sectors may require the participation, appreciation and understanding of institutions and agencies in other ministries.

The first set of regulations is possibly predictable and industry can plan around them. The second set is not and a policy needs to pay attention to them as they could disrupt, discourage or facilitate investment. The third set of regulations play a vital role in the learning, adaptation and development of the industry. For instance, inflexible labour laws may make it difficult to change the business strategy of a firm if it results in manpower loss. Similarly, lack of skilled manpower could discourage investors or hinder development of new services while a functioning money market may promote expansion.

For example, Mauritius offered foreign and domestic investors in the ICT sector a package of incentives to enterprises whose activities involve technology and skills above the average existing in Mauritius, a 50% income tax reduction for expatriate employees, duty-free status for their personal effects coming to Mauritius, accelerated procedures for visas and work permits, and the availability of work permits for spouses. It has also developed the Ebène CyberCity - a property owned by a State enterprise - as an ICT park and role model for future ICT-connected communities.

2.4 After launch Campaign and awareness initiatives.

Countries invest significant amounts of energy, resources and time conducting consultations, gathering information, identifying priorities and needs, draft documents and then handover the draft law to parliament to enact. After a grand launch, all the players go back to "business-as-usual" and the policy seems to vanish or gather dust on some shelf.

The policy beneficiaries may create contact teams in different areas of interest, collaborate or share information. For instance, a team of IT firms, financial institutions, research centres and government agencies could review emerging projects, global technologies, competition, skills and national and international regulations.

They could make presentations that raise interest in the government and public interests.

2.5 Creating markets

An effective ICT policy should seek to address the entire innovation strategy - from design, initiation, development and commercialization of new and mature products and services. This could generate a dynamic and competitive industry. For that to happen, the policy should provide support for marketing the products and services the policy stimulates at home and abroad. This could include easy and cheaper market entry conditions, protection of inventions and promotion of the products at home and abroad.

Government is one of the largest organization and thus potentially a major user of ICT products and services on the domestic market. Governments could encourage business houses and their own institutions to adopt new technologies to improve their operations. For example, when Zambia developed its stock market in 1993, it settled for an electronic one. [27] The Lusaka Stock Exchange (LuSE) uses an electronic clearing and settlement system. Since it does not use physical certificates, an investor can get his/her shares or money in three days. Tax authorities, hospitals, schools and universities, among others, could be required to use some of their limited resources to develop e-services, not just for communication, but as part of their modernization strategies and development. Government could also encourage firms to shift to an e-economy through well crafted incentives and regulations. Such moves could provide additional market and learning opportunities for ICT business houses and individuals.

2.6   Promoting investment in ICTs

There are many challenges Africa faces in promoting and attracting investment in the ICT sector. Many African countries have a low FDI potential and are unlikely to see substantial increases without improving their business environment and ICTs could be one such area. According to UNCTAD's FDI Potential Index ranking, there are only four African countries with a high FDI potential. However, almost half (14 out of 31) of the countries that are considered high FDI performers but have a low FDI potential are African countries (see table 2). Given that most of the reforms have already been implemented (e.g., privatization which attract FDI), Africa countries may wish to develop their ICT sector to attract investors or improve the general FDI potential of the country (to move into the high -FDI potential, high FDI performer class).

ICT policies that conceive projects of interest to the private sector, research centres and international institutions could attract investor. For instance, Malaysia's Multimedia Super Corridor (MSC) has attracted about 900 multinational firms and formed the basis for a number of its flagship projects such as Smart Schools,

Telehealth, smart card technology and e-government. Mauritius's cyber city and Thailand's Science Parks have had similar impacts.

3   National ICT policy or ICT strategies?

The ICT policy is supposed to solve bottlenecks, such as those highlighted earlier, in order to realize the full potential of the current and emerging ICT tools. It is supposed to be a tool that will guide a country to benefit from the modern ICT tools and address or redress some of the ICT challenges. For this to happen, the policy is supposed to be dynamic, focused and action-oriented to meet the aspirations of the country.

Here, we compare the ICT strategies of Korea and Zambia and see how well they meet the key elements discussed in section 2.

3.1   The case of Korea

Korea has developed a competitive ICT industry in the last 4 decades and increased the penetration of many ICT tools in the country. One of the early goals was to eliminate the waiting list and increase penetration of telephone services. To achieve this goal, Korea introduced the one-phone, one-family policy and separated the national telecommunication firm from the Ministry of Communication in 1982. Within 8 years of the initiative, the waiting list was eliminated and home phone lines increased from below 40% to 90%. [17]

Korea raised money for investment through bonds and restructured tariffs to promote investment in ICTs. Annual investment increased from about $1.5 billion in 1982 to over $3 billion in 1992. In addition, the country charged its power utility (KEPCO) and telecommunication company (KT) with building an extensive fibre network that to license and carry traffic of cable and internet service providers.

