

# **TOWARDS AN AFRICAN ICT E-INDEX: TOWARDS EVIDENCE BASED ICT POLICY IN AFRICA**

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## **1 BACKGROUND**

There is a growing recognition among African policy makers of the role of ICTs in the growth and development process, despite the limited impact of past technology solutions on Africa. There is a great deal of debate over what the dominant ICT strategy for Africa should be for confronting the challenges and opportunities of globalisation and harnessing the potential benefits of the knowledge economy. This is clearly illustrated in the continent-wide initiatives such as the New Partnership for Africa's Development (NEPAD), the African Telecommunications Union, the African Connection and in various programmes of the Economic Commission for Africa (ECA). These initiatives reflect policy-makers' firm belief in the possibilities of ICTs to accelerate broad-based growth and sustainable development, and for reducing poverty. The creation of an African ICT Research Network arises from the growing demand for the information and analysis required for appropriate policy formulation and effective regulation.

Yet despite the rhetoric and public statements of commitment to utilising ICT for development in Africa, the vast majority of African countries appear ill-prepared to optimise the potential of ICTs, since they lack the financial and human capital, along with the policies and institutions required to exploit the knowledge economy. Underlying this is the fundamental absence of data, research and analysis to make informed decisions. This danger of African countries remaining on the wrong side of the global digital divide is also raised in the context of a digital divide within countries due to the uneven nature of diffusion of ICTs between urban and rural areas. If ICTs are a new source of economic growth, there is indeed cause for concern that ICTs could become a factor contributing to the widening of income differentials between countries. Domestic digital divides often mirror existing inequities within developing and developed countries and are therefore likely to reinforce them rather than contribute to developmental objectives. Moreover, fears that the rapid pace of change in ICTs can contribute to the deepening of technological dependency and economic underdevelopment in large parts of Africa, are not entirely unfounded.

These concerns together with the mixed outcomes the adoption of policy reform models for telecommunications in developing countries has had, has also raised questions about the ability of markets to deliver on developmental goals in addition to economic growth. The enthusiasm for market solutions has also been tempered by an acceptance that especially in developing countries they can be highly imperfect and therefore not unlikely to optimally allocate resources. Across the globe, even in mature markets, governments or their specialised agencies are regulating markets to ensure competitiveness and delivery. While the private sector continues to be recognised as the key driver of economic growth, effective regulation can be the key not only to economic efficiency but also to address issues of equity and inclusion. Also, as there is usually tension between the strategies driving industrial policy, innovation policy and social policy of ICTs, understanding the linkages and trade offs is important.

While these concerns are pertinent to those responsible for ICT development throughout the world, decision-makers in Africa have seldom had the benefit of research and analysis, particularly competing analyses to inform their policy processes. Research in the field of ICT and development in Africa is limited, fragmented and typically undertaken as isolated and

disconnected projects. The establishment of the Research ICT Africa! Network (RIA!) in 2003 emanates from the growing demand for data and analysis necessary for appropriate but visionary policy required to catapult the continent into the information age. Through network development, RIA! seeks to build an African knowledge base in support of ICT policy and regulatory design processes, and to monitoring and review policy and regulatory developments on the continent. Research ICT Africa! fills a strategic gap in the development of a sustainable information society and network knowledge economy by building the ICT policy and regulatory research capacity needed to inform effective ICT governance in Africa.<sup>1</sup>

The realisation that a research gap existed between the national or regional policy objectives for the ICT sector and outcomes became apparent in various research centres across the globe at the turn of the century. Various multilateral agencies, such as the OECD, began to develop what have become known as Regulatory Impact Analyses, which are applied across most of its member countries.<sup>2</sup>

Arising from the same concerns, LIRNE.NET<sup>3</sup> conducted research which sought to assess the impact policy and regulatory frameworks were having on sector development – the sector performance review. The LINK Centre has been conducting regular Sector Performance Reviews of the South African telecommunications sector since 2001. The purpose of these essentially supply-side studies is to provide decision-makers with hard data and analysis so that countries that had traditionally operated in an information vacuum without the benefit often of any data, the competing analyses from different think tanks and research entities that many mature economies enjoy, can move towards evidence based policy.

## **1.1 FAIR ACCESS TO THE INTERNET REPORT (2002)**

In line with attempts to grapple with ways to measure the information society and digital divide for the first World Summit on the Information Society in Geneva in 2003, the Open Society Foundation together with the Canadian International Development Research Centre (IDRC) commissioned the LINK Centre together with Mike Jensen and several African researchers who were to become part of the RIA network, to explore the relationship between good governance (regulation), pricing and Internet penetration. The study was premised on the assumption that the regulatory environment has the potential to enable new entrants, ensure fair competition, improve choice and reduce costs or add costs all

