THE MOBILE PHONE IN AFRICA:
HAS IT BECOME A HIGHWAY TO THE INFORMATION SOCIETY OR NOT?

Elirea Bornman
Department of Communication Science
University of South Africa
South Africa
bornme@unisa.ac.za

ABSTRACT

The single most dynamic ICT development in recent years has been the worldwide surge in mobile phone subscriptions. This "mobile miracle" has been continued in the developing world and particularly in Africa. In a time when discourses on the information society have focused on the internet, the mobile phone has been providing access to electronic communication to people at the bottom of the income pyramid – often for the first time in their lives. Mobile broadband internet has furthermore raised hopes that mobile phones can allow Africa to leapfrog across the digital divide to be integrated into the information society. This paper addresses issues related to Africa's position in the information society pertaining to access to mobile phones and mobile-broadband; pricing, ICT skills and readiness, usage patterns and impact on the lives of Africans. Conclusions are drawn on the potential role of mobile phones as information highways to the information society.

INTRODUCTION

Since the 1990s – and particularly since academics and analysts have started to take note of the far-reaching changes brought about by the explosive growth of information and communication technologies (ICTs) – the concept of the "information society" has gained popularity (Van Oudenhove, 2003). Although various definitions of an information society has been forwarded, the concept is generally associated with the proliferation of ICTs – the so-called "information highways" of our times – and beliefs that the new possibilities to create, store and distribute information created by ICTs have fostered a new kind of society, that is an information society.

Closely associated with notions of the information society is the conceptualisation of information in economic terms (Madikiza & Bornman, 2007). Information is regarded as a commodity that can be bought and sold on world markets. The power and status of nation states, collectivities, organisations and/or individuals is furthermore determined by their access to and their ability to dominate and/or control information highways of which the internet is regarded as the most important. Economic growth and development is thus associated with the spread of as well as usage of ICTs within a particular nation state or society (International Telecommunication Union (ITU), 2011; Van Audenhove, 2003). Thus information has created both a new social and economic order.

It is furthermore widely believed that the proliferation of ICTs within a nation state or a society and the concomitant integration with the information society will have positive social and economic consequences as it will, among others, raise productivity, increase work opportunities, contribute towards the spread of information and knowledge, and in general raise the quality of life of the population (Van Audenhove, 2003). It is furthermore believed that the proliferation of ICTs could help developing countries to "leapfrog" stages of development towards becoming advanced information societies (Hyde-Clark & Van Tonder, 2011). Manuel Castells (2000, 2001) represents one of the most prolific adherents to the viewpoint that a society's economic growth and development is dependent on the spread of ICTs throughout the society. In contrast to this optimistic view of the impact of ICTs – also known as the technophilic view – there is, however, also a pessimistic or technophobic viewpoint within which technophilics are accused of technological determinism. Technophobes such as Van Dijk (1999) believe that ICTs could also have wide-ranging negative effects for a society as it can lead, among others, to a decrease in work opportunities and can increase the gap between the rich and the poor.

Concomitant with the technophobic role of the impact of ICTs are discourses on the so-called "digital divide" (Madikiza & Bornman, 2011). Within these discourses it is pointed out that disparities between developed and developing countries with regard to access to and control of the information highways make it more difficult for developing countries to compete in the global economy and in other fields and to become full players in the information society. Technophilics nevertheless believe that the spread, uptake and use of ICTs remains the only way to bridge the digital divide, also known as the "North-South" divide.

The digital divide and its dire consequences for the developing world is nowhere more conspicuous than within the African continent and in particular in Sub-Saharan Africa. Africa is by far the least computerised region of the world (Castells, 2000; Jensen, 2006). With the exception of a few major cities, ICT infrastructure on the continent is scarce at best and nonexistent at worst (Kamalipour, 2007). African countries also rank relatively low – below the top 50 – in most indices of globalisation and the information society (Dutta & Mia, 2009; ITU, 2011). In an era where other developing countries such as those in East-Asia have been making major strides towards becoming modern economies and full members of the information society, Africa and Sub-Saharan Africa have furthermore experienced a noteworthy deterioration in their relative position with regard to trade, investment, production and consumption in comparison with other areas of the world – including other developing areas. According to Castells (2000), this state of affairs can predominantly be ascribed to the region's social exclusion from the information highways of the information society.