In recent years, the Korean government investment in ICT projects increased from $131 million in 1996 to $322 million in 2002. Most of the investment was in high speed internet infrastructure (about 86% of the money in 1996 and 46% in 2002). The main goal was to facilitate private sector investors to rollout services in poor regions. Today, Korea ranks among the top countries in terms of high broadband penetration.

The current Korean ICT strategy launched in 2003 is dubbed the "IT 839 programme" i.e., '8 services, 3 infrastructures, 9 new growth engines'. [18] The eight services include: wireless broadband, digital multimedia broadcasting, home network, telematics, radio frequency identification, W-CDMA, terrestrial digital televisions and VoIP while the three infrastructures to support these services are: background convergence network, ubiquitous sensor network , and next-generation Internet protocol (IPv6).

These are expected to drive the new 9 growth engines: next-generation mobile communications, digital televisions, home network, IT system-on-chip, next-generation PC, embedded software, digital contents, telematics and intelligence service robot. Put together, they are supposed to help Korea become a "*nation connected by telecom networks that will provide uninterrupted, high-speed access to the Internet, fixed lines and mobile networks anytime, anywhere by 2007*". [19]

Table 2. Comparison of FDI performance and potential of countries.

	High FDI performers	Low FDI performers
High FDI Potetial	Australia, Bahamas, Bahrain, Belgium, **Botswana**, Brunei Darussalam, Bulgaria, Chile, China, Croatia, Cyprus, Czech Republic, Dominican Republic, Estonia, Finland, Hong Kong (China), Hungary, Iceland, Ireland, Jordan, Kazakhstan, Latvia, Lebanon, Lithuania, Luxembourg, Malaysia, Malta, Netherlands, New Zealand, Panama, Poland, Portugal, Qatar, Singapore, Slovakia, Slovenia, Spain, Sweden, Trinidad and Tobago and United Arab Emirates.	**Algeria**, Argentina, Austria, Belarus, Brazil, Canada, Denmark, France, Germany, Greece, Islamic Republic of Iran, Israel, Italy, Japan, Kuwait, **Libyan Arab Jamahiriya**, Mexico, Norway, Oman, Philippines, Republic of Korea, Russian Federation, Saudi Arabia, Switzerland, Taiwan Province of China, Thailand, **Tunisia**, Turkey, Ukraine, United Kingdom and United States.
Low FDI potential	Albania, **Angola**, Armenia, Azerbaijan, Bolivia, **Congo,** Costa Rica, Ecuador, **Ethiopia, Gabon, Gambia**, Georgia, Guyana, Honduras, Jamaica, Kyrgyzstan**, Mali**, Mongolia, **Morocco, Mozambique, Namibia**, Nicaragua, **Nigeria,** Republic of Moldova, Romania, **Sudan**, Tajikistan, **Uganda, United Republic of Tanzania**, Viet Nam and **Zambia**	Bangladesh, **Benin, Burkina Faso, Cameroon**, Colombia, **Côte d'Ivoire, Democratic Republic of the Congo, Egypt**, El Salvador, **Ghana**, Guatemala, Guinea, Haiti, India, Indonesia, **Kenya, Madagascar, Malawi,** Myanmar, Nepal, **Niger**, Pakistan, Papua New Guinea, Paraguay, Peru, **Rwanda, Senegal, Sierra Leone, South Africa**, Sri Lanka, Suriname, Syrian Arab Republic, TFYR of Macedonia**, Togo,** Uruguay, Uzbekistan, Venezuela, Yemen and **Zimbabwe**

Source: WIR, 2006

The ultimate goal is to use ICTs as an engine of economic growth that will help raise the income per capita of Korea from $13,000 in 2003 to $20,000 by 2007, expand IT employment from about 1.2 million to 1.5 million and expand IT export products from $57.6 billion to about $110 billion over the same period.

To meet such ambitious targets, the Korean government and the private sector proposed to invest about $170 million and $85 million, respectively, in the initiative between 2003 and 2007. Korea already accounts for about 28% of the global mobile phone market, and is a major player in the semiconductor, liquid crystal displays and digital television sets. However, this project was designed to keep Korea a step ahead of its competitors.

