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**USING INFORMATION COMMUNICATION
TECHNOLOGY (ICT) TO ENHANCE SOCIO-
ECONOMIC DEVELOPMENT — IMPLICATIONS
FOR CAPACITY DEVELOPMENT IN AFRICA**

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Abstract

A hallmark of the new globalization, the adoption of ICT — computers, mobile phones and broadband connectivity — is now a key determinant of international competitiveness, prosperity and living standards. Earlier apprehension has given way to optimism that developing countries can harness ICT to leapfrog expensive investment in 20th century telephony, power and transport infrastructure. This paper surveys the cumulative international experience on leveraging ICT for economic growth and poverty reduction through creating new businesses and expanding opportunities for the poor. Recent trends in ICT development are located within the intellectual development discourse that centers on the nexus between knowledge accumulation and human capabilities, capacity development, Schumpeterian creative destruction, and pro-poor innovation. The mobile phone is profiled as an exceptional leapfrogging technology, and its rapid adoption over the recent years in Africa and elsewhere in the developing world is chronicled with a keen eye on the development impact of ICT more generally and mobile telecoms in particular. We distill key considerations for the formulation and implementation of the requisite policy and regulatory frameworks to unleash the transformational impact of ICT for African development. The paper concludes by advocating a new generation of capacity development projects and programs that leverage the full interactivity of the mobile phone and mobile internet to get around the traditional infrastructural bottlenecks to African development and reach a wider and growing audience especially the poor, particularly in the new and resurgent areas of African development endeavor, notably agricultural and rural development, public health and epidemiology, public service delivery, financial sector development, and elections and human rights monitoring, to name but a few.

Key Terms: ICT, knowledge economies, technological leapfrogging, entrepreneurship, capacity development, e-government

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Gibson Guvheya and Frannie Léautier¹

Introduction

This paper surveys the cumulative international experience on leveraging ICT for economic growth and poverty reduction through creating new businesses and expanding opportunities for the poor. The paper starts off by locating recent trends in ICT development within the intellectual development discourse that centers on the nexus between knowledge accumulation and human capabilities, capacity development, entrepreneurship and Schumpeterian creative destruction, and pro-poor innovation. Recent trends in mobile telecoms in Africa and elsewhere in the developing world are chronicled with a keen eye on their development impact in the pertinent areas of agricultural development, e-government, primary health care and epidemiology, financial-sector development, and elections and human rights monitoring. Key considerations for the formulation and implementation of the requisite policy and regulatory frameworks for unleashing the transformational impact of ICT for African development are discussed, replete with a measurement framework for benchmarking national ICT capacity across space and time. The paper then assesses ACBF's experience and unexploited potential in leveraging ICT for capacity development in Africa, ending with an exhortation for a new generation of projects that both exploits the full interactivity of the mobile phone and mobile internet as the ICT platform of choice, as well as ICT-based projects in the resurgent areas of agricultural and rural development, public health and epidemiology, and public service delivery.

Knowledge Accumulation; Human Capabilities; Capacity Development — An Eclectic Conceptual Framework for African Development:

In a paper adapted from his 1979 Nobel Lecture, Schultz (1998) argues that the decisive factors in improving the welfare of poor people (poverty reduction) lie not in space, energy or cropland, but in the improvement of population quality and advances in knowledge, as embodied in human health, skills and knowledge. This so-called human-capital² thesis was quite epochal in the development of

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² There is some conceptual difference between human capital — which consists of the acquired abilities, skills, and knowledge of individual workers through access to healthcare, schooling, training, and experience — which is rival and excludable, and abstract or public knowledge which is non-rival and non-excludable (Romer, 2001). For the sake of this paper, however, human capital and knowledge are often used interchangeably unless the distinction is convenient.

economic thought, and has been supported by several stylized facts and anecdotal evidence in development experience. Accordingly, it was observed that intrinsic land quality per se cannot explain differences in the incidence and severity of poverty across regions or countries, holding other factors such as political stability constant. Rather, variations in human capital as embodied in healthcare, schooling, training, experience, and research-and-development (R&D) have been empirically crucial in explaining differences in the prospects and welfare of the poor. For example, studies such as Schultz (1975) and Ram and Schultz (1979) reaffirmed that investments in human capital significantly enhanced labor productivity and entrepreneurial (allocative) ability. Or, in Schultz's eloquent prose, the ability of human agents to deal with the disequilibria or maladjustments that are inherent in the development and growth process is a decisive determinant of the economic prospects and welfare of the poor. The upshot of this debate is that poor people in developing countries are not hostage to an iron-clad poverty equilibrium that economics is unable to break, if only an earnest effort is made to understand the economics of being poor or, more analytically, to measure and identify the covariates of poverty (Schultz, 1998)³.

At the macroeconomic level, the promulgation of the *new growth theory* in the late 1980s formalized the role of knowledge in the economic growth process. Thus, measures of a country's stock of knowledge and the knowledge-generation infrastructure⁴ have been among the significant explanatory variables in cross-country growth regressions. Therefore, leveraging knowledge has become a critical strategy for attaining international competitiveness, prosperity and living standards. The centrality of human capital and knowledge is further articulated in Amartya Sen's broader conceptualization of *development as freedom*, where the advancement of fundamental human freedoms is central to the pursuit of development. It is argued that a focus on *human capabilities* or fundamental human freedoms — including democratic and political freedoms, human rights, human capital proper, employment opportunities, the empowerment of women and other disadvantaged groups, and the provision of information and other public goods — provides a richer organizing framework for analyzing development. Consequently, capability deprivation is advanced as a better measure of poverty and predictor of famines (Sen, 1999).

The key role of knowledge and human capital in the development process was also widely recognized in the context of the structural adjustment programs (SAPs), their successor poverty reduction strategy papers (PRSPs), and the millennium development goals (MDGs). It became quickly apparent that a country's human, organizational and institutional *capacity* to formulate and successfully implement structural economic reforms and development programs

³ In similar reasoning, Sachs (2005) dismisses the fatal determinism of physical geography (access to cheap ocean transport, rainfall availability and reliability, disease prevalence, forbidding terrain etc) to long-run economic growth, as these could be overcome by investments in infrastructure, technology and human knowledge accumulation, albeit at a higher cost than would have to be made in well-endowed countries.

⁴ For example, research-and-development (R&D) expenditures as a percentage of GDP, or the national stock of knowledge workers such as scientists and engineers.

was crucial to the achievement of development results, arguably foreshadowing financial and material resources in importance.

Capacity could be defined as that emergent combination of individual competencies and collective capabilities that enable a human system to create value. The implementation experience of SAPs, PRSPs and MDGs has forcefully manifested a resurgent demand for capacity development across Africa and other developing countries, a fortiori with the global financial crisis, the food price crisis, climate change, the persistent specter of political and social instability in fragile states, let alone the systemic brain drain across the Continent. Thus, it is expected that demand for capacity development in Africa will increase in the outlook period in order to: secure political and social stability for the continent; tap benefits from trade and regional integration; facilitate the implementation and assess the impact of structural reforms, economic policies and development programs; and manage within uncertainties spawned by external shocks.

Consequently, national capacity development strategies are emerging across Africa, currently existent for Ethiopia, Liberia, Rwanda and Sierra Leone; while capacity development initiatives are also being pursued at lower levels of government in other countries including Mozambique and Tanzania (ACBF, 2009; UNDP, 2009). The case for capacity development was also forcefully reasserted at the Paris Declaration and its kindred Accra Agenda for Action, which bemoaned Africa's persistently weak capacity for national strategy formulation, implementation and monitoring-and-evaluation.