Thus the question can be posed: What does Africa – and Sub-Saharan Africa in particular – need to do to change its exclusion from the information society and its lack of competitiveness in the global economy? Can the mobile phone play a role in helping the continent to leapfrog towards becoming a full member of the information society and being globally competitive? These and other questions will be addressed in the sections that follow.

CHARACTERISTICS OF AND PROCESSES TOWARDS BECOMING AN INFORMATION SOCIETY

The first issues that need to be considered are the developmental fundamentals for any country or region for being integrated into the information society and the global economy.

As already mentioned, Castells (2000, 2001) regards the proliferation of ICTs, and the ability to adapt to and make use of the opportunities created by ICTs, as the first critical factor in accessing wealth, power and knowledge within the current global order. The establishment of technological infrastructure, which includes advanced telecommunication networks, internet connectivity, the infrastructure to make use of computers and advanced computer systems (including electrification), are mentioned as vital factors in this regard.

There is, however, also a second factor – the proportion of knowledgeable labour in a country – that has become an important factor in determining the degree of social inclusion or exclusion of a particular country or region (Muller, Cloete & Badat 2001). Self-programmable labour is those people in a society that can become producers of knowledge and information (Castells, 2000). Self-programmable labour represents people with high educational qualifications and exceptional skills levels. Non-self-programmable or generic labour, on the other hand, do not have the capacity to generate productivity in a similar way than self-programmable labour. The most important factor that distinguishes the two groups is not only education but also the quality of education. Thus it is not only the availability of

information infrastructure, but also the quality of the educational systems of a country and the proportion of the population that achieves a high level of education (secondary and tertiary levels) that determine its inclusion of exclusion from the information society and the information economy.

The ITU (2011) identifies a three stage model that countries or regions follow – or should follow – in becoming an information society. The three stages are the following:

1. The first phase represents network-readiness as reflected by the proliferation of networked ICT infrastructure within a society or country and the degree of access that individuals, businesses and institutions have to this infrastructure. In short, the emphasis in the first phase falls on access to ICTs. This first phase as distinguished by the ITU (2011) closely coincides with Castells (2000) notion of the proliferation of ICT infrastructure within a region or society.
2. The second level involves ICT intensity, namely the degree of uptake and use of ICTs by individuals and other role-players within a society. Thus the second phase represents the actual use of ICTs. The ITU (2011) mentions in this regard the ICT and other skills of a population that enable the effective use of ICTs. Thus the ITU (2011) – similar to Castells (2000) – emphasises the "knowledgeable labour" or levels of education in a society.
3. The third and final stage represents the actual impact or results of access to and the effective use of ICTs for a particular society or region.

Reaching the final stage, thus becoming an information society and a competitive role-player in the information economy, depends according to the ITU (2011) on the first two stages. In the absence of information highways as represented by networked ICT infrastructure no participation in the information society is possible. However, a society can also not reap the advantages of becoming an information society without a large percentage of people who have both the skills and the knowledge to use ICTs maximally. Thus economic growth and development will remain below potential and a country or region will remain socially excluded from the information society if it does not fulfil both criteria, namely access to ICTs as well as having a population with the skills and knowledge to enable the full and efficient use of ICTs.

THE POSITION OF AFRICA – AND SUB-SAHARAN AFRICA SPECIFICALLY – IN THE INFORMATION SOCIETY

Africa is by far the least computerised region of the world (Castells, 2000; Jensen, 2006). With the exception of a few major cities, ICT infrastructure is scarce at best and nonexistent at worst (Kamalipour, 2007). Firstly, Africa often lacks the minimum infrastructure required for using computers. Computers are, for example, dependent on reliable electricity supplies. Where electricity supplies are nonexistent or unreliable, efforts to supply electronic equipment to African countries and organisations become futile. The critical aspect of computer usage is, however, networking capability to link to the internet and other global communication networks. Networking capability requires telecommunications infrastructure and network connectivity. However, many schools, universities and research centres on the African continent have no internet access at all. Where basic ICT infrastructure does exist, networks are mostly meagre and fragile in comparison with world standards. The consequence is that, although 14.1% of the world's population live in Africa, Africa houses only 2.1% of the internet users in the world (Hyde-Clark & Van Tonder, 2011). Furthermore, in South Africa – one of the most connected countries in Sub-Saharan Africa – only 15% of households have a working computer and only 5% of households have access to the internet. Sub-Saharan Africa furthermore has the lowest teledensity (number of telephones for a particular portion of the population) in the world and a large unmet demand for telecommunication services.