An earlier report summed up Korea's strategy as follows: "*Korea has built and is continuing to build a stand-alone capability in a broad range of electronics technologies; electronics materials and packaging, and development of key new information technology products. The nation's strategic focus is on achieving dominance not only in the production and manufacture of electronics products and components, but also in creation and innovation of new technologies in the field. Korea is determined to remain internationally competitive in electronics in the long run and is prepared to commit the required long-term financial and logistical resources to achieve its goals.*" [20]

3.2   Zambia's ICT policy

The current ICT-related policies of Zambia were adopted as part of the structural adjustment programme (SAP) of the World Bank, which included the privatization of state-owned firms and opening up of the economy. As part of this process, Zambia enacted the Telecommunication Act (1994) which separated the Post and Telecommunication Corporation (PTC) into Zambia Postal Services (ZAMPOST) and Zambia Telecommunications Company (Zamtel). Another legislation of interest is the Broadcasting Act (1994, revised 2002).

Other than meeting the World Bank/IMF conditinalities, these changes were also needed to promote investment in the telecommunication and broadcasting sector and improve services. Like most of Africa, mobile phone, digital television and radio broadcasting services grew rapidly (figure 4). For instance, the number of radio stations has increased from one to about 25 over this period. They include commercial and community radio stations in urban and rural areas.

There is a feeling that the country that was a front-runner in getting onto the internet and launching private mobile phone firms but it is being overtaken by late comers. [21] It is also observed that investment in

the telecommunication industry of Zambia has fallen from $1.2 per capita in 1996 to $0.5 per capita in 2002 while that of Mozambique increased from $1.6 per capita to $2.7 per capita over the same period. [22]

Meanwhile the demand for ICT services in the country remains very high. Some rural districts used their constituency development funds to invest in digital satellite transmitters for television. The government tried to ban the practice but a public outcry soon forced it to lift the ban. [23] The state-run television station is now playing catch-up installing digital transmitters.

This year, the government released the national ICT policy (28 March 2007) [24] During its launch the President stated that the policy will help create "an innovative, market responsive, highly competitive, coordinated and well regulated ICT industry" to make Zambia globally competitive. [25] It will also "create a favourable business environment and promote Zambia as a destination for ICT-related investments within the region and on the international market."

The policy identifies 13 pillars: Human capital development; promoting ICT in education, research and development; promoting public access content development and cultural heritage; developing the ICT service sector; developing the telecommunications and support infrastructure; promoting e-commerce; e-government; integrating ICT in agricultural development; integrating ICTs in healthcare delivery; integrating ICTs in tourism, environment and natural resource management; mainstreaming youth and women issues; developing the legal and regulatory framework; and promoting security in the information society.

The vision of the policy is to develop a "*Zambia transformed into an information and knowledge-based society and economy supported by consistent development and pervasive access to ICTs by all citizens by 2020*". The above 13 pillars and their objectives and strategies are designed to realize this vision.

Figure 4. Basic ICT subscribers per 100 inhabitants: Zambia

Source: ITU, 2006
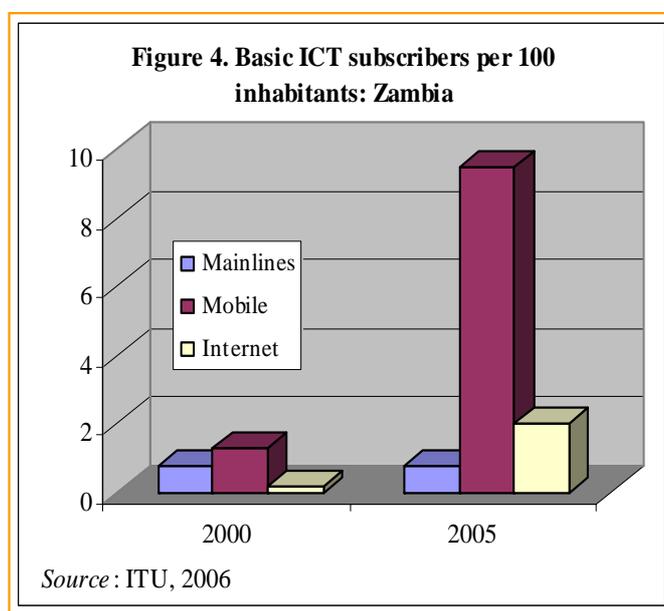
To meet these goals, the country seeks to establish a number of regulatory and promotional agencies. These include bodies such as the Computer Crimes Investigation Unit, ICT incubator, ICT Enterprise Development Fund and Zambia ICT Agency. These agencies are supposed to cooperate and work in close collaboration with the government to avoid duplications, promote innovation and entrepreneurship and provide a level playing field.

The implementation strategy seems to rest largely with government departments and public institutions. The location of the proposed ICT Agency has been left hanging, the role of the private sector is not clear and the relationship between the new agencies and existing one is not yet worked. Similarly, the financial, human and technological resources needed to meet the targets have not been worked out.