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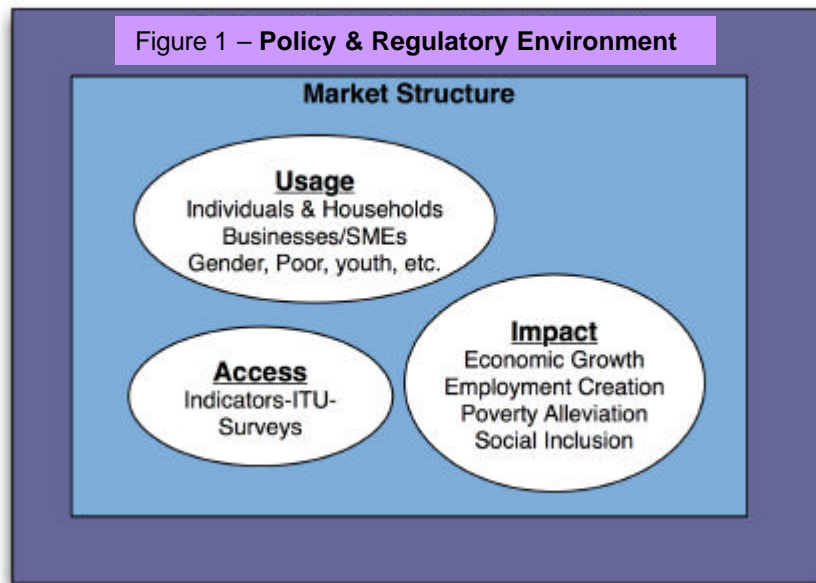
<sup>1</sup> The research arising from a public interest agenda is made available in the public domain and individuals and entities from the public and private sector and civil society are encouraged to use it for teaching, further research or to enable them to participate more effectively in national, regional and global ICT policy formulation and governance. See <<http://www.researchICTafrica.net>>.

<sup>2</sup> See University of Manchester's Centre on Regulation at <<http://idpm.man.ac.uk/crc/public.html>> for research on RIA).

<sup>3</sup> LIRNE.NET is a research network comprising Research ICT Africa!, LIRNEasia in Sri Lanka, the DIRSI network for Latin America and the Caribbean, and three centres in Europe, Center for ICT at the Danish Technical University, Economics of Infrastructures at the Technical University of Delft, and media@lse at the London School of Economics, and is coordinated by Comunica in Uruguay. See <<http://lirne.net>>.

along the supply curve of Internet services, thereby influencing the services demanded by consumers and users and consequently deleteriously impacting on internet penetration.

The report established that the number of factors that impact on the relationship between the regulatory environment and the cost of services was substantially greater than anticipated. In fact, the relationship between regulatory environment and cost of services is



not linear, but is rather intermediated by several other factors.

Following from this later in 2003 the LINK Centre in collaboration with the IDRC extended the scope of this nascent policy work to the rest of the continent linking up with universities and research entities in seven countries to establish a ICT policy and research network Research ICT Africa! today spans 18 countries across East, North, South and West Africa.

The research agenda that has emerged since then is summarised graphically in the figure above. The research of the network focuses on the linkages between the ICT policy and regulation, the arising market structure and the achievement of sector policies, primarily of affordable access and infrastructure extension. The interplay, and ultimately outcome, of these will determine the impact ICTs can make on economic and social policy objectives such as economic growth, employment creation, poverty alleviation and social inclusion.

## 1.2 ICT SECTOR PERFORMANCE REVIEW (2003)

The work of the network started with the 2003 *ICT Sector Performance in Africa: A Review of Seven African Countries*, a supply-side sector performance analysis based on the LIRNE methodology was conducted in Cameroon, Ethiopia, Kenya, Rwanda, South Africa, Uganda and Zambia. The study arose out of the need, not only to fill the data gaps that existed on the continent in relation to ICT indicators, but more specifically to assess regulatory impact and policy outcomes of telecommunications reform against actual sector performance.

While the tools used to conduct the sector performance review may make it appear to be a more conventional market analysis, the purpose of the SPR is to examine sector policy

outcomes against national policy objectives. Across the continent these include affordable access in and increase range of services, usually through strategies of increased competition, but also often where there is market failure through regulation and universal service levies or roll out obligations. What the study demonstrated was that across the continent, even where there was overall sector growth, that the primary national policy objectives of delivering affordable access, generally through strategies involving extension of fixed lines services, were not being met and that despite the relatively high cost of mobile services, it was more responsive to the pent up demand for voice telephony, especially following the introduction of flexible pre-paid services. However, it was clear that large numbers of people on the continent remained unconnected and that while mobile was addressing the gap between those who had voice services and those that did not, relatively few Africans were able to affordably access the Internet and other enhanced services that have become necessary to effective participation as a citizen, consumer and service provider.

The assumption of this shift from public to private provisioning in the global reform model assumes that market mechanisms are best able to efficiently allocate resources with associated benefits for users and consumers. Despite the uniqueness of political economies of countries impacting on reform, there are established relationships between market conduct and performance. Despite such strategies being adopted, markets in Africa are generally poorly structured, creating market distortions and resulted in high prices, collusion and facilities control. Markets continue to be designed around dominant, vertically integrated incumbents. This creates anti-competitive incentives as new entrants come into market. As a result, resource and skill-intensive access regulation is required to constantly adjust the behaviour of incumbent. Few regulators in more mature economies are able to resource this model; it is a quite unfeasible model for inexperienced and poorly resourced African regulators.