It is furthermore not only a problem of basic connectivity, but also of bandwidth. The reality is that even Africa's most well-equipped centres of excellence have less bandwidth than a home broadband user in Europe and North America (Jensen, 2006). Most African internet connections do not have a bandwidth larger than 80bps that may be sufficient to sustain basic email communication, but makes it difficult – if not impossible – to offload large files such as academic articles and scientific reports. The most important reason for the lack of sufficient bandwidth in Sub-Saharan Africa is the low penetration of fibre optic cables that have a vast capability of transferring data (Song, 2005). North Africa is however in a better position as the rest of Africa as it has access to a web of cables criss-crossing the Mediterranean.

Another major problem brought about by the lack of fibre optic infrastructure is the exorbitant prices of internet connectivity, in particular broadband connectivity, in Africa and Sub-Saharan Africa (Cherlin, 2009; ITU, 2011). The costs of internet connectivity are in some cases literally a thousand times higher than for broadband users in the developed world. According to Jensen (2006), the most important reason for high broadband costs is the fact that the few fibre optic links with the developed world have been operated by ineffective state-owned operators which have been charging monopoly prices. In 2006 there were still very little signs that prices have been coming down after additional links have been established. Research by the ITU (2011) furthermore indicates that countries with relatively high ICT prices have relatively low levels of ICT access, uptake and use. The opposite is also true. People have more access and use ICTs more in countries where prices are more affordable and cost a relatively small portion of their income. Thus prices and affordability represent major factors determining access to and use of ICTs and thus in bringing people into the information age.

Discussions on the position of Africa in the information society has, however, been dominated by discourses on internet access. However, according to the ITU (2011), the single most dynamic development with regard to ICT access and use in recent years has been the worldwide surge in mobile phone (cellphone) subscriptions. Whereas fixed line telecommunication has been declining all over the world, the worldwide growth in mobile-cellular technology is depicted by the ITU (2011) as a "mobile miracle". In fact, the mobile-cellular market has become the fastest growing telecommunications industry in history. By the end of 2010 there were, for example, 5.3 mobile phone subscriptions worldwide, in comparison with 4 billion in 2004. Whereas the growth in mobile telephony has now also reached a point of saturation with penetration rates of over a 100 per cent of the population in the developed world, the "mobile miracle" has been continued in the developing world by spectacular growth rates of over 20 per cent per annum. With the advent of mobile broadband internet the question arises whether the mobile phone can play a significant role in promoting growth and development in Africa and in integrating the continent with the information society.

THE PROLIFERATION OF MOBILE PHONES, MOBILE INTERNET AND ICT SKILLS IN AFRICA

In the developed world, the mobile phone represents an extension of pre-existing landline (or fixed) networks (Ling & Horst, 2011). However, people in the developing world have had only limited access to telecommunications – often only by means of payphones. As recently as 2000 the subscription rates to fixed line networks in Africa was as low as 3 per cent (Bailard, 2009). It was initially reasoned that the lack of interest in fixed line telephony – whether due to financial limitations or a simple lack of interest – would also apply to mobile phones. Thus the possibilities of the African market have been overlooked by most. However, despite the fact that fixed line subscriptions have continued to stagnate at less than 4 per cent, mobile phone penetration rates soared from lower than 2 per cent in 2000 to above 90 percent in a number of African countries (Calandro et al., 2010). Thus, in a time when discourses on the information society has

predominantly been focusing on the internet, the mobile phone has quietly come to provide access to electronically mediated communication to people at the bottom of the income pyramid – often for the first time in their lives.