3.3 How do the two strategies measure up?

In terms of vision, both countries seem to know what they wish to achieve. However, the Korean vision is clearer and measurable. In a way, it is easier to hold the Korean government accountable for any failure and for success in meeting the goal (e.g., GDP per capita $20,000). On the other hand, the Zambian vision is not measurable in anyway.

The Zambian targets are likely to occur whether there is a policy in place or not. For instance, the level of ICT literacy and expertise, ICT infrastructure development, ICT contribution to economic development and use of ICT to promote entrepreneurship or reduce poverty is taking place already. External pressure and modernization efforts by firms will drive such goes.

It is also possible to galvanize support around a national strategy where all players feel they have a role to play. For example, both strategies seek to involve the private sector. However, the Korean strategy estimates the level of investment, use, production and exports the private sector needed to achieve while the Zambia strategy simply expects the private sector to participate. It perhaps reflects the differences in their ability to estimate the technological, economic and social impact of the proposed policies.

Both policies promise their citizens improved services and development. Korea promises its people by the time its ICT strategy is completed (4 years) their income will almost double and they will be using state-of-the-art ICT networks and products. Zambia promises its citizens things that would happen in 13 years (if one considers the current rate of growth of internet, mobile and television and their convergence, that will happen).

The Zambian policy has already been criticized for not addressing Zambia's involvement in the East African Submarine Cable (EASSy). Zamtel, the State-run firm,

enjoys a near monopoly on the project. [26] The Zambian strategy has a greater focus on legal and regulatory issues (e.g., requiring new projects to include ICTs, avoid duplication of infrastructure, liberalize all ICT policies, establish a rural ICT development fund etc).

Zambia charges ISPs $25,000 as for an operating license – a huge sum for start-up firms without any financial support. By contrast, Korea does not charge ISPs any fee. Korea only requires ISP to register.

The Zambian policy is a collection of what may have come from the World Summit on Information Society than providing a true national direction. Zambia is a poor country, unlike Korea, and does not have the luxury of abundant financial and human resources. it is all the more important that the policy should have had a focus in those areas it stands to gain most.

Zambia seeks to create new bodies for implementation and monitoring the policy but does not estimate how much is needed to run them. It does not say why the, for instance, the Zambian Communication Authority (CAZ) cannot handle communication development and licensing. Uganda has used this approach and it seems to work. The Korean strategy does not go that way.

The Korean policy does not emphasise labour and market flexibilities or go beyond automation of processes and production of services and electronic products. Perhaps highlighting the amount of catching up Korea needs to undertake to attain leadership position in value-added and productivity gains.

Policy makers should at least attempt to estimate the cost and impact of a policy on employment, productivity, efficiency, competitiveness, exports and wealth creation. Perhaps the main difference between the two is that one is more of a policy (government statements) and the other is more of a strategy (how governments want to achieve their goals). For Korea, government pick the winning technology services. Zambia does not seem to go that way.

Conclusion.

The growth of the mobile industry in Africa provides a good lesson why ICT strategies need to address demand and supply sides of their ICT visions. Although, there are no grand plans in many African countries that guided the growth of the mobile industry, it has and promises to deliver more products and services to the poor. Demand and innovation has led to the development of some Africa-first and Africa-specific products and services.

Government policies are only beginning to be supportive and leave much to be desired. A number of national monopoly telecommunication firms that carry traffic for other players seem to be making huge profit margins and national tax regimes seem to view ICTs as a luxury.

The competition and consumer protection rules remain an area of great concern. For example, the Mauritius regulator ICTA conducted a price investigation that led to the fall in the prices users paid Mauritius Telecoms for traffic on the SAT3 submarine cable from $10,000 per mbps per month to $3250 per mbps per month. This resulted in Mauritius Telecom's traffic on the cable to go up (from 17% to over 80%). There are few such determinations on the continent.

National ICT policies should develop strategies whose targets are action-oriented, focussed, measurable and inspirational to attract the interest of key stakeholders. They should also be timely as the technology is changing rapidly.

Currently, the focus on needs is not serving the continent well. Although Africa adopted "a master plan and a declaration to move [its] countries into the information age" in 1996, it remain at the periphery of the information society. Ironically, even the limited growth registered so far has been driven by entrepreneurial activities that have seen opportunities for growth in the ICTs market and not the grand plans.

Party of problem is the lengthy policy making process time. Zambia's first ICT policy draft was published in 2003, the final draft in 2005 and launched in 2007. During that period, mobile networks have been extended to some rural areas, new telecommunication and broadcasting firms have entered the market, wireless broadband deployed in some cities, more than 500km of fibre network laid, ePost launched, [28] and new technologies have emerged. While those developing the policy were busy identifying needs and priorities, others who saw the opportunities the market offered were busy realizing them.