The Overarching Role of ICT for African Development

A key refrain of this paper is that leveraging Information and Communications Technologies (ICTs) is critical for any country's international competitiveness and transition to a knowledge economy, particularly for African countries as they endeavor to achieve the MDGs and close the knowledge divide with developed countries in the increasingly globalized world. ICTs have shown potential for transforming businesses, markets and organizations; transforming the provision of healthcare, learning and knowledge-sharing; fostering greater citizen participation in the political and development process through information provision; in short, ICTs have shown potential for enhancing human capabilities. Accordingly, the G8 Charter for a Global Information Society — hammered out at the June 2000 meeting at Okinawa, Japan — was a clarion call to the development of effective policy responses to leverage ICT for development (UNDP, 2003).

Granted, western countries are most positioned to seamlessly transition to a knowledge-based economy, having previously transitioned from the pre-industrial (agricultural), industrial (manufacturing) through to the post-industrial (services) phases of structural economic transformation. This is however not to presuppose that countries pursue a linear development path comprising distinct successive

phases as was proposed by Rostow (1960)⁵. In particular, ICTs (computers, mobile phones and broadband connectivity) have provided an opportunity for African and other developing countries to overcome their under-investment in roads, rail, electricity, fixed landlines and postal services — hereafter *social overhead capital* for short, unless specificity is warranted — to leapfrog to 21st-century technology for driving economic growth and poverty reduction⁶.

The ICT revolution and globalization have led to the unbundling of the vertically integrated firm into horizontal networks spread across different parts of the world, each focusing on its competitive niche⁷. Global corporations in OECD countries now typically have decentralized research facilities across the world including emerging markets, where they are working with local R&D outfits in developing (including some African⁸) countries, often within outsourcing or open-innovation frameworks. As a result, hosting countries are now better able to leverage international research and local knowledge in the development of appropriate technologies to tackle development challenges. Similarly, many global corporations now typically outsource production at various stages of the value chain across the world to exploit locational competencies and cost advantages such as those inherent in proximity to growing markets, thus attaining greater global competitiveness for the bottom-line (assembled) products or service offerings.

This trend has explained the rise in high-tech exports in emerging economies including South Africa. Similarly, India's Bangalore has risen to international prominence in software development, data processing and customer services for corporate clients across the world (UNDP, 2001; The World Bank, 2008). To tap into these growing opportunities, however, African countries must improve their investment climates through sustaining ongoing structural reforms and commitment to macroeconomic stability, nurturing human capital formation through education and health, and investing in social overhead capital even if it means initially targeting special economic zones to serve as growth poles.

⁵ The late American economic historian, Walt Whitman Rostow, posited one of the historical models of economic growth that held that countries go through five basic stages of variable length, from the traditional society, the attainment of preconditions for economic takeoff, takeoff itself, drive to maturity, and mass consumption. Though a brave attempt at characterising the historical pattern of economic growth and famous at its time, this theory was later widely criticized by both left and right-leaning scholars, among other things for its Anglo-Saxon centricism and the excessive emphasis that it placed on government at the exclusion of other players in the development process.

⁶ Quite a voluminous literature exists on the so-called Africa's growth tragedy that characterized the period from the late 1970s to the mid 1990s, including Collier and Gunning (1999) and Easterly and Levine (1997). These studies identify Africa's under-investment in *infrastructure-for-development*, or *social overhead capital* as one of the proximate covariates of its poor economic performance.

⁷ In a seminal paper, Coase (1937) posited that firms are motivated by the overarching goal of minimizing transactions costs to choose between performing internally those activities that are fraught with high transactions costs, or contracting out to the market those activities with lower transactions costs. Accordingly, the inexorable decline in international transportation and communication costs that have been associated with globalization and the ICT revolution — in conjunction with the rise of industrial manufacturing costs in the West as a result of high wages and stringent labor and environmental standards — have spurred the emergence of the global decentralized production and R&D firm.

⁸ For example, Kenya is home to Nokia's Africa research laboratories.

Another refrain of this paper pertains to the dynamism of entrepreneurship and the associated innovation that lie at the heart of the global ICT revolution. Long before the Regan-Thatcher revolution of the 1980s and the dented belief in Keynesian macroeconomic management in the wake of the stagflation of the 1970s, the economic historian Joseph Schumpeter (and a handful of his followers) was a contrarian voice in the economics profession in propounding entrepreneurship as the key propagating mechanism for capitalism. In his 1942 tour de force, *Capitalism, Socialism and Democracy*, Schumpeter popularized the idea that innovative entry by entrepreneurs was the key determinant of sustained economic growth in capitalist economies, albeit at the destruction of the value of erstwhile incumbent firms that hitherto enjoyed some measure of monopoly power. Hence, Schumpeter held that incumbent firms were “standing on ground that was crumbling between their feet”, coining the term *creative destruction* to describe this dynamic process (The Economist, 2009b).

Schumpeter and his followers therefore decried the ascendant Keynesian (orderly) macroeconomic management as “the bureaucratization of capitalism” that was bound to stifle entrepreneurship and innovation. As shall be argued repeatedly throughout the paper, entrepreneurship and innovation — and often outright creative destruction — not only in technologies but in business models, have comprised the hallmark of the ICT revolution of the past decade. The key question for Africa is to identify evidence of creative destruction processes in the wake of ICTs and to highlight what potential trends such transformations may portend.

It is noteworthy that telecom operators in African and other developing countries have led the world in producing creative business models⁹ that extend the reach of mobile telecoms to the poor especially those in rural areas, in the process often lifting the competitive stakes for their Western counterparts. After C.K. Prahalad's provocative idea in his bestseller, "The Fortune at the Bottom of the Pyramid", that views the poor as a vast pent-up market rather than mere recipients of aid, it is now presumed that investment in “bottom-of-the pyramid” (BOP) businesses could attract far more capital to developing countries compared to official development assistance. This thesis touched off a frenzied search for business models to meet the needs of the poor through proprietary means, albeit with mixed results¹⁰.

Much of this dynamism has indeed been an attempt by mobile telecoms such as MTN and Celtel to reach the bottom of the pyramid in Africa, after studies in Latin America had shown that the poor were willing to pay for mobile telecommunication; and that as developing country incomes rise, household spending on mobile telephony rose faster than expenditure on energy (World

⁹ Besides business models, the past five years have seen the rise of China's telecoms equipment manufacturers (Huawei and ZTE) to global prominence, upending traditional industry players in the West such as Canada's Norvotel that declared bankruptcy in January 2009, once the country's most valuable company (The Economist 2009f).

¹⁰ Contrast the considerable success of microfinance in developing countries and the subprime mortgage debacle in the USA and Britain.

Resources Institute, 2009). Professor Leonard Waverman of the London Business School, an authority in the empirical analysis of the role and impact of telecommunications on development, avers to data that shows that the poor in Africa spend up to 15 percent of their annual income on mobile communication, which is considerable bearing in mind that they live on less than one dollar a day.