Access to Mobile Telephony in Africa

The tremendous growth in the uptake of mobile telephony is particularly noteworthy for African and Sub-Saharan countries. Calandro et al. (2010) provides statistics for the number of SIM cards sold as a percentage of the population for a number of Africa countries (see table 1).

Table 1: Mobile cards sold as a percentage of the population

	2006	2007	2008	2009
Botswana	44.10	60.86	77.34	96.12
Tunisia	73.60	77.89	84.59	94.96
South Africa	81.54	86.02	90.60	92.67
Ghana	23.30	33.25	49.55	63.38
Cote d'Ivoire	20.70	37.11	50.74	63.33
Benin	13.00	24.45	41.85	56.33
Namibia	29.73	38.31	49.39	56.05
Senegal	25.75	30.53	44.13	55.06
Kenya	19.96	30.06	42.06	48.65
Nigeria	22.40	27.35	41.66	47.24
Tanzania	14.37	20.16	30.62	39.94
Cameroon	17.20	24.31	32.28	37.89
Zambia	13.84	21.43	28.04	34.07
Uganda	6.77	13.69	27.02	28.69
Mozambique	11.00	14.08	19.68	26.08
Rwanda	3.41	6.72	13.61	24.30
Burkina Faso	7.10	10.94	16.76	20.94
Ethiopia	1.10	1.54	2.42	4.89

Source: Calandro et al (2010)

Calandro et al. (2010) warn that the data reported in table 1 could represent an over-calculation (even by millions) of penetration rates as most markets are characterised by multi-SIM usage. However, even when taking over-counting into account, the conclusion can be drawn that there has been a rapid growth in the uptake of mobile services as indicated by vast differences between the figures for 2006 and 2009. Whereas South Africa and Tunisia maintained a leadership position between 2006 and 2008, these two countries were overtaken by Botswana in 2009 to become the African country with the highest mobile penetration. In Botswana, Tunisia and South Africa mobile penetration has nearly reached a saturated rate of 100 per cent – similar to many developed countries. Cote d'Ivoire, Ghana and Senegal have also seen tremendous growth rates. Even countries at the bottom of the index such as Burkina Faso and Rwanda have experienced significant growth rates – albeit from very low baselines. However, in a large number of African countries mobile penetration is still below 50 per cent and in a country such as Ethiopia as low as 4.89 per cent.

The conclusion can however be drawn that the lack of fixed-line subscriptions in Africa cannot be ascribed to a lack of interest in telephony and access to the information society (Bailard, 2009). The real reasons for the lack of demand for fixed-line services is the fact that, due to the high costs of fixed-line infrastructure, it has not been available in many rural areas and customers often have to bear a large percentage of the installation costs when it does become available. People furthermore often have to wait long times for the infrastructure to be installed in their homes. Moreover, the lines frequently go down due to poor maintenance, floods and the theft of copper cables. In contrast, due to the privatisation of telecommunication industries since the mid-1990s, most mobile phone markets have been characterised by competitive industries due to the presence of more than one operator (Bailard, 2009; ITU, 2011). The result is more affordable and reliable mobile services. People also do not have to wait for long periods of time to have a mobile phone installed. The can nowadays buy it over the counter from a multitude of dealers. The advent of pre-paid or "pay-as you-go" (or rather "pay-as-you-use") services have furthermore helped poorer users to control telecommunications costs.

Mobile Broadband in Africa

The impact of the mobile phone is however not restricted to basic telecommunication services. Wireless broadband access via mobile technology has also become a significant growth sector and the growth in mobile broadband subscriptions had been the single most dynamic aspect of the ICT sector in the past years (ITU, 2011). Even in developed countries people are shifting more and more to wireless broadband access via wireless devices such as mobile phone and tablets. In developing countries, in particular, the growing access to mobile-broadband technology and devices hold the promise of bringing people in developing countries online. Thus the mobile revolution – which includes access to wireless internet via mobile phones – holds the promise of being a key enabler to help developing countries to leapfrog stages of development and to experience the many benefits associated with being integrated into the information society (Castells, 2000, 2001). Thus wireless internet access has already been successful in providing health and business information to people in poorer countries and specifically in far-off rural areas and in facilitating e-learning and e-governance (ITU, 2011).