Perhaps, more emphasis should be placed on the strategy and assessing the potential impact of the proposed policies on employment, productivity, innovation, competition and demand. The current NICIs schemes emphasise the "process of arriving at the vision" (policy making) and the statements of government (policy). The Korea ICT Policy is actually a strategy (and so it is called officially) with only 1-2 pages devoted to background information while the Zambian one devotes 23 pages (recounts the main United Nations, African Union, NEPAD, SADC and COMESA ICT initiatives). In this case (Zambia), policy is more prominent than strategy.

Many African countries are in a good position to harvest the opportunities ICTs present. The painful reforms that they undertook in the 1990s introduced labour and market flexibilities that could enable firms and institutions to quickly adopt new technologies and change their business models. This goes beyond simple automation or electronic linking of various entities. It entails streamlining and developing new producing, processing and managing products and services.

To realize such benefits, strategies should focus on laying the foundation on which the industry or services will be based (e.g., IT universities, networks, tax and licensing regulations, labour and market reforms etc) and stay out of most areas where the private sector is best suited to meet the needs.

Donors and government will have to focus on the big picture and support the emergence of an information society. In particular, mathematics, language, science and engineering skills, life-long education, financing start-ups especially in new sectors and in rural areas, communication infrastructure and supportive regulations. It is the dividends, not the divide by itself, that inspire individuals, institutions and firms to innovate, develop, produce and deliver the benefits of ICTs.

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recipient.

From the Press:

The 'Wireless' Revolution

A recent survey in 'The Economist' argues that the falling cost, size and power requirements of wireless functions are slowly creating a new industry that is likely to transform our lives and the way society manages its social and natural environment in a profound way.

The enthusiasm for new wireless technologies in parts of Asia is mirrored in Europe and America. Mobile operators are investing billions of dollars in building new networks that provide fast internet access. 3G systems are being upgraded and an upstart technology called WiMax is being explored. Many executives hope that this will connect not just people and their phones but also gadgets, machines, cars and homes.

New Opportunities

These developments may improve future farming systems: tiny sensors on the ground could monitor water availability, as well as pest and disease infestation and make irrigation and spraying more efficient. Irrigation systems could be switched on and off remotely. Apart from improvements in precision farming, wireless could also become a source of new revenue from services such as traffic information. Consumers could download maps, restaurant information and media content. It may also help to lease cars to people with poor credit histories. The wireless device allows to switch off the ignition if payments are missed, and to find the car if it is stolen or has to be repossessed. Around half a million cars are already equipped with the system.

The growing importance of "personal-area network" or PAN technologies is likely to have the biggest impact on daily lives. An example is Bluetooth, which is used to link mobile phones with earpieces. The last is near-field communications (NFC), where contact needs to be close, as in passes for buildings and public transport. A variant is radio-frequency identification (RFID) tags, used by retailers and others. When passed in front of a reader, the tags send back data stored on them.

The most ubiquitous accessory for wireless devices is the wire used to power them. Much of the research on wireless energy transfer lay fallow for a century. It was difficult and dangerous, and there was no immediate need. But the proliferation of small wireless devices has sparked new interest in the idea. There are several kinds of wireless energy transfer. One, dubbed "radiative", involves generating an electromagnetic field. A special receiver picks up a bit that has not naturally dissipated in the air and converts it to electricity. The energy can travel nearly three metres (ten feet) to keep a small battery charged. A second technique relies on magnetic fields. It is still at an experimental stage and works using resonance. When two objects resonate at the same frequency, they transfer energy well—just as a child easily maintains momentum on a swing when he uses his legs to move in synch.

"Inductive coupling", is not so much wireless as plugless. Power is sent on almost direct contact, for example, with a mat on which gadgets can be placed to recharge. Another method is to "harvest" energy from the environment, converting heat, light or vibrations that occur naturally. For example, sensors in a skyscraper could be powered by the normal sway of the structure. And certain materials are "piezoelectric", meaning that they naturally become deformed by heat or vibrations, generating an electrical current that can be captured and stored. The technology is young but advancing fast.

New Challenges:

Dealing with lots of wireless gadgets everywhere is an unpractised art. Security must be assured and privacy protected. All those radio waves raise health worries. There may not be enough radio spectrum to go around as demand grows. And in the longer term disparate systems may converge and become interconnected, bringing up a whole host of new questions.

What is already clear is that the infrastructure required to support wireless communications will have to be massive. Already, tens of billions of e-mails, mobile text messages and instant messages are being sent through the world's public networks each day, not to mention quasi-closed networks used by stock exchanges, flight-reservation systems and the like. Each CDMA mobile phone communicates with a cell tower 800 times a second just for its power management.