The ICT revolution is fostering competition by making it easier for ordinary people everywhere to start new businesses, and harder for incumbents to defend their territory. For instance, it took 20 years in 1960 for a third of the Fortune 500 list of companies to change, compared to 4 years now (The Economist, 2009b). The triumph and democratization of entrepreneurship across the world has been driven by profound technological change — notably the trio of the personal computer, the mobile phone and the internet. As a result, even cash-strapped innovators in developing countries can quickly reach markets that were once the province of giant corporations. The internet has provided a cheap platform for building interactive businesses, with leading examples including Ebay, the online auction firm, and pyjama-clad bloggers who have grown to challenge established newspapers on breaking stories. Furthermore, the development of "cloud computing" — or internet-based computing whereby shared resources are available on demand — has provided small businesses with the benefits of large corporations without the accompanying sunk costs, thereby dispensing with the need to invest in expensive server equipment and related hardware. Also, ICT has transformed the business model of globalization. Rather than the incremental approach of the old globalizing firm that would start by developing competencies in the home- and regional markets before going truly international, ICT has enabled upstart companies in developing countries to quickly establish a global presence, further providing a fillip to entrepreneurship (*ibid*).

Earlier apprehension of developing countries' capacity to exploit ICT has given way to optimism that the technology can be harnessed to leapfrog or mitigate the limitations of under-investment in expensive 20th-century technology and social overhead capital. This renewed optimism derives from the encouraging progress in the early adoption of mobile phones in developing countries; the continual emergence of new, often destructive, ICT technologies with expanded possibilities for resolving nagging development problems; and the evolution of business models towards the profitable rollout of ICT to developing countries with a particular focus on the poor in rural and other backwater areas. However, the enthusiasm on technological leapfrogging should be tempered with the growing development experience that the diffusion of modern technologies (including ICT more broadly defined), hence their development impact, is crucially dependent on a country's stock and reach of social overhead capital. Other determinants include education, the state and performance of the R&D sector, financial sector development and the quality of government. It is for this reason that, apart from the mobile phone that has served as a truly leapfrogging technology, Africa's under-investment in fiber-optic cable and reliable electricity, a fortiori in rural areas, has engendered the poor adoption and diffusion of

broadband connectivity and computers relative to comparable countries in Asia (The Economist, 2008a,b,c; World Bank, 2008).

Mobile Telecoms in Africa — Recent Trends and Development Impact

Mobile phones epitomize technology's ability to transform the lot of the poor in Africa and the developing world. Industry-watchers reckoned that by end of 2009 more than half of the world population would own a mobile phone. This is an important milestone because galloping technological change is increasingly fostering convergence between mobile telephony, the computer and the internet, thus transforming the mobile phone into a platform for transacting business and finance, and for the delivery of public services. The mobile phone has few rivals as a leapfrogging technology, deriving on its unique utilization of radio rather than expensive physical infrastructure such as fiber-optic and fixed land-lines. Even the dirt-poor with low literacy and a modicum of numeracy are able to use the mobile phone. Furthermore, base-stations can be powered using fuel-powered generators in places underserved by the national electricity grid.

As per the ensuing discussion, mobile phones have rapidly caught on across Africa and other developing countries, thereby substituting for travel, permitting real-time access to market information thus enabling traders to reach wider markets and improving farm household incomes, boosting micro-entrepreneurship, and generally making it easier to do business. At a more macro-level, mobile phones stimulate investment in the telecoms industry, create new jobs and generate tax revenues (The Economist, 2009a,b).

In addition to the anecdotal stories, there has been a rising volume of systematic empirical studies that have confirmed the economic impact of mobile phones, notably through the enhancement of market efficiency and integration as a result of better access to market information (GSMA Development Fund, 2008). For example, a 2007 study of coastal fish markets in the southern Indian state of Kerala established that the introduction of mobile phones between 1997 and 2001 had led to an increase in social welfare or market efficiency, through an 8%-increase in fisherman profits, a 4%-decrease in consumer prices, a dramatic decrease in fish dumping (spoilage) as a result of a greater coordination between buyers and sellers, and a reduced price dispersion across space through a greater adherence to the law of one price that is the axiomatic requirement of efficient markets (Jensen, 2007). Similarly, a study of grain markets in Niger by Aker (2008) confirmed that the widespread adoption of mobile phones had resulted in greater spatial market integration in the form of reduced price dispersion across space, lower consumer prices in grain deficit areas, and higher producer prices in grain surplus areas.

These micro-level studies have been corroborated by macro-level studies of the impact of mobile phone coverage on growth. In a widely cited study by Professor Leonard Waverman of the London Business School, an increase of 10 mobile

phones per 100 people was associated with a 0.6 percentage point increase in economic growth (Waverman, Meschi and Fuss, 2005). A similar World Bank study estimated that an extra 100 mobile phones in a representative developing country is associated with about 0.8 percent in additional growth; and that mobile phones were more effective at boosting growth than fixed land-lines albeit playing second fiddle to dial-up and broadband access. However, since mobile phones have achieved the greatest penetration in developing countries due to their leapfrogging property, their aggregate impact on economic growth has been largest. Furthermore, the World Bank study established that all mobile technologies unleashed growth more in developing than developed countries, through unleashing entrepreneurship, increased productivity, reduced transactions costs and fostering greater market efficiency, themselves being areas in which developing countries had lagged far behind their developed counterparts (Qiang, 2008).

According to the World Bank and International Telecommunications Union (ITU), it is estimated that growth in mobile phone ownership in developing countries is greater than their OECD counterparts, rising from one quarter of the world's estimated 700m mobile phones in 2000, to three quarters of the estimated total of 4 billion mobile phones in 2009. As a result, mobile phones now represent the largest distribution platform for ICT. It is noteworthy that Africa has witnessed the fastest rate of subscriber growth. With developed markets having reached maturity, it is reckoned that the developing world's rural poor will account for most of the growth in the coming years. In Ghana, for instance, the number of mobile phones grew from 3.9 per 100 people in 2003, to 13 per 100 people in 2006, a 333% increase in 3 years! Thus, although 4-in-ten Africans are reckoned to currently own a mobile phone, there is still great potential especially as new business models and financing partnerships come on stream to improve mobile penetration in Africa's vast rural areas (World Bank, 2009a).

The rapid penetration of mobile phones in developing countries has been due to three salient factors. First, the introduction of prepaid versus postpaid billing systems dramatically expanded mobile phone use in developing countries through obviating previous concerns with subscriber creditworthiness, more so with the further innovation of low-denomination top-up vouchers and most recently, per-second billing. Second, the declining cost of handsets has further buttressed mobile phone penetration in developing countries, from about \$250 in 1997 to about \$20 in 2009, largely reflecting the switch by global hardware manufacturers to low-cost handsets in order to serve the vast low-income market in developing countries (The Economist, 2009f).

This trend was initially reinforced by innovative business models that sought to extend mobile phone access to non-mobile phone owners, such as the use of microfinance to help micro-entrepreneurs to purchase mobile phones and then sell phone calls to customers. Traced to the Grameen-Bank's Mobile Phone Women, this model soon found its way to various African countries including DRC, Uganda and Rwanda. However, the continued decline of the price of mobile

handsets is making it easier for people to afford personal mobile phones, thus perhaps presaging the inexorable death of this former business model in a classic fashion of Schumpeterian creative destruction.

The third crucial determinant of mobile phone penetration has been the liberalization of domestic telecoms markets in order to unleash competition and its salutary effect on consumer prices and innovation. A graphic illustration is provided by the contrast between the Democratic Republic of the Congo, with six mobile operators and 13 times as deep a mobile penetration rate as in Ethiopia which has only one (state-owned) mobile operator. The rest of this section discusses the particular transformational impact of mobile phones across key development imperatives or themes.