However, despite these promising developments, more than 70 per cent of the world's population – and more than 80 per cent of people living in developing countries – do not have internet access yet and much fewer has access to broadband internet (ITU, 2011). Thus in many developing countries schools, hospitals, other institutions and other households located outside major urban centres do not have access to high-speed internet services. Table 2 gives an overview of access to mobile broadband access as well as internet access in general in a number of African countries as reported by Calandro et al. (2010). The statistics are based on the results of a household survey conducted by Research ICT Africa.

Thus, despite the spectacular growth in mobile access in Africa, the data in table 2 indicate that levels of access to wireless broadband internet via mobile phones has remained extremely limited notwithstanding the fact that most mobile operators in Africa have introduced mobile broadband services including 3G and 3.5G (Calandro et al., 2010). It is only in South Africa, one of the first countries to introduce mobile broadband services, where ADSL connections have been overtaken by mobile internet subscriptions. However, it is not only the case that mobile internet subscriptions have been low. The low levels of subscription to mobile broadband services are merely another reflection of the overall low levels of internet subscription, internet access and internet use in African countries.

Table 2: Mobile cellular broadband subscriptions and other forms of internet access for a number of African countries in 2009

	Statistics reported per 100 of the population			
	Internet subscriptions	Internet users	Fixed broadband Internet subscriptions	Mobile cellular internet subscriptions
Tunisia	4.03	34.07	3.63	
South Africa	Not available	8.82	0.96	10.52
Botswana	Not available	6.15	0.77	2.97
Senegal	0.47	7.36	0.47	
Ghana	0.38	5.44	0.11	0.24
Rwanda	1.47	4.50	0.08	0.15
Zambia	Not available	6.31	0.06	0.03
Mozambique	0.059	2.68	0.05	0.40
Nigeria	0.58	28.43	0.05	4.89
Cote d'Ivoire	Not available	4.59	0.05	
Burkina Faso	Not available	1.13	0.04	
Kenya	2.11	10.04	0.02	4.98
Benin	0.21	2.24	0.02	
Namibia	Not available	5.87	0.02	1.48
Uganda	0.91	9.78	0.02	1.10
Tanzania	Not available	1.55	0.02	1.37
Cameroon	0.13	3.84	0.00	0.49
Ethiopia	0.58	0.54	3.498	0.10

Source: Calandro et al (2010)

The low levels of internet access in most African countries as reported by Callandro et al. (2010) are confirmed by the ITU (2011). Only three African countries ranked among the top 100 countries with regard to their composite measure (IDI index) for ICT access and use: Mauritius (69), the Seychelles (71) and South Africa (97). The IDI values for these three countries vary between 3 and 4 in comparison with the 8 of the Republic of Korea Korea at the top of the list.

Pricing Structures in Africa
It is, however, not only the availability of infrastructure that determines its use. As is indicated by the low penetration of fixed-line telephone access in Africa, people are sensitive to price structures (ITU, 2011). The price of a mobile phone call, a sms or a mobile broadband connection will determine how many people will subscribe to a particular service and how often and for what purposes they will use it. The period from 2008 to 2010 has not only been characterised by a tremendous growth in mobile phone subscriptions, but also by a 21.8 per cent drop in prices of mobile phone services worldwide. This drop in prices was however higher in developed than in developing countries,

As already indicated in the introductory sections, the prices of ICT services remain high in most African countries in comparison with the rest of the world. In a comparison of the overall price basket for ICT services only six African countries fall under the 100 cheapest countries: Mauritius (47); Tunisia (65); Algeria (71); Egypt (78); Botswana (85) and South Africa (99). The results furthermore confirm that countries with relatively low ICT prices have relative low ICT access and use.

Similar to the overall drop in prices for ICT services, the prices for a basket of mobile services (30 outgoing calls and 100 sms's) also dropped worldwide by 21.8 per cent (ITU, 2011). However, the ten countries with the highest prices for a basket of mobile services are all in Africa: Malawi, Niger, Zimbabwe, Togo, Burkina Faso, Mozambique, Madagascar and Chad. The only light in this dark tunnel is the fact that five countries mentioned last had also seen the largest decrease in prices in the last two years in absolute terms. Similar to the price structures for ICT services in general, only six African countries ranked among the 100 cheapest countries in the world with regard to the mobile price basket: Mauritius (37); Botswana (67); Tunisia (82); Algeria (86); Tonga (93) and Egypt (96). Thus, although there are positive indications that the prices of mobile services are coming down in some African countries, the overall price structures for mobile services remain high.