There is also the issue of privacy: Mobile phones should be able to pick up the presence of sensors. People should be able to read basic RFID tags—and destroy them too to preserve their privacy. Such rights will become more important as wireless technologies become small enough to be invisible. Yet the technology cuts both ways. Prisons in America are experimenting with bracelets that have wireless chips embedded in them to keep track of inmates. It sounds Big Brotherish, but prison officials say that violence among prisoners has decreased. Guards are also tagged, so prisoners may feel safer from abuse.

Following the path of technological evolution

Scholars in the field argue that the highly speculative markets and the great challenges are characteristic for the early stages of the creation of a new industry. It is reminiscent of computing in the early 1970s when companies began to adopt it in earnest. There was plenty of resistance. The systems were difficult to operate and seemed to be set up for nerds. The economic benefits were questioned. There were privacy and regulatory worries. Yet over time the rough edges were smoothed and everybody benefited. Technology rarely evolves in the way that people think it will. When Marconi invented his wireless telegraph, he never imagined broadcast radio.

A decade earlier, Heinrich Hertz declared: "I do not think that the wireless waves that I have discovered will have any practical application." To the men at Bell Labs in 1947 the transistor was simply an efficient replacement for vacuum tubes; they had no inkling of its use in computers. Today these technologies are omnipresent: televisions, computers, phones and radios etc.

Read more   http://www.economist.com/surveys/displaystory.cfm?story_id=9032088

IN THE NEWS

Mobile TV: The next big thing in Africa?

It is estimated that mobile TV viewers will grow from the current 60 million to about 488 million by 2010. Developed countries, led by Japan, Europe and the United States will lead the way.

The lion's share will be delivered over cellular networks - about 356 million by 2010
Most of the consumers are expected to receive mobile TV as part of their subscription as many consumers do not wish to watch TV on the move. Thus, it will be driven by operators bundling it together with other services to appear as though it is free.

In Africa, mobile TV could change the lives of many that either do not have access to a television, energy and coverage or are travelling over the breadth and depth of the continent.

With Celtel, MTN and Vodacom all gearing up to offer or offering the service already in their prime markets (Vodacom and MTN), the question is perhaps not if but when will it reach all their customers?

Africa's call centres on the rise?

You speak perfect main foreign language, technologically aware, well educated and can manage a business - run a call centre.

Internet-based call centers in West Africa are providing telephone marketing and customer service for companies around the world and it is a growing industry. Well you,may have to change your name from Moustapha Diallo to a more business like "Frédérique Maillard" when online to make customers, say in France, feel more comfortable. But who does not have an imaginary online name.

With low internet telephones costs and inexpensive labour, one should compete favourably. Morocco, Mauritius and Senegal account for a large share of the French offshore call centres. Some Senegalese call centres employ up to 500 workers although the majority are small. Other countries in the region, such as Benin and Mali, are also beginning to offer the service.

Call centers provide business opportunity and employment. It may reduce unemployment and migration. What will be more interesting that making money abroad without actually leaving your country? Perhaps, governments should provide support to facilitate growth of the sector.

Source: http://www.voanews.com/

Creating an institutional setting for ASIF

The African Science and Innovation Fund (ASIF) — proposed by the African Ministerial Council on Science and Technology (AMCOST) in 2005 — could implement Africa's consolidated plan of action for science and technology and related African Union (AU) programmes.

Given the disadvantages other options, AMCOST has decided ASIF should be developed and managed through existing intergovernmental bodies. But how to legally establish the fund remains undecided — until AMCOST meets in Nairobi, Kenya later this year.

John Mugabe, advisor on science and technology to NEPAD and former executive director of the African Centre for Technology Studies in Nairobi, argues that an incremental approach is needed, beginning with a 3-5 year pilot phase where the AU Commission, AfDB and NEPAD jointly manage ASIF. At this stage, the fund should be governed by AMCOST and supported by an international scientific and technical advisory panel to review and provide independent advice on how programmes are developed and implemented.

The AU Commission could build African political leadership and leverage contributions. The AfDB could manage the funds — receiving and dispersing contributions to centres implementing the science and technology plan of action. NEPAD could mobilise research institutes and private companies to develop and implement specific research and innovation programmes, and could also give administrative support to the advisory panel.

At the end of the pilot phase an independent evaluation — sanctioned by the AU Summit — would make specific recommendations on whether, and how, ASIF should continue to operate.

Mugabe however suggests that ASIF will never become a success unless African governments are more strongly committed. They will need to supported it through voluntary contributions as well as develop and use a coherent mix of national policy, administrative and legal instruments such as intellectual property protection to invest in regional science and technology development programmes.