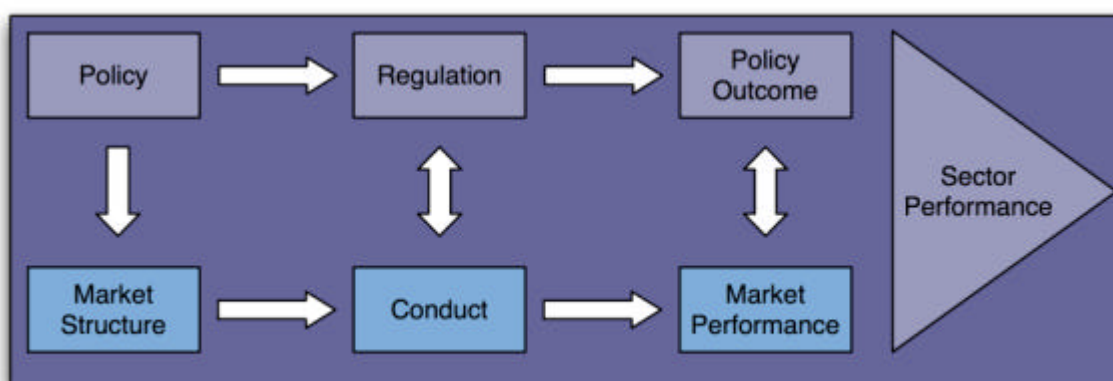


Figure 2

### 1.3 INDIVIDUAL AND HOUSEHOLD ACCESS AND USAGE SURVEY (2004)

This supply-side analysis was therefore followed by a demand side survey of ICT access and usage by over 70,000 individuals in nearly 15,000 households across 12 African countries during 2004 to ascertain the nature and drivers of ICT usage. The data was collected from rural, urban and metropolitan areas providing the first disaggregated data in the public domain. The survey also permitted the disaggregation of gender, age, education and limited household income data. The survey was supplemented by focus groups studies in five

countries of the original ten countries – Cameroon, Ethiopia, South Africa, Uganda and Zambia. A rich picture emerged of ICT access and usage and the reasons for marginalisation from services. While large numbers of the Africans continued to be excluded from services simply by access others were excluded by the cost of services and as services became more complex by the absence of the necessary skills. While expanding mobile services improved access to voice services, the surveys revealed a multiple service communication strategy where different services, fixed and mobile, public and private, were used according to available resources. People with mobile phone would often make use of public access phones if they were available to reduce costs or when they had no more airtime. Of limited use in this strategy for most was the use of Internet, for which there appeared to be limited demand mainly due to perceptions of unreliability due to poor network quality or limited bandwidth and high costs. The survey also allowed the network to begin to grapple with the nuances of indicators as research tools in an attempt to make their findings more rigorous.

#### **1.4 SME ACCESS AND USAGE SURVEY (2005)**

With an understanding of individual and household access and usage, the next obvious gap in understanding the ICT market was around enterprise usage. By the time the household survey was being completed the WSIS Geneva Plan of Action item on Measuring the Information Society led by the ITU and UNCTAD had got underway and identified an internationally agreed set of universal indicators and various demand-side surveys. The first was an individual and household survey and the second was an enterprise survey. As RIA! had limited resources and because of the significance of SMEs in economic growth strategies for developing countries in particular, the decision was taken to do an access and usage survey of ICTs by SMEs. The Research ICT Africa! network in 14 African countries carried out the survey. Due to the absence of national business registers in most countries, a non-representative sample of SMEs from a range of sectors were surveyed during 2005 demonstrating widespread use of mobile phones in particular and raising a range of significant policy issues around supportive SME policies and the importance of banking and business cell phone applications.

The survey report demonstrates that the negative impact of ICT investments on business performance reported in the literature can be attributed to the failure to distinguish between the formal and informal sector. The SME survey report uses a formality index to classify respondent SMEs into informal, semi-formal and formal businesses. The main findings of this survey are:

- ✍ Informal businesses have a higher profitability in terms of fixed assets employed than semi-formal ones, which in turn have a higher profitability than formal businesses. This is understandable, given that increasing formality encumbers a business, ensuring that it must follow certain laws in its operation, with the associated costs.
- ✍ ICTs are significant input factors for both formal and informal SMEs and contribute positively to revenue generation.
- ✍ Mobile phones have overtaken computers as tools in supporting the running of SMEs, given their prevalence and accessibility.

✂ The traditional focus on formal businesses particularly in terms of financial support undermines the role that the informal sector plays in the economy. The fact that it is more difficult to measure does not diminish its impact. The fact that informal businesses are more profitable than formal ones raises the issue that some businesses might prefer to be out of the formal environment.

## **1.5 SECTOR PERFORMANCE REVIEW / PUBLIC SECTOR ACCESS (2006)**

As the public sector in many African countries constitutes the single largest user of ICTs, the obvious next step was to assess ICT access and usage by the public sector, the biggest single collective user of ICT in many African countries.