Agricultural Development

ICT, in particular mobile phones, is being exploited to aid the cause of agricultural and rural development in Africa through the improvement of smallholder farmers' access to market information and professional agricultural advice, thus playing an important role for poverty alleviation in Africa (The World Bank, 2008b). The Government of Rwanda — whose President Paul Kagame has long identified ICT as central to his country's development and has been courting foreign direct investment in that sector — has through the *e-soko project* partnered with the telecom operator MTN to buy 35,000 mobile phones for distribution to farmers' cooperatives across the country. E-soko aims to improve farmers' access to agricultural market information across the whole country through mobile phones (The New Times, 2009).

Similarly, Ghana's TradeNet provides an internet platform that allows farmers to receive real-time market information on product prices, demand and supply for more than 80 commodities from across 400 markets in West Africa, thus fostering regional agricultural trade. TradeNet's major stakeholders include the Ghana Agricultural Producers' and Traders' Association, as well as counterpart associations in Burkina Faso, Mali and Nigeria. As already discussed for Niger, mobile-phone-delivered agricultural information systems helped lower regional price disparities primarily through the arbitrating actions of agricultural commodity traders (World Bank, 2009a).

In Burkina Faso, the Songtaaba Association has harnessed broadband to economically empower female agricultural producers, given their important role in agricultural and rural development. Songtaaba, a skin-care products manufacturer, provides jobs to more than 3,100 women across 11 villages. Telecenters were set up in two villages, replete with mobile phones, the Global Positioning System, and computers with high-speed internet access. Managed by trained rural women, the telecenters seek to improve member's access to real-time market information. In the two years following the establishment of the telecenters and the website in 2005, product orders increased by more than 70 percent and members doubled their profits (*ibid*). In this case, ICT is playing a powerful role of empowering women through participation in gainful business

activity, thus strengthening their voice and unleashing dynamic benefits that derive from women's allocative role in household production¹¹. In a very real sense, Songtaaba is helping build the organizational capacity of women to effectively dialogue on a wider range of issues germane to women participation in the political economy of Burkina Faso. Facilitating dialogue and participation of women and other marginalized groups is crucial for strengthening their capabilities. The same model could be extended to other market women in West Africa who comprise an important socioeconomic group in the region.

A canonical example of leveraging ICT for agricultural development is provided by India's *E-Choupal* that has had a positive impact on agricultural incomes in rural India. Started in 2000 by ITC — one of India's largest agricultural exporters — the program operates in traditional gathering venues (choupals) in farming communities, using a common portal that links multimedia personal computers by satellite. Literate farmers with a respected role in their communities receive training to host the portals. The system gives farmers better access to a diverse array of critical information such as local weather forecasts, crop price lists in nearby markets and the latest sowing and other technical information. *E-Choupal* has increased farmers' productivity and incomes, and helped secure and increase the efficiency of ITC's agricultural supply chain (UNDP, 2001). We flag this case because it is a more holistic, sophisticated version of what currently exists in Africa. India being a comparable country socio-economically, this model could be piloted, adapted, and scaled-up across Africa to great effect.

However, we contend that vast potential exists for leveraging ICT for agricultural transformation in Africa, particularly through fostering *cohesive farmer associations* and dynamic national agricultural systems around which public-service delivery for agricultural development could be coordinated. ICT could also be leveraged for strengthening and fostering the development of *key agricultural value chains* within the domestic, regional and multilateral trading contexts. Africa's underdeveloped agricultural value chains comprise one of the key reasons for her poor performance in international agricultural trade¹².

E-government¹³

The idea that the interactivity and speed of the internet could be leveraged to deliver public services (e-government) has mostly met with high costs and poor returns, despite a few success stories across the world that provide staple for further experiment, piloting and local adaptation. Proponents of e-government

¹¹ Household production theory, whose formalization is credited to the American economist Gary Becker even though the basic ideas are much further predated, views the household as a production and consumption unit that uses market produced goods as intermediate inputs, own capital and labor to produce goods and services that generate utility for household members. Examples of household production activities include cooking, childcare, shopping, etc, and the importance of womenfolk to these activities becomes readily apparent.

¹² The current stasis at the Doha Development Round of trade negotiations notwithstanding, many African countries continually fail to exhaust their export quarters under existing bilateral and regional trading arrangements, for example AGOA and the EU-ACP pending the finalization of the successor EPAs.

¹³ This section draws heavily on the following article: A Special Report on Technology and Government, The Economist Print Edition (2009a).

argue that ICT can afford politicians and public-sector officials a better idea of what the public wants (demand) and how to provide it (supply), and that embracing e-government can fundamentally transform the way government works. There are three gradations of the transition toward e-government, starting with putting government information online (what may be called i-government, or in geek-speak, web 1.0). A downloadable visa application would provide a perfect example, similarly for important legal forms and information on key laws, policies and policy processes, and parliamentary bills and debates with a special thought for women and other marginalized groups so that they could participate effectively in national development processes.

The second-stage of e-government involves harnessing the interactivity of the web (the so-called web 2.0). To continue with the analogy, enabling applicants to complete, submit, and maybe pay for the visa application online would mark a significant step in that direction. Ultimately the entire service could be provided online. That would mean completing, submitting and paying for the application online, printing out and downloading the processed visa onto a smart card or even storing it in a mobile phone (a case of m-government, same service, different delivery). An important application in the context of strengthening institutions responsible for promoting government transparency, accountability, and effectiveness — notably ministries of finance and planning, central banks, auditor-general's offices, anti-corruption commissions, central statistical offices, private-sector chambers of commerce and civil society organizations, and the media — lies in the need to leverage ICT for harvesting input and views of citizens and stakeholders in order to improve public service delivery. In Kenya, for example, call-in radio shows using mobile phones have enabled journalists circumvent traditional censorship, and newspapers have even started quoting the interviews in their reportage. Last, e-democracy would mark the advanced stage of e-government, whereby politicians would leverage technology to better connect with and be accountable to their voters. The OECD has outlined four progressive stages of e-government, starting with information, then interaction, then transaction, and finally transformation, in increasing order of complexity and social benefit (*ibid*).

While putting information on the web (i-government) has worked fairly well especially in western countries¹⁴, three main factors have however hampered government efforts to emulate the success of the private sector in harnessing ICT for lowering costs, gaining market share and raising profits (e-commerce). These factors have been identified as: lack of competitive pressure in government business, a tendency to reinvent the wheel, and a focus on technology rather than organization. A survey of the few success stories suggests that the common factor of successful e-government seems to be the existence of a tough-minded leader at the top who is willing to push through change against the resistance of vested interests. Therefore, comparisons with the private-sector need to be tempered with the idiosyncratic nature of public services, that government rarely

¹⁴ The flagship project of this kind is easily America's usa.gov, a multiple award-winner and arguably the best e-government website in the world (The Economist, 2009a).

faces competition in their provision, that many are seldom fully mediated by market prices owing to their public-good nature, and that their use often needs to be policed or subsidized.