ICT skills and the Readiness of the Population to Use ICTs
Whereas data on ICT penetration rates, and particularly those for mobile subscriptions, are more readily available from household surveys as well as data provided by operators, it is much more difficult to obtain data for and to compare levels of education and ICT skills for different countries. Research by the ITU (2011) nevertheless emphasises the importance of these variables. The ITU found that internet usage tends to be much higher among people with higher levels of education. Higher levels of education also correlated with a higher income and a higher degree of computer literacy – both important factors that determine people's internet subscriptions as well as internet usage.

The relationship between income and internet usage is much stronger for Africa than for the developed world (ITU, 2011). Whereas hardly any Africans with only primary education were using the internet, large percentages of individuals with tertiary qualifications were online. There were, however, noteworthy differences between countries regarding internet access among the highly educated, ranging from 90 percent in Rwanda to less than 20 per cent in Uganda. As already mentioned, income was another important variable determining internet usage. In most African countries a strong relationship was found between income and internet access. In Botswana, for example, only 2 per cent of people in the lowest three income quartiles accessed the internet. In contrast, the concomitant figure for the highest income quartile was 19 per cent. Interestingly, the relationships between education levels and internet access are much less conspicuous for developed countries. One of the reasons might be that internet subscription is much cheaper in the developed than in the developing world. In Africa, however, it appears that internet access remains the preserve of the highly educated and wealthy elite, namely those who can afford internet subscription and those who have the necessary skills to use it. Thus a digital divide also exists within African countries – between the wealthy educated and the poor uneducated.

The ITU (2011) nevertheless voices the opinion that the advent of mobile internet – including mobile broadband – will not only alleviate problems with ICT infrastructure, but will also play an important role in enhancing ICT skills in Africa. The skills for using a mobile phone are relatively simple. The fact that many Africans are already using mobile phones, implies that they have already mastered some basic ICT skills which could make it easier for them to go online. Furthermore, the availability of prepaid mobile broadband could serve to lower the income barrier and allow low-income customers to buy small amounts of data volumes to access the internet whenever they have money available. Electricity also forms less of a barrier as minimal facilities are needed to load the battery of a mobile phone. Thus it appears that the mobile phone is already serving and could in future serve to be the first step for many Africans to access the information highways of the information society.

USAGE OF MOBILE PHONES IN AFRICA

The impact of mobile phones on development will, however, in the end be determined not only by the number of owners of SIM cards and subscription rates, but also by the actual ways in which mobile phones are used and the benefits that Africans derive from using mobile phones (ITU, 2011; James & Versteeg, 2007).

The proliferation of mobile phones in Africa have influenced micro, meso and macro contexts. Mobile phones have in the first place been enhancing friendships and family interaction and has resulted in the tightening of social cohesion among close friends and family members (Ling & Horst, 2011). It has however been found that mobile phones do not expand social networks – as is often the case with internet platforms such as Facebook and Twitter – but rather serve to intensify existing social networks. Ample evidence furthermore exists of the use of mobile phones for business and governance purposes and the ways that it is changing daily life in Africa (Bailard, 2009). For example, buyers and sellers can connect more readily creating more efficient markets in the process; small business owners and vendors are less dependent on middlemen thus reducing their susceptibility to extortion and bad information; mobile banking has given poor people access to basic banking services, made payments easier and have simplified the payment of remittances; while access to government services and e-education have been streamlined.