The intention here was not to review government delivery using ICTs or to conduct e-readiness surveys but to understand the scale and scope of ICT usage and the costs charged to government. However, as indicated in the OECD Working Party on Indicators for the Information Society, one of the main partners in the WSIS thematic on *Measuring the Information Society*, in its assessment of measurement challenges for e-government, relatively few OECD countries attempt to measure e-government via survey of government organisations. The difficulties of comparability across very different forms of government with regard to definitions, scope, intensity of activities and other heterogeneous aspects of governments make multi-country studies unlikely to be meaningful.

In recognition of the statistical difficulties, the OECD has adopted a demand-side approach to e-government measurement through their household and business surveys. Some individual countries, for example Denmark and Canada, collect statistics on government use of ICTs. In order for this significant portion of the ICT market in most African countries to be gauged, but taking into account the realities of the European experiences, RIA! sought to ascertain government access of ICTs in its 2006 Telecommunications Sector Performance Review in combination with demand side data from its household and SME surveys. However, only a few countries were able to access data on government ICT ownership, access and usage during the Sector Performance Review research including Cameroon, Benin and Ethiopia.

## **1.6 TELECOMMUNICATION REGULATORY ENVIRONMENT (2006)**

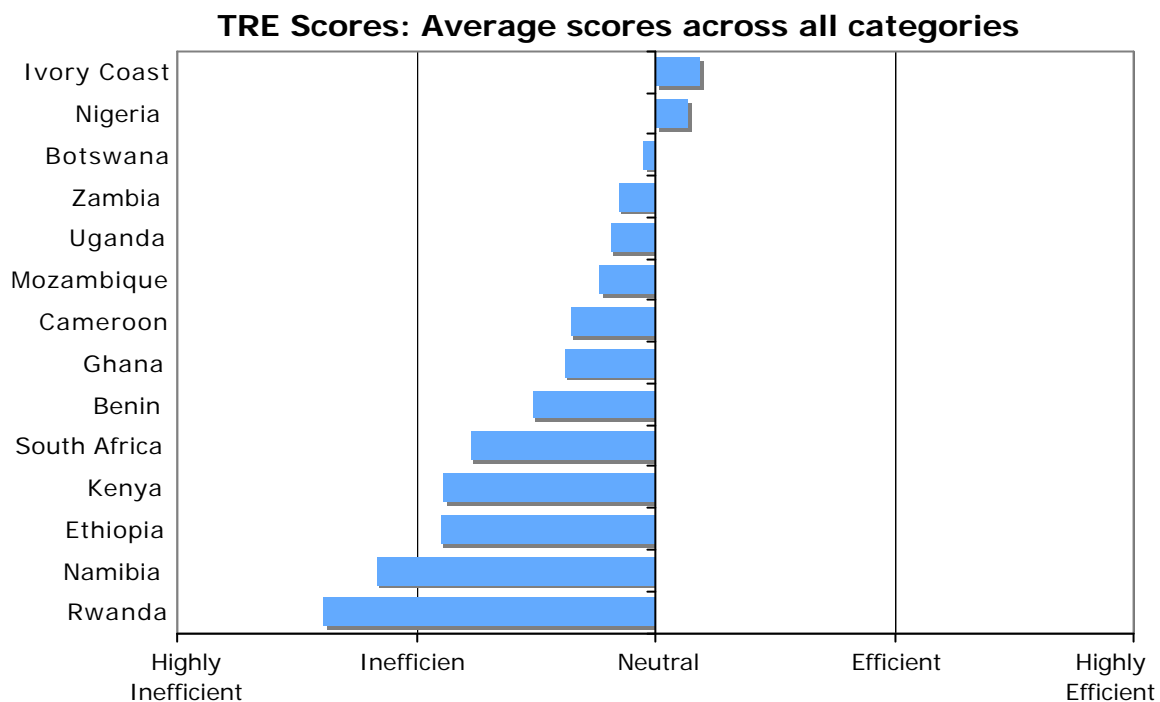
With the shift from public to private investment in the ICT sector globally, the conditions in the telecommunications sector for investment provide a good indicator of the effectiveness of the policy and regulatory environment and whether countries have filled one of the necessary conditions for the development and expansion of the sector. A policy and regulatory perception analysis drawing on the Telecommunication Regulatory Environment (TRE)<sup>4</sup> methodology developed by LIRNEasia (See Samarajiva and Dokeniya 2005: 161-162) was included in the *2007 Towards and African E-Index: Telecommunications Sector Performance across 16 African countries*. The TRE assessment seeks to capture perceptions of efficacy of the regulatory environment by collating the opinion of sector stakeholders.

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<sup>4</sup> Studies using this method have, subsequent to the Asian studies, been carried out in Chile, Guyana, Peru and Ecuador (see [www.regulateonline.org](http://www.regulateonline.org)).

The telecommunications regulatory environment methodology surveys perceptions of actors from across the sector and the entire environment, except for those of the regulator, whose ability to reduce regulatory risk and enable market development is to a significant degree determined by the policy and legal framework.