The disappointing results of e-government experiments even in the western world reflect both the learning curve effects and the uncertainty about what it is exactly that public officials want to maximize (the objective function) and how it can be measured. One of the misgivings about e-government has been its colossal waste of taxpayers' resources on grand computer systems and databases, ill-conceived and overpriced. Critics have also charged that e-government has embraced a quick technological fix and distracted from the hard slog of reforming public administration and improving public service delivery. Therefore, capacity building for implementing civil service reforms and sound public-sector management is *de rigueur* for successful e-government. Even in those places where it works reasonably well, adopting the internet as the platform for transacting government risks excluding that section of the population that can ill-afford a computer, or are averse to technology. Furthermore, e-government may have the perverse effect of amplifying the voices of the well-to-do and well-connected at the expense of the poor, thereby vitiating the ethos of democracy and poverty reduction (The World Bank, 2000). As a result, efforts to embrace the poor and the elderly have mandated that governments continue to maintain offline platforms in addition to e-government, thereby inadvertently diluting its economy in the first instance.

The success of e-government is predicated on deep broadband penetration, computer literacy and skilled bureaucrats, all currently in short supply in the average African country. Fortunately, as mobile phone penetration proceeds apace across the Continent, the platform for the delivery of e-government could be shifted from connected computers to web-enabled mobile handsets. This transition is especially possible given the ongoing technological convergence between mobile phones, computing, and the internet. The semantics is therefore transitioning from e- to m-government, which focuses on fostering citizens to interact with each other and their governments through pared-down websites and security barcodes sent as pictures or simple text messages. Similarly, there is increasing attention to harnessing digital television so that the computer have-nots could interact with their governments in the comfort of their homes.

Successful e-government schemes have also thrived on strong public trust in the government's competence and good faith. For example, using a single high-strength password (the Singpass), citizens in Singapore can transact on virtually anything with the government online or by mobile phone. Singapore also highlights the importance of the right relationship between the state and the private sector, for the Singpass is also widely recognized as a secure digital identity for electronic commerce, from banking to shopping. The same principle is also operational with the London Oyster card, introduced as an electronic ticketing system for the city's public transport system but now available as an add-on to a credit card, and in Scandinavian countries, where online banking

passwords and logins are now being accepted for authenticating clients for public services. This centrality of the healthy relationship between business and government is the essence of the annual World Bank's Ease of Doing Business Survey. In that regard, it is gratifying to note that a number of African countries have been among the top reformers for the past couple of years, with Rwanda snatching the coveted world's (never mind Africa's) topmost reformer in 2009. Other top African reformers include Ghana, Burkina Faso, Mauritius, Tanzania, Senegal and Zambia (The Economist, 2009a; World Bank, 2009b).

Although many African governments have official websites, at least nominally, one does not come across many notable e-government projects. However, a 2002 Survey by the Economic Commission for Africa (ECA) showed that by June that year, there were about 706 websites representing African public administrations, most of which were shared between the early adopters Morocco, Egypt, Nigeria, Kenya, Mozambique, Mauritius and South Africa, thus leaving huge scope for e-government in Africa (ECA, 2003). At that time, the Moroccan program on providing online information on social security-, regulatory- and customs information systems was considered a best practice on the Continent, so was the online provision of the voters' role and use of rural radios in the 2002 presidential elections in Senegal (*ibid*). One of the recent success stories is the e-customs system in Ghana (GCNet), which increased customs revenue by 49% in its first 18 months of operation and reduced processing time from three weeks to two days (World Bank, 2009a).

We end the discussion on e-government with the following Indian case study which is instructive since India together with Bangladesh is a comparable developing country to Africa, and has indeed been a source of many innovative pro-poor business models in ICT-for-development that are being adopted and adapted across a number of African countries. Box 1 overleaf is a profiling of the e-seva scheme in India.

Box 1: [The e-seva scheme in India]

E-government has offered hope for transforming public service delivery in India, given the country's widely perceived grim state of public administration. The poster-child of e-government in India is the southern state of Andhra Pradesh which pioneered e-seva, itself a network of public internet offices where citizens can pay bills online. E-seva is a giant step forward for India given the country's forbidding initial conditions regarding the delivery of public services, by obviating long waits and bribes for both private citizens and businesses in paying for electricity and phone bills, taxes and other interactions with government. Those with access to computers are free to visit esevaonline.com, and those without visit the local e-seva center. Although other services such as getting a birth certificate or passport remain difficult, at least citizens can more easily pay for them. However, a pilot project to facilitate the online application of driver's licenses for citizens on the e-seva platform is in the offing. One can also transfer and collect money through Western Union on the e-seva platform. Furthermore, e-seva is outsourced to a private contractor who recruits staff, provides the infrastructure and renders customer service on commission. The system has transformed the lives of millions of people. Already processing 110 million transactions valued at \$2.8m per day, and growing at 25% a year, some 60% of all payments for public services is now processed online. The state government plans a drastic expansion of the program from the current 116 centers to 4,600 statewide. Arguably, the most important innovation of e-seva was to shift the payment platform from the computer to the mobile phone (m-government). Biometric identifiers such as thumbprints can be scanned on the mobile phones, with immediate applicability to a country where about half of the population is illiterate. Further innovation to harness the computing functionality and excellent coverage of the mobile phone in the state is being explored to facilitate the payment of pensions and unemployment benefits. The pension payment system is also fast metamorphosing into an online bank. The success of e-seva has touched off healthy competition between different public agencies within the state, and between states and the federal government in India. (Source: *Economist*, 2008)

Primary Health Care and Epidemiology

Nearly a decade ago there was widespread apprehension at the idea of harnessing modern ICT technologies to improve the public health systems of the poorest countries in much of SSA, Latin America, and parts of Asia, where villages lacked access to clean water, basic sanitation, and clinics and doctors, and power. There has since been a sea-change to this attitude, with the poor now standing to profit from technical improvements that reduce the cost of manufacturing medical devices and vaccines that can be stored at room temperature, or make drugs more effective. That is an important and very active dimension of medical technology research that is directly targeted at the poor, particularly in the area of HIV/AIDS, malaria, and tuberculosis, with funding by the Global Fund, the Bill and Melinda Gates Foundation, and similarly interested organizations. These are important innovations insofar as health is a key determinant of labor productivity both in production and employment, two of the pathways out of poverty and determinants of human capabilities.

Another great revolution in public health delivery is unfolding with the rapid diffusion of the mobile phone in Africa and other developing countries, thus spawning a whole new pedagogy of mobile health (mHealth, for short). The

ubiquity, personal convenience and interactivity of the mobile phone is being harnessed for launching mass public health campaigns, stitching together smart medical grids, expanding the reach of already-few health workers, and surveillance for outbreaks of infectious diseases. It is reckoned that fully 40 mHealth projects are currently operational across the developing world as documented by the UN and Vodafone Foundations, two leading sponsors of mHealth for developing countries (The Economist, 2009c).

iTeach, in South Africa's densely populated province of KwaZulu-Natal with one of the highest HIV infection rates, is arguably the largest mHealth field trial in the world. Despite some improvements over the last couple years in the country's public policy response to HIV/AIDs, it is reckoned that some four fifths of the victims do not get tested due to the pervasive stigma attached to the disease. Through *iTeach's Project Masiluleke* — a collaboration between *iTeach*, various actors and MTN, a leading mobile carrier in South Africa — the mobile phone has been harnessed to launch a massive public-health campaign to encourage infected people to contact Project Masiluleke in order to get tested. A million short-messages are sent each day, in local languages, to encourage recipients to contact a national AIDs hotline. The campaign has met with a decidedly positive response, especially from the young who were hitherto considered a hard-nut-to-crack for public health campaigns.

mHealth was also at play during the 2008 polio outbreak in Kenya, where data collected and transmitted by health workers using handheld devices helped give a reliable picture of the incidence and spatial spread of the outbreak. The key to that campaign was a software called EpiSurveyor which was designed by DataDyne.org, itself a core partner in mHealth with the United Nations Foundation and Vodafone Foundation. EpiSurveyor is an open-source software — by definition free and customizable to suit local needs — that allows health officials to design or customize health-survey forms that can be downloaded to ordinary mobile phones. Health workers carrying the phones can then collect and transmit information as they visit local clinics, about immunization rates, the availability of vaccines and other medical supplies, or possible disease outbreaks. The information can then be quickly centralized, collated and analyzed to determine disease outbreaks and shortages of medicines.