James and Versteeg (2007) suggest, however, that both the quality and quantity of mobile phone usage will be lower in developing than in developed countries. As far as quantity is concerned, the lower levels of mobile penetration imply that people in developing regions such as Africa will use mobile phones less frequently. However, James and Versteeg warn that the fact that many people in Africa do not subscribe to mobile telephony do not mean that they do not make use of a mobile phone at all. Sharing of mobile phones is a common practise in Africa. In Tanzania, for example, household surveys indicate that there is at least one additional user for each owner of a mobile phone. However, people sharing a mobile phone will often buy their own SIM card which will be reflected in SIM card data for various countries. Facilities for commercial sharing, namely mobile services that are available after payment, are also widespread in Africa (Sey, 2007). It can nevertheless be assumed that people who share a mobile phone with other people or make use of commercial mobile services will use the phone less than the owners of a mobile phone. Household surveys in Tanzania and South Africa indicate, for example, that approximately 76 per cent of mobile owners use their phones four times or more per week (James & Versteeg, 2007). However, only 24 per cent in South Africa and 16 per cent in Tanzania of non-owning users use a mobile phone four times per week or more. It is furthermore assumed that users in developing countries make shorter calls than in developed countries. Owning users will furthermore have a longer calling time than non-owning users. These tendencies are furthermore aggravated by the relative higher prices of mobile services in Africa as discussed in a previous section (ITU, 2011).

It is furthermore expected, as already mentioned, that also the quality of mobile usage will be lower in developing than in developed countries (James & Versteeg, 2007). In developed countries mobile phones have been developing in multi-media devices used for receiving and sending emails, photographs and real-time exchange of information. The reality is probably very different in developing countries where the costs of services are much higher. Methods of saving costs such as "beeping signals" (to notify a recipient of a missed call so that he/she could call back) and cost-effective ways of texting such as MXit in South Africa have been developed. According to Gillwald (2005), African users have been using multiple communication strategies in which they use whatever medium is available in different ways depending on two key factors, namely convenience and disposable income. Thus they will make alternative use of public access phones, mobile phones, mobile phone kiosks and traditional landlines depending on the circumstances. It is, for example, unlikely that they will make a mobile phone call costing about 30 US cents in the middle of the month. In such a case it is more likely that a limited amount of airtime will be bought from a mobile kiosk.

Different types of usage are furthermore characterised by various levels of quality and complexity (Hyde-Clark & Van Tonder, 2011; James & Versteeg, 2007). If somebody borrows, for example, a mobile phone to make a call or make use of a mobile phone kiosk, that means that this person can make a call, but cannot receive a call at any time. The research by Hyde-Clark and Van Tonder (2011) furthermore indicates that the activities performed via mobile internet are also qualitatively different from those performed via computer-based broadband access. A sample of youth in the Johannesburg-area indicated that they use broadband access via their mobile phones primarily to check their email and to interact with friends on Facebook and other social networks. This finding is in accordance with the results reported by Ling and Horst (2011) that mobile phones play an important role in intensifying social relations. However, a third of the respondents did not believe that mobile phones can replace computers. Some of the reasons forwarded for this opinion were the limited storage and memory capacity of mobile phones; the fact that more complex functions can be performed on computers; the fact that is more convenient to browse the internet via a computer; the possibility to play more complex games and the option to use several programs at the same time. One of the respondents commented: "A computer has an ability of its own. It's more sophisticated, smarter and has better functions and a wide variety of programs. Some functions just can't be replaced by a phone e.g. Microsoft Word, Excel, Powerpoint, etc" (Hyde-Clark & Van Tonder, 2011:271).

Hyde-Clark and Van Tonder (2011) draw the conclusion that the mobile phone is predominantly used in Africa for voice communication, sms's and limited access to and use of social networks. Overall, the mobile phone can however not replace the complexity of functions offered by broadband access via a computer.

THE IMPACT OF THE MOBILE PHONE IN AFRICA

According to the ITU (2011) the final stage in becoming an information society entails reaping the benefits and implications of increased access and use of ICTs. The final issue that therefore needs to be considered is whether and to what extent the mobile phone fosters growth and development on the African continent and whether it can become a key factor in helping the continent to leapfrog stages of development to become an information society.

As already mentioned, ample evidence exists that the mobile phone fosters wide-ranging changes in the lives of African people (Bailard, 2009). Research has indeed indicated that mobile phones are contributing towards the reduction of price discrepancies; lead to increasing consumer and producer welfare; facilitate improved productivity; assist people in finding employment; and reduce corruption on the continent. However, the most recent data of the ITU (2011) indicate that most African countries are still ranked low on most indices of

the information society. It can therefore be concluded that the mobile phone has not (yet) succeeded to bridge the digital divide between Africa and the rest of the world (Hyde-Clark & Van Tonder, 2011).