Figure 3 – **Comparative assessment of Telecommunications Regulatory Environment across several African countries**



Source: Esselaar, Gillwald and Stork (2007).

As indicated by LIRNEasia while assessment for individual countries should be informative, assessments conducted using uniform methods for several countries have all the benefits associated with comparative analysis. Despite the unevenness of the information gathered, the TRE is presented as an indicator of regulatory perception with the necessary caveats about its representivity.

Using the adjusted WTO Reference Paper’s criteria as described above the evaluation for each dimension is undertaken on a five point Lickert scale: poor (1); unsatisfactory (2) neutral (3); satisfactory (4); and excellent (5). Each of these dimensions is then weighted according to their assessed importance to the overall assessment.

Most countries on the continent, followed the global trend towards liberalisation of their markets, though often the lag in doing so meant the investment appetite was not there, either due to changing global economic conditions, the absorption of capital by earlier liberalising markets, or the very small markets for relatively costly services in low income countries. While all of these factors will be significant on a case-by-case basis, the single common factor that is likely to attract or repel, particularly foreign investment, is regulatory risk. This relates more formally to the validity of the law, and the transparency of the

administrative process and the assessed regulatory transaction costs, but over time is also determined by the effectiveness of the regulator in creating a fair competitive environment, specifically with regards to the categories assessed below.

### **1.7 INDIVIDUAL AND HOUSEHOLD ACCESS AND USAGE SURVEY (2007)**

The 2007 e-Access & Usage household survey as a follow up on the 2004 survey is being conducted in 17 African countries and focuses on:

- E-Access: Assess the access of households to ICTs across income groups, geographic location and other factors.
- E-Usage: Household and individual usage of ICTs across socio-economic and geographic factors including rural/urban and how gender plays a role.
- Demand Elasticities: Demand elasticities will be estimated using revealed preferences and stated choice concepts. Knowing the demand elasticities of individuals and households will facilitate an in-depth analysis of the obstacles to ICT adoption which might be of a monetary relevance (income - household or personal disposable income) or qualitative nature (culture, status etc.)
- State of Information Society: Analysing e-access and e-usage will allow measurement of progress of nations and population segments within and across countries towards information societies.
- Impact on Poverty Alleviation: Analysis of E-Usage identify the factors that could potentially reduce poverty. An example could be "Mobile phone usage for private and recreational use" compared to communication with colleagues, suppliers and customers.

## **2 BUILDING ON CURRENT RESEARCH LEARNING IN NEXT RESEARCH CYCLE**

As RIA! moves into its next research cycle it will continue to feed its methodologies and findings into global initiatives to determine indicators and models that can inform past policy performance and propose new strategies for enabling the pervasiveness of ICTs.

The supply and demand side work done by RIA! over the last five years has allowed considerable refinement of indicators traditionally utilised to assess ICT access and usage and inform policy making. Indicators that were taken as given, have been reviewed and exactly what they are measuring distinguished. This methodological exploration of ICT indicators will be expanded in the next research cycle in order to have more informed evidence of policy outcomes.

The research distinguishes the indicators to be used to determine for example the generalised concepts of access, usage and impact. Access indicators measure what people or businesses have in terms of ICTs or how many exist in a country. Usage indicators measure how and for what ICTs are being used by households, individuals, businesses or governments, etc. Impact indicators capture the impact of access and usage on economic growth, employment creation, improvement in public service delivery on a macro level; and company performance, household poverty levels and social inclusion on a micro level, to give just a few examples. Impact indicators are usually derived from analysis of primary or secondary data. This is the level at which ICT indicators link to policy making. This does not mean, however, that access or usage indicators are not useful to measure policy outcomes. All that needs to be demonstrated is the link between access and usage indicators and the impact. This link is likely to be a different one across countries.

Another distinction can be made between demand and supply side indicators. Demand-side indicators are based on information collected from users of ICTs and supply-side indicators on information from service providers. Mobile subscribers per 100 inhabitants can, for example, be computed using data from household surveys (demand side) or by adding subscribers of all operators of a county and dividing the sum by the total population of that country (supply side).

A further distinction could be by users of ICTs: household indicators, individual indicators, business indicators, school indicators, health indicators, government indicators, trade indicators, ICT sector indicators, gender indicators etc.

Adding to this complexity would be any combination of these distinctions, resulting in many permutations. The figure below demonstrates the indicator space for just three distinctions:



Figure 4

Table 1 – Example of Household indicators

	Indicator	Demand side	Supply Side
Access Indicator	Mobile Penetration	Mobile subscribers per 100 inhabitants – as determined by household surveys?	Mobile subscribers per 100 inhabitants: Sum of all subscribers of all operators divided by population
Usage Indicator	Mobile Phone Usage	Average money spend on mobile phone usage proportional to disposable income	Total call minutes billed by operators
Impact Indicator	ICT investment and economic growth	Magnitude and significance of coefficient for ICT investment and ICT expenditure on profit, sales and labour productivity using firm-level data	Strength and lead and lag of link between ICT investment and GDP using Granger causality <sup>5</sup>

Measuring ICTs only from one side might bear the risk that progress is being observed without it actually taking place. The number of mobile phone users stated by operators often seems questionable, for example. Using household data helps to check on these figures, aligning the supply side and demand side indicators. A holistic approach to ICT indicators that reflects all dimensions is hence of importance.