The World Health Organization (WHO) later elevated EpiSurveyor to a technological standard, and is collaborating with national health ministries and the two sponsoring Foundations to scale up the program to 20 sub-Saharan African countries. A similar program is running in Rwanda with financing from Voxiva, an American firm. African countries could also benefit from an expanded *mHealth Alliance*, a joint initiative by the UN Foundation, the Vodafone Foundation and the Rockefeller Foundation to popularize and foster the adoption of the smartest ideas in mHealth across the world. Similarly, work is afoot to sharpen and harness the sensitivity of the mobile phone for environmental scanning and consumer surveillance (The Wall Street Journal, 2009).

Mobile Banking

Mobile phones are increasingly facilitating the instantaneous transfer of money as opposed to traditional banking and other financial services in African and other developing countries. The business model for mobile banking is anchored on the network of registered corner shops who sell mobile phone credit across much of Africa. The corner shop takes cash from people and credits their mobile phone accounts through a special kind of text message, thus turning these corner shops into bank branches of sorts. Once credited, one can therefore transfer money credit by mobile phone to intended recipients — be they relatives, business partners, service providers etc — who can then redeem the credit for money at their nearest registered corner shops. To complete the business model, the mobile operator provides both settlement (clearance) and guarantor functions.

Mobile banking has particular advantages for sub-Saharan Africa and other developing countries, as it provides a faster, cheaper and safer way of transferring money compared to extant alternatives against the adversity of poor infrastructure. There is also a productivity dividend: rather than spend a day traveling by bus to the nearest bank, recipients in rural areas can spend their time more productively. Mobile banking also provides a stepping stone to formal financial services for the billions of un-banked people in Africa and other developing countries, thus enabling them to smooth consumption and deal with unexpected shocks without having to strip their productive assets or take children out of school. Indeed, innovations in mobile banking are pushing the frontier in microfinance development, through resolving the high transactions costs that have traditionally been prohibitive for advancing small loans to poor borrowers.

The most successful pilot for mobile banking has been M-PESA in Kenya. Launched in 2007 by Safaricom, the country's largest mobile operator, M-PESA now has nearly 7 million subscribers in a population of 38m about half of whom have mobile phones. Quite expectedly, the early adopters for M-PESA were young urban migrants who embraced the service to remit money to their families in the rural areas. Now, M-PESA is more widely used to pay everything from school fees to taxis. In a recent study cited by *The Economist* (2009e), Kenyan households participating in M-PESA have had their annual incomes increase by between 5 to 30 percent¹⁵. Kenya's success story with mobile money has motivated other pilot schemes across Africa.

Despite its promising potential, mobile money has faced rent-seeking from traditional banks who have fretted that the innovation directly eats into their potential market, and skepticism by regulators who fear that mobile money could be exploited by fraudsters and money launderers. Furthermore, many mobile operators and their networks of retail corner shops either lack formal banking licenses or have failed to meet the strict criteria for formal bank branches. Still, other schemes have had to reckon with cultural constraints, for example in

¹⁵ This should however be compared to a control group in order to establish any causality between participation and income.

Tanzania where a mobile money scheme simply failed to catch on (The Economist, 2009e).

The success of M-PESA is turning around the fortunes for mobile money, however. Banks are beginning to see vast potential in leveraging mobile operators' extensive and rapidly growing networks as well as their powerful brands to reach new customers, where the latter would be required to open mobile money accounts with the banks, thus an improvement in the business model. Since the clients for mobile money are most likely outside the ambit of traditional banking, perhaps a tie-up between mobile money and microfinance could yet provide another promising innovation. For regulators, tie-ups between mobile operators and banks should mitigate their apprehension. While placing convenient limits on the size of mobile money transfers and the size of bank balances, rules could be relaxed on the types of institutions that could participate in financial intermediation to allow corner shops to serve money-taking and disbursement functions (The Economist, 2009e).

Election and Human Rights Monitoring

One of the central tenets of the current thinking on development is the importance of sound governance for sustainable economic growth and poverty reduction, a key component of which is the conduct of transparent, free and fair elections. The mobile phone, drawing on its new-found ability to transmit text, numerical, video and other data to a central computer, is transforming election monitoring from the formerly slow and laborious process of observing the balloting, recording the data manually on paper, and verification and transporting or faxing completed forms to a distant regional center for entry into a central computer. Fraud or violence, if it broke out, would travel fast through electronic media and threaten to derail the electoral process. The new methodology saved the day in Sierra Leone in 2007 when the election was briefly threatened by false charges of violence in some remote centers, ironically spread by text messages. Calm was quickly reestablished when some 500 observers from the concerned polling stations sent contrarian messages to the elections command center.

Similarly, the mobile phone is being increasingly deployed by law-abiding citizens to monitor and expose human rights abuses through recording, transmitting and uploading still cameras or videos of human rights abuses on the internet, with websites such as the Hub, Human Rights Watch and YouTube as well as media programs such as CNN's I-Report dedicated expressly to photojournalism submissions of human rights abuses. In Kenya, Ushahidi (Swahili for testimony) is a mobile-enabled platform that was set up after the 2008 post-election violence to leverage mobile phones for crisis and disaster management. The Ushahidi model has since been used to map out and track violence in the Palestinian province of Gaza, and in Haiti to track the impact of and coordinate the disaster response to the earthquake across the country.

Broadband Expansion; and the Policy and Regulatory Framework for ICT Development

So far we have followed market trends in focusing virtually exclusively on mobile telecoms. We briefly turn to broadband connectivity before discussing policy and regulatory issues for ICT development broadly defined. Broadband networks, both fixed (delivered through fiber-optic and other conducting media such as copper wire) and wireless (transmitted through satellite and air waves) are used to deliver modern communications that require larger volumes and faster rates of data transmission, for example enterprise file transfer, television, and high-speed internet. High-speed internet opens up access to a wide range of online services, and contributes to the economy through stimulating investment in laying-out the ICT infrastructure itself as well as in IT and IT-enabled services (ITES), thereby creating jobs and increasing tax revenues. Examples of information-intensive ITES sectors include the media, import-export, finance, consulting, marketing, real estate, etc. Kenya and Rwanda are already positioning themselves to attract investment in this sector, especially targeting the vast potential in the global market for outsourcing.

Of the two types of broadband, the fiber-optic-delivered type provides for faster and cheaper internet access as well as reducing the cost of international phone calls, especially when the regulatory framework sanctions voice-over-internet telephony. To the contrary, satellite links are slower, more expensive per unit of bandwidth and do not provide for cheaper international phone calls. The benefits and dynamism notwithstanding, Africa's extant broadband penetration still lags far behind that of mobile phones, chiefly for the reason that broadband connectivity is not as leapfrogging as the mobile phone, as the former requires expensive investment in backbone infrastructure (The Economist, 2009d; The World Bank, 2009a).