ATDF CORNER

Entrepreneurship investments

In January 2007, ATDF officially announced the Zambian Entrepreneurship Award 2007 as well as the Entrepreneurship Challenge Award.

By May 1, 2007, the official deadline for submission, TDF has received over 100 Business Plans with many original ideas. The proposed businesses include agro-tourism, alternative energy products, infrastructure improvements, non-traditional export crops, waste management, telecentres, transport services, etc. Most of the applicants are highly qualified. Some of the applicant are already running small businesses and hold degrees of higher education obtained at home and abroad. The business plans prove that there is much more entrepreneurship spirit in African countries than social planners wish to acknowledge.

The business plans will go through a first screening process by end of May, second screening by end of June and the final selection by July. At each stage, comments will be sent to the applicants and those selected may have to make some modification before the proposals go to the next stage.

About 10 applicants will be invited to make a presentation and meet the Zambian advisory board and members of the Board of Directors of the Hub around mid August in Zambia. The awards are supported by the Swiss entrepreneur and member of the Board of Director of the Business Hub, Ernst Thomke.

ATDF would like to thank all the applicants for their efforts and interest in the Hub's investment products. Although the first round is now closed, those with business ideas may send them to:

info@atdforum.org

The Entrepreneurship Course

The course has attracted significant interest and several requests have been made. Here we provide answers to some of the frequently asked questions:

What is the cost? Approximately US$200. This does not include transportation costs

What will the course cover? Business foresight, developmental entrepreneurship, entrepreneurial mindset and attitudes, planning, investment options, competition, project evaluation, intellectual property rights, taxation, other business-related legal and regulatory instruments and business plan design, among others. Teaching is largely via case studies, demonstrations and presentations by established entrepreneurs and policy makers.

How does one apply? Candidates are expected to submit a business proposal (less than 1100 words) and will be selected based on their proposals (as a team or as individuals, and firms may also propose a candidate). The course is designed to help refine and develop these ideas, experiment through mini-consulting units or prototypes.

Can one apply for the course as well as for the Hub's other products? Yes

What is the main expectation? The candidates will have developed their ideas into successful business concept that may qualify for the Hub's funding in 6 to 10 months. The course is not intended to qualify workers, but to develop entrepreneurs, capable of weighing and taking investment risks and understanding the business environment.

You may send your applications to info@atdforum.org

Website design competition fails to attract applicants

The website design competition, though offering an attractive commercial rate for a prototype, not a single application was received from Africa. The few requests for consideration came from Asia. Given that we received business plans for internet café development, their seems to be a huge gap in ICT knowledge in Africa.

ATDF, through the Entrepreneurship Hub, is considering the development of specific IT skills at secondary and tertiary levels. The target is to move from usage knowledge to creative and innovative IT skills.

Coming soon: ATDF French website and content

You want to be involved to help ATDF speak French?

African Technology Development Forum
Lusaka and Geneva

Promoting creativity and innovation through entrepreneurship.

www.atdforum.org

ANOUNCEMNENT

ICT Africa 2007 : Co-operation & Connectivity

Date: 1 - 5 October 2007.

Venue: Kenyatta International Conference Center, Nairobi, Kenya

"ICT Africa" is an annual continental conference addressing all aspects of ICT development in Africa. The conference is convened by NEPAD council in collaboration with the NEPAD Kenya secretariat. The 2007 event will be organized by Global Conferences, Cape Town, South Africa.

The conference features technical tutorials, demonstrations, news in the making and the opportunity to meet experts, entrepreneurs, scientists or engineers, exhibitors etc. Its also brings together agencies, industry, and governments to exchange ideas and form synergies.

Programming

ICT Africa will consist of a plenary session, conference tracks, technical tutorials and an exhibition.

Plenary session

ICT Africa 2007 will consist of a plenary session to be addressed by ministers (or their representatives) from all regions of Africa. The plenary session is expected to address infrastructure projects throughout Africa including The East Africa Marine System (TEAMS) and the East Africa Submarine System (EASSy). The Kenyan ministry of information and communications will host the plenary session.

Conference tracks

The rest of the conference will be divided into two main tracks, a technical/academic track and a policy/business track. The technical/academic track will feature presentations from peer reviewed papers by scientists, engineers, professors and students from Africa and abroad. The policy/business track addresses policy and business challenges of ICT development in Africa. Topics will include, but not limited to, deregulation, monopoly, and ICT investment.

Technical tutorials

One day will be dedicated to technical tutorials. NEPAD Council experts and other experts from different parts of the world will deliver short courses in next generation networks, fibre optics, and voice over Internet protocol and other topics of interest to the attendees.

Exhibition

The 2007 event will consist of an Industry exhibition running parallel to the conference. The exhibition is organized by Togo consultants.