## 2.1 INDICES FOR EVIDENCE POLICY MAKING

While the indicator distinctions discussed in the previous section may seem simple and obvious, combining them into useful indexes or models that reflect the overall state of ICT development and its contribution to effective policy formulation is a challenging task. A

<sup>5</sup> See Granger (1969).

good example for this is the way the International Telecommunications Union (ITU) is measuring the information society. Its ICT Opportunity Index (ITU, 2007) is based on ten indicators and uses the conceptual framework of George Sciadas's (2005) Infostate Model. It distinguishes between Infodensity and Info-Use. In the initial model Infodensity is the sum of all ICT stocks (capital and labour); Info-use the consumption flows of ICTs for a certain period and the Info-state, the aggregation of Infodensity and Info-Use. The ITU splits the Infodensity indicators into network and skills indicators and the Info-Use indicators into Uptake and Intensity indicators (see Table 2).

Table 2 – ITU ICT Opportunity Index

Orbicom concept		Indicator	Comment
Info density	Networks	Main telephone lines per 100 inhabitants	Access indicators which are not necessarily linked to the network if service prices are very high, e.g. A better indicator would be population covered by mobile or fixed line footprint.
		Mobile subscribers per 100 inhabitants	
		International Internet bandwidth	Network indicator
	Skills	Adult Literacy rates	Research indicates that there is no link between general education indicators and ICT skills.
		Gross enrolment rates (primary, secondary, tertiary)	
Info Use	Uptake	Internet Users per 100 inhabitants	Access Indicator
		Proportion of households with a TV	Access Indicator
		Computers per 100 inhabitants	Access Indicator
	Intensity	Total broadband Internet subscribers	Access Indicator
		International outgoing telephone traffic per capita	Usage indicator that has little bearing for most African countries.

The indicators chosen for the sub-indices are somewhat unfortunate. Main telephones and mobile phone subscribers per 100 inhabitants say little about the network. These could better be described as access indicators and would better be placed under Uptake indicators. Equally, the broadband Internet subscribers could better be categorised as an Uptake rather than an Intensity indicator.

Stork & Esselaar (2006) provide an alternative definition that defines intensity as usage divided by access. On a micro level that can be an index of activities for which ICTs are being used by a household divided by what a household has in terms of ICTs. On a macro level an example for an intensity indicator could be call volume divided by subscriber lines.

## 2.2 AFRICAN E-ACCESS & USAGE INDEX

Building on the supply and demand side work of Research ICT Africa! described above the objective of developing an African eIndex will focus in 2008 on contributing to the international frameworks and applying these in Africa. This index will be based on the conceptual framework of George Sciadas's (2005) Infostate Model.