All hope is not lost, however. A recent report by the Boston Consulting Group entitled "The Internet's New Billion" has identified mobile internet in emerging markets as the next major frontier in ICT development. The rapidly increasing mobile phone subscribers are expected to turn to accessing the internet through their mobile phones, thereby leapfrogging the expensive fixed broadband infrastructure and the quintessentially low access to personal computers on which the latter depends in developing countries. The ongoing rollout of third-generation or higher (3G, 4G) technologies across developing countries enables subscribers to access the internet through mobile phones. The economic benefits of mobile internet promises to be much more dynamic and larger for the economy than was possible for the prior-generation mobile phones, for example with the unemployed now able to search for jobs online and farmers in remote areas accessing customized technical, weather and market information on the internet. Moreover, the intense price competition that has been waged for mobile phone penetration is likely to carryover to the market for mobile internet (The Economist, 2010). However, the benefits of mobile internet are predicated on sound literacy rates which may pose problems across a good swath of the

Continent. Even then, mobile internet is a quantum leap forward in the sense that local information centers based at such literate establishments as schools, clinics and old-school extension agencies could now serve as vibrant information nodes for local farmers within their hinterlands.

Apart from the economic benefits, broadband enables the further transformation of the ICT sector through fostering the convergence of telecoms, media and computing. The convergence process is three-fold, comprising *service convergence*, which allows different telecom providers and platforms to use the same network to offer multiple services; *network convergence*, which allows a service to travel over any combination of networks; and *corporate convergence* that facilitates firms to merge or collaborate across different sectors. Central to ICT convergence is the digitization of communication, as well as expanding the internet protocol (IP) that has enabled the interconnection between disparate networks, devices, and applications. Driven by both technology and demand, convergence is fostering competition and propagating major changes in industrial organization and business models, thereby meriting close policy and regulatory attention (World Bank, 2009a).

Turning to the policy and regulatory issues, the nascent discipline of ICT for Development (ICT4D) is undergoing flux in technologies, business models, products and market behavior. As a result, both developed and developing countries are grappling with the challenge of how best to regulate and formulate a policy framework for the sector. For developing countries in particular, a regulatory and policy framework should tackle the following nagging challenges in ICT4D, namely that:

- (i) ICT convergence does not easily fit into established, discernible sector frameworks, thereby posing the challenge of translating a broad vision (ICT4D) into specific policies for convergence. Convergence also has direct implications for the competitiveness of the industry, as services may get to be bundled together and concentrated in a few market players. For example, mobile telecom operators are also entering the market for mobile banking;
- (ii) Broadband access is naturally proceeding apace in the cities and inter-city corridors, with rural areas and low-income neighborhoods of urban areas lagging further behind;
- (iii) Despite a few success stories, there has been a high rate of failure in the adoption of e-government in developing (and developed) countries which reflects the daunting challenge of marshaling large-scale data systems even for countries well-endowed with technical skills; and
- (iv) African countries still have to grapple with meeting the threshold initial conditions, besides broadband access per se, for participating effectively in the global market for IT and ITES, particularly regarding investment in sound technical education to support the IT sector (World Bank, 2009a).

These challenges and the ongoing learning notwithstanding, *three global best practices* are emerging regarding regulating and fostering ICT development. First, authorities must cultivate competition in the sector by primarily lowering barriers to entry and actively seeking to enhance the participation of multiple players as a strategy for driving down prices, stimulating innovation and fostering industry growth. The competition should be fostered in all critical sub-sectors, notably, telecom operators, service providers and infrastructure through regulating natural or state-granted monopolies and correcting for other market failures. Nonetheless, while the reform process tends to well-advanced for mobile telecoms, significant imperfections still exist in many countries especially in respect of opening up the national spectrum to allow other, newer wireless technologies and services. The regulatory shackles against the development of mobile banking have already been discussed.

Second, reform of regulatory frameworks should be governed more by market trends than historical or legal precedent to encourage market participants to innovate new products and business processes, diversify their offerings and cut costs. Third, regulators should allow innovators to unleash the full technical potential of new innovations, for that would mean new business opportunities. In that regard, the proscription of Skype and voice-over-internet telephony that is in force in some countries, with obvious implications for the cost of international communication and commerce, is ill-advised. The welfare benefits of lower prices, expanded choices and better quality to users should be prized in ICT policy formulation and regulation.

The other policy thrust concerns creating a sound investment climate for ICT development. Whereas much of the investment in mobile telecoms has been private-sector-led, the heavy outlays, sunk costs and longer gestation periods associated with laying out backbone networks for broadband call for a catalytic role for the state in financing infrastructural investment. That means removing all generic barriers to investment more generally, and to ICT sector development more specifically. Fostering competition between infrastructure companies remains crucial for cost-effectiveness. Governments should pay attention to providing incentives for extending broadband access to commercially less attractive areas beyond cities and inter-city corridors, and this could be done through cross subsidization funds where urban markets could be taxed to finance infrastructural investments in less favored, rural areas. Creative public-private partnerships (PPPs) have been employed using various models, including government guarantees, tax concessions and competitive subsidies, or front-loading repayment schedules so that private players recoup their investment earlier than government because of the latter's presumably more patient capital. It is however critical that PPP agreements enshrine competition in the use of the infrastructure under the common-carriage principle at law, as opposed to government granting a time-bound monopoly to the PPP partner in operating the infrastructure (World Bank, 2006; World Bank, 2009a).

In addition, ICT policy frameworks should heed the idiosyncratic requirements for IT and ITES sector development. As argued earlier on, this is a vast global market with a lot of currently untapped potential. Nonetheless, targeted policy support is required for the competitive development of a successful sector that could take on the global and emerging players such as India, the Philippines, etc. Apart from general efforts to improve the business climate in the country, the IT and ITES sectors require targeted support for the installation of backbone ICT infrastructure; increasing the supply of technical engineering and IT skills through sound technical (and language) education; fostering R&D; and promoting innovation. This could be achieved through catalytic support to technical and higher education, sound intellectual property law, and innovative financing arrangements including government guarantees for an emergent venture capital industry. A specific industry body may be advisable to more actively champion the cause of ICT development in the country (*ibid*). Box 2 overleaf reviews the media coverage of the arrival of broadband in Kenya.

Box 2: East Africa Gets Broadband — a New Telecoms Revolution in the Offing.