Sponsorship Opportunities

Sponsoring the NEPAD Council ICT conference is a social responsibility and an appropriate opportunity to contribute to the development of Africa. Your support, participation and sponsorship of this conference will contribute significantly towards the successful implementation of the NEPAD initiatives throughout Africa.

Revenue generated from sponsorships will be used principally to fund the cost of traveling and hotel accommodation for invited speakers. This will ensure that relevant decision makers attend the conference. Sponsorship revenue will also enable us to advertise the event. Any surplus will be used to organize subsequent events.

See the ICT-2006 conference program at:
http://www.nepadcouncil.org/ICTeAfrica2006/downloads/2006_ICT_Conference_Report.pdf

More Details

For more details, please contact the conference general chair:

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or visit our conference page:
http://ictafrica.nepadcouncil.org

Featured project

AFRICA BROADBAND COMMUNITIES
NEPAD Council S&T and ICT Commission

Introduction

"African Broadband Communities" initiative seeks to promote the development of broadband networks and modern ICTs in Africa by providing broadband access and related services to selected communities and demonstrate its benefits to Science and Technology, and the economy of Africa. For this reason, NEPAD Council has contacted several companies including operators, Internet Service Providers (ISP) and equipment vendors to participate in this effort as partners.

Background Information

The global e-commerce revenue reached more than $10 trillion in 2006! ICTs are shrinking the world, making it possible for people from one part of the world to work for companies in other parts of the world without leaving their own countries. Voice over Internet Protocol (VOIP) is significantly reducing the cost of voice communications for businesses and residences all over the world. Professional and academic courses can now be offered through electronic enabled distance learning and web casts. Educational institutions separated by thousands of kilometers can now share resources and offer common courses through video conferencing and e-lab programs.

Unfortunately, these fast paced developments require high speed or broadband Internet access which is still out of reach of most Africans. Internet penetration, including traditional dial-up access, is only about 2% in Africa – the lowest in the world. There are only about 10 Internet exchange points which are isolated from one another. Only a handful of African countries have been able to deploy broadband access networks, which include mostly digital subscriber lines (DSL) and wireless broadband.

To address the ever growing digital divide between Africa and the rest of the world, a couple of infrastructure initiatives have been launched. These include the SAT-3/WASC/SAFE submarine fibre cable for South Africa and West Africa, EASSy submarine system for East Africa, the EASSy backhaul to connect landlocked countries of Eastern and Southern Africa to the EASSy undersea cable, The East Africa Marine Systems (TEAMS) for Kenya, COMTEL for COMESA countries, COM7 and many other long haul network initiatives.

Unfortunately, the already existing SAT-3/WASC/SAFE has not been well utilized by African countries where the system has landing points. Communities in South Africa and West Africa with access to this long awaited and celebrated infrastructure have not taken full advantage of the system. This project intends to encourage bandwidth take-up on available and upcoming submarine and terrestrial long haul fiber optic networks by facilitating the establishment of broadband access networks in selected African communities.

After several consultations, it was concluded that ICT infrastructure is the number one challenge to ICT development in Africa and needs urgent attention. NEPAD Council supports some of the NEPAD's e-Africa commission's initiatives and we have concluded that working on an initiative to bring high bandwidth capacity to communities augments the work of the e-Africa commission.

Management

NEPAD Council is identifying and inviting equipment vendors, Internet Service Providers, Private Network Operators, Financing Organizations, African and International Organizations, Universities and other players to join the program partnership. A program task force comprising of representatives from partner organizations will spearhead the program under the leadership of a NEPAD Council S&T and ICT commission.

Equipment

The demonstration community projects will be selected based on recommendations by members and the task force. Equipment vendors are expected to donate or sell equipment to the program at discounted prices. In return, vendors will gain exposure to the African market and the possibility for supplying products to subsequent initiatives that may be triggered by the Africa Broadband Communities Program.

Finance

Financial organizations will be requested to support the network operators and Internet service providers to procure equipment and build the networks. Many network operators are unable to develop access networks because of the high cost of upfront equipment cost and lack of financing. This could be in terms of investments or long term, low cost-loans and development assistance. Donated or low priced network equipment is expected to be an incentive for network operators to participate in the program.

Operation

Partner network operators will ultimately be responsible for deploying, operating and maintaining these networks and provide data, video or voice access at prices commensurate with the cost they incur on the networks and sourcing the value added services. NEPAD Council will review and approve proposed pricing by the operators before their inclusion.

Main outcomes:

- Provision of timely information to users

- Cheaper broadband prices

Demonstrative impact may lead to wider deployment of broadband

For details see www.nepadcouncil.org.