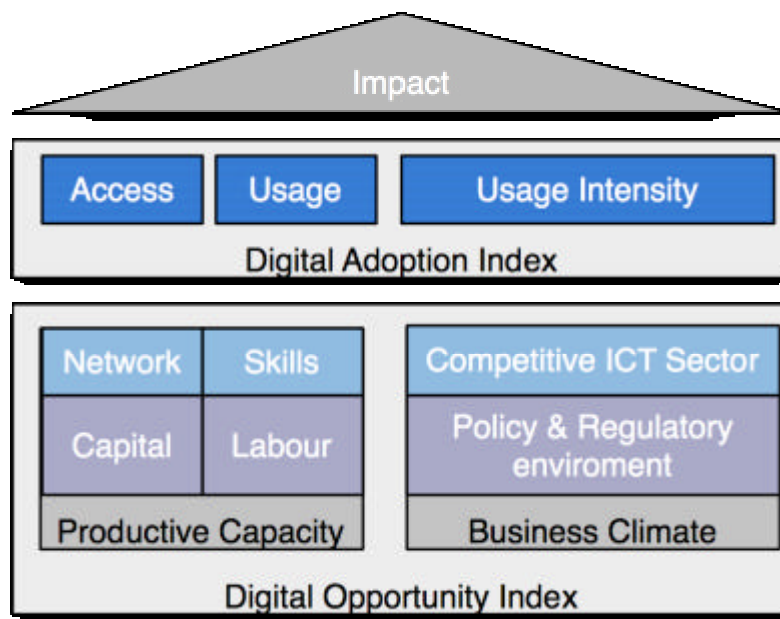


Figure 5 - African e-Access & Usage Index

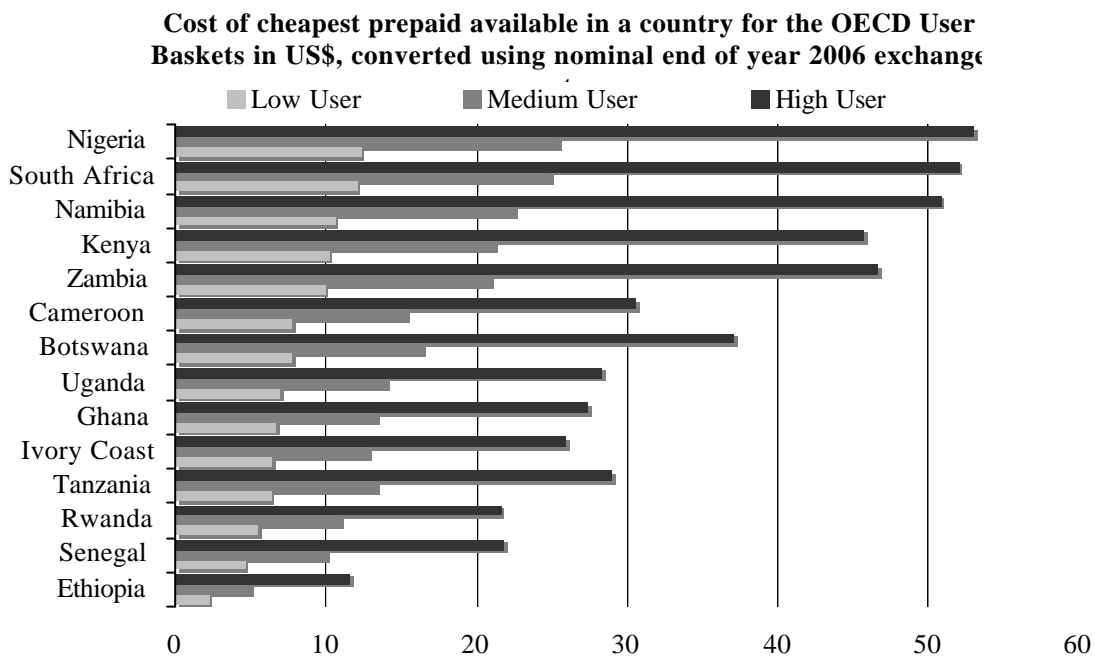
The Infostate model explains consumption (access, usage and usage intensity) by productive capital, capital and labour, which translate into Network and Skills. The RIA model extends the Infostate model by a third factor, the policy and regulatory environment, which determines the competitiveness of the ICT sector to a large extent.

The competitiveness of the ICT sector is captured by nominal and relative prices for telecommunication services. These are important indicators for ICT sector performance. Prices can generally be seen as impact indicators since they are the result of the access, usage and regulatory environment. Prices also work the other way round, lower prices will lead to more access and usage. In a competitive environment prices should be lower than in a non-competitive environment.

Focusing on prices is a very effective way of 'keeping it simple', important for indicator development. However, this is by no means a simple task. Price indicators are always relative and the only way of making them comparable across countries is by defining user baskets and pricing them for each country. The OECD devised benchmarking tools for mobile and fixed telephone usage based on such user baskets. This methodology was used to allow for comparative analysis of African countries against international competitors.

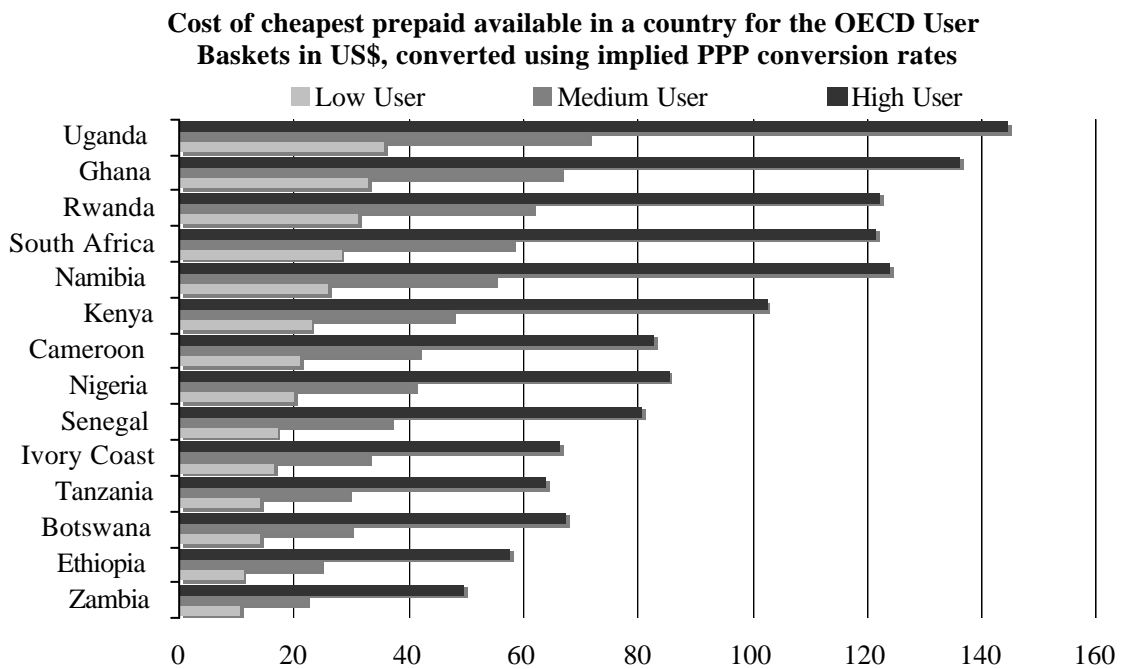
The OECD defined three users, a Low User, a Medium User and a High User and based its assumptions on usage (minutes and SMS), time-period of calls and call destinations on information submitted by member countries. The OECD mobile price-benchmarking basket was last revised in February 2006 and the prices for the latest SPR collected during that year.