The most important reason is most probably that internet access via mobile-broadband (and probably also other wireless devices) cannot replace broadband access via computers. It is therefore not only a question of access to and use of ICTs. It is in the end the complexity of functions offered by particular devices that makes all the difference. As mobile phones cannot offer the full range of complex functions offered by broadband internet access via computers, they cannot serve as a shortcut towards becoming an information society. Making use of complex devices furthermore requires a highly educated population who has developed advanced ICT skills.

There is consequently no short cut for Africa to become an information society. Bridging the digital divide between Africa and the rest of the world will require the roll-out of the infrastructure for the use of computers (e.g. electrification) and for fixed-line broadband access (fibre optic cables); the implementation of policies to bring down costs; and the advancement of the quality of education on the African continent.

REFERENCES

Bailard, C. S. (2009). Mobile phone diffusion and corruption in Africa. *Political Communication*, *26*, 333-353.

Calandro, E., Gillwald, A., Moyo, M., & Stork, C. (2010). *Comparative ICT sector performance review 2009/2010.* Cape Town: Research ICT Africa.

Castells, M. (2000). *End of millennium: The information age: economy, society and culture: Volume III* (2nd ed.). Oxford: Blackwell.

Castells, M. (2001). *The new global economy.* In: J. Muller, N. Cloete & S. Badat (Eds.), *Challenges of globalisation: South African debates with Manuel Castells* (pp. 2-21). . Johannesburg: Maskew Miller Longman.

Cherlin, E. (2009). *An Internet bandwidth bonanza coming to Africa.* Retrieved September 29, 2010 from http://www.olpcnews.com/internet/access/internet_bandwidth_bonanza_africa.html

Dutta, S., & Mia, I. (Eds.). (2009). *The Global Information Technology Report 2008-2009.* Geneva: World Economic Forum.

Gillwald, A. (Ed.). (2005). *Towards an African e-index: Household and individual ICT access and usage across 10 countries in Africa.* Johannesburg: The Link Centre, University of the Witwatersrand.

Hyde-Clark, N. & Van Tonder, T. (2011). Revisiting the "leapfrog" debate in light of current trends of mobile phone Internet usage in the Greater Johannesburg area, South Africa. *Journal of African Media Studies*, *3*(2), 263-276.

International Telecommunication Union (ITU). (2011). *Measuring the information society: 2011.* Geneva: ITU.

James, J & Versteeg, M. (2007). Mobile phones in Africa: How much do we really know? *Social Indicators Research*, *64*, 117-126.

Jensen, M. (2006). *Lowering the costs of international bandwidth in Africa* (draft format). [O]. Retrieved September 23, 2010 from http://rights.apc.org/documents/fibre_bandwidth_EN.pdf

Kamalipour, YR. (2007). *Global communication* (2nd ed.). Belmont, CA: ThomsonWadsworth.

Ling, R., & Horst, H. A. (2011). Mobile communication in the global south. *New Media & Society*, *13*(3), 363-374.

Madikiza, L, & Bornman, E. (2007). International communication: shifting paradigms, theories and foci of interest. *Communicatio, 30*(2), 11-44.

Muller, J., Cloete, N., & Badat, S. (2001). Introduction. In: J. Muller, N. Cloete, & S. Badat (Eds.), *Challenges of globalisation: South African debates with Manuel Castells* (pp. vi-x1). Johannesburg: Maskew Miller Longman.

Sey, A. (2007). *Mobile phone systems in Africa: Developments, uses and implications.* Paper presented at the 93rd National Communication Association Annual Convention, Chicago, USA.

Song, S. (2005). *Viewpoint: Bandwidth can bring African universities up to speed.* Retrieved September 23, 2010 from http://www.scienceinafrica.co.za/2005/september/bandwidth.htm

Van Dijk, J. (1999). *The network society.* London: Sage.

Van Oudenhove, L. (2003). Theories on the information society and development: Recent theoretical contributions and their relevance for the developing world. *Communicatio*, *29*(1&2), 48-67.