Figure 5 – Mobile price comparison for 2006 using OECD basket methodology and nominal exchange rates



Source: Esselaar, Gillwald and Stork (2007)

Figure 6 – Mobile price comparison for 2006 using OECD basket methodology and implied ppp conversion rates



Source: Esselaar, Gillwald and Stork (2007)

What is clear from Figures 5 and 6 is that one needs to use nominal as well as ppp<sup>6</sup> price indicators in parallel. Uganda, Ghana and Rwanda moved to the top of the most expensive countries for prepaid mobile usage when pricing the OECD user baskets in US\$ using implied ppp conversion rates.

Price indicators, however, would not be enough for measuring sustainable development and to assess the competitiveness of the sector since they themselves do not indicate whether or not there is effective competition, the basic driver of ICT sector development and the source of much of ICT's contribution to development and growth.

The number of operators in a country is not necessarily positively correlated to increase in competition, for example. On the one hand, effective regulation could translate into lower prices. High prices on the other hand do not necessarily mean that the regulatory environment is ineffective since many other factors are in play (e.g. import duties).

Price indicators need therefore to be complemented by other indicators that help indicate the extent to which there is effective competition in a country's ICT sector, such as concentration measures and accounting indicators for operators (the return on equity, profit margin, asset turnover, financial leverage and many others).

A further difference is that the e-index will have two sub-indices, the Digital Opportunity Index (DOI) and the Digital Adoption Index (DAI). Contrary to the ITU's opportunity index the RIA DOI only measures actual opportunity for households, individuals, governments etc to access and use ICTs but not their actual access and usage. Those are captured by the DAI. Breaking the African e-Index down into these two components allows the separation of issues that can be influenced by decision makers in the short and long- run from behavioural patterns. The table below provides an framework for composition of an African-e-Index.

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<sup>6</sup> ppp = purchasing power parity

Table 3 – RIA Supply Side Model

		Indicators	Source
Opportunity	Networks	International Internet bandwidth per capita	ITU
		% population coverage with mobile networks	ITU
		% population coverage with fixed networks	Operators/NSO
	Skills	Adult Literacy rates	Unesco
		Gross enrolment rates (primary, secondary, tertiary)	Unesco
Competitive ICT Sector	Price indicators based on monthly usage baskets	RIA	
Adoption	Access (Uptake)	Internet Users per 100 inhabitants	ITU / RIA
		Proportion of households with a TV	ITU / RIA
		Computers per 100 inhabitants	ITU / RIA
		Main telephone lines per 100 inhabitants	ITU / RIA
		Mobile subscribers per 100 inhabitants	ITU / RIA
		Total broadband Internet subscribers	ITU / RIA
	Usage	Mobile call volume per capita	Operators / RIA
		Fixed call volume per capita	Operators / RIA
	Usage Intensity	used international bandwidth / Internet Users	ITU
		Mobile call volume / Mobile subscribers	Operators / ITU
Fixed call volume /main line subscribers		Operators / ITU	

The actual index will only be computed in 2008 after intensive data analysis and further complementary qualitative research. The research agenda for 2008 comprises several smaller research activities that draw together and complement research conducted so far. Qualitative tools such as focus group discussions, expert interviews, skills and usage experiments will complement analysis of quantitative data. The aim is to use the data from 17 countries to build in indexes for all of Africa using easily available data.

The following components will be analysed in 2008.

- ✍ Link between network indicators and network development.
- ✍ Reduction of access, usage and usage intensity indicators to be included in the index by analysing supply side access data to test for co-linearity and link to policy objectives.
- ✍ Link between general education indicators and ICT skills: Harnessing the collected household and individual data to link education to ICT skills. Additionally, qualitative tools to complement analysis.
- ✍ Formulation of Indicators for Competitiveness of ICT Sector.
- ✍ Develop a weighting system for index.

### 3 CONCLUSION

ICT indicators are commonly used in policy development frameworks. The most frequent indicators found are supply side access indicators collected by the ITU. These indicators are usually the most easily obtainable, which explains their preponderance in ICT measurement

literature. A holistic picture needs to be provided for measuring the access, usage and impact of ICTs, rather than just a focus on supply side indicators. This means that different measurement tools need to be used, such as household surveys. In addition, a new set of indicators is proposed for future research that would provide information about the effectiveness of the regulatory environment and the competitiveness of the ICT sector. This integrated approach would go some way towards providing useful indicators for measuring ICT progress across countries. The African e-Index sets out a framework to deliver on this.

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