Kenya recently inaugurated the first of three international fiber-optic cables that are expected to come to life in the next few months, thus improving prospects for linking the East Africa region (Kenya, Uganda, Rwanda, Burundi, Ethiopia, Tanzania and parts of Somalia) to the world-wide web through fast-speed internet access. Work is ongoing to expand the in-country reach of the fiber-optic network, while internet villages are being set up to reach the rural and urban poor. It is hoped that the high bandwidth and presumably fierce competition between the three cables will bring down costs and help create new businesses in the IT and ITES sector. With its critical mass of young English speakers and a mere two hours ahead of Europe's time-zones, it is hoped that East Africa could leverage broadband to compete with India and Sri Lanka in the international market for back-office-processing (BOP), not a wild imagination since a few call centers have been operational for a while before. These sectors are expected to expand rapidly with the commissioning of the three cables. However, concerns persist that the prices of high-speed internet access are not reducing drastically enough for ordinary Kenyans. Besides, Kenya still needs to further invest in expanding in-country backbone infrastructure in order to extend broadband access to all strata and regions of Kenyan society. Nonetheless, high-end, information-intensive companies like KenCall, an outsourcing company, have already reported a steep fall in prices, from a peak of \$3000 down to \$300 per one megabit per second (Mbps). Perhaps this time Kenyan call centers can realistically hope to upstage their Indian counterparts who faced prices ten times cheaper primarily because the Indian fiber-optic system was far better and cheaper. *Source: The Economist (2009d); BBC, (2009).*

National E-Strategies

A National Information Society Policy (NISP) — more commonly known as a National ICT Policy or National E-Strategy — and its associated Action Plan provide an organizing framework for addressing the foregoing policy and regulatory concerns in order to unleash the development and full transformational impact of ICT. An NISP is a declarative document that articulates the national vision and principles for guiding a country toward an information society. Fundamentally, an NISP: (i) Articulates a vision that frames the role of

ICTs in achieving key national development objectives, or that adopts the transition to a knowledge-based economy as goal in and of itself; (ii) Establishes the requisite legislative roadmap for creating the enabling environment to achieve the vision, as informed by existing opportunities, challenges and constraints; (iii) Defines the major strategic resources and initiatives that will be required; and (iv) Specifies a timeline and agenda for action (UNDP, 2003).

As with any governmental policymaking process, the challenges of formulating and negotiating a national e-strategy are variegated. It is important to single out the salient issues on a case-by-case basis and proceed in the full knowledge of their operation. Furthermore, there should be a recognition that e-strategies are ancillary to the broader process of building a knowledge economy, itself a complex and long-term process and dependent on the following four essential factors, namely: appropriate institutional regimes and incentive structures; effective systems for education and life-long learning; a dynamic national information infrastructure; and an efficient innovation or R&D market comprising public and private institutions, secure intellectual property rights as well as strategic partnerships.

Predicated on these fundamentals, national e-strategies can be envisioned as providing a framework for addressing the transition to a knowledge-based economy by articulating a national vision, establishing an appropriate enabling environment, and providing a roadmap for action replete with indices for benchmarking and tracking progress of implementation (*ibid*). It is difficult to discern from the literature how many African countries have formulated and formally adopted e-strategies, save for the early data that noted that the number of countries with ICT policies had increased from 13 in 2000 to 16 in 2002, during which period countries in the process of developing e-strategies jumped from 10 to 21 (ECA, 2003).

Measuring ICT Sector Performance

As would be expected, there has been frenzied work on devising sensible indicators for assessing the ICT performance of sectors, regions or countries. ICT indicators are important for benchmarking and tracking a country's state of ICT development over time, and for making contemporaneous comparisons with peer countries. Comprehensive standardized measures have been developed to examine the status of countries' so-called e-readiness, addressing such factors as the legal and regulatory environment, infrastructure, human capacity, access and awareness, thereby helping to highlight the priority areas for development and the countries' comparative advantages. A number of competing e-readiness methodologies exist, though many focus primarily on quantitative measures at the expense of important qualitative measures such as the local political environment. Another useful typology for e-readiness measures is to distinguish between those that focus on basic infrastructure or a nation's readiness for business or economic growth, and those that focus on the ability of the overall society to benefit from ICTs (UNDP, 2003).

A quick overview of these e-readiness methodologies and indexes is justifiable for this paper for two reasons, namely that e-readiness measures enable an assessment of the state of capacity for ICT development across Africa, and that they facilitate the characterization of the baseline situation for monitoring and evaluating the implementation of a country's national e-strategy or NISP. One area that is increasingly gaining currency is impact evaluation, hitherto a fraught area for many developing and developed countries. The key focus for impact evaluation is the need to ensure that ICT strategies are relevant and that governments can be held accountable for their implementation, answering for example such instructive questions as: how do returns to public-sector investment in ICT compare to those for education and health?

Inspired by the need for comparable ICT data to provide a basis for sound policies, the *Global Partnership on Measuring ICT for Development* was launched through the collaboration of UNCTAD, ITU, OECD, UNESCO, UN Regional Economic Institutions, Eurostat and the World Bank. The partnership has since been assisting national statistical agencies in ICT data collection and dissemination, as well as organizing regional workshops to share national experiences and discuss nomenclature, methodologies, survey instruments and results measurement in ICT sector performance.

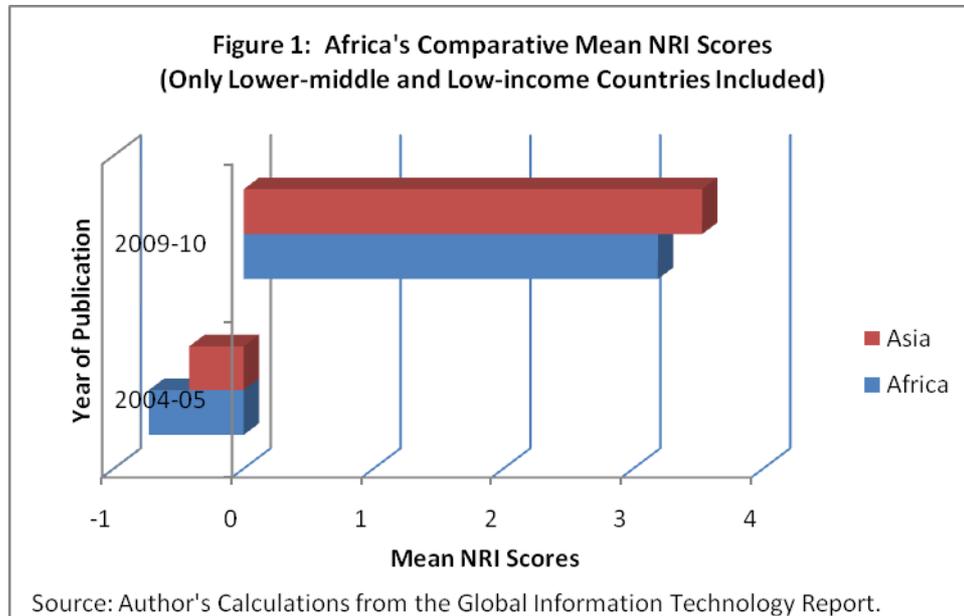
First published in 2006, the World Bank *ICT-at-a-Glance (AAG) Tables* enable ICT assessment and comparisons over time and across countries to assess ICT capacity, performance, progress and opportunities. AAG Tables show the most recent national data on key indicators for ICT development. Key measures of ICT development are tracked, such as access to ICT services, affordability of ICT services, and adoption of ICT applications in government and business to provide a basis for sound policies (World Bank, 2006). Alternatively, the *Networked Readiness Index (NRI)* — published annually by the World Economic Forum (WEF) — is designed to measure countries' propensity to leverage ICT for enhancing their international competitiveness. NRI is made up of three components, to wit, the ICT environment for a given community or stakeholders, the readiness of key stakeholders (individuals, governments, businesses) to use ICT, and the actual usage of ICT among stakeholders. WEF, in collaboration with INSEAD¹⁶, publishes the *Global Information Technology Report* which makes use of the Index.

Figure 1 overleaf is a comparison of regional ICT capacity for low- and lower-middle income countries in Africa and their comparators in Asia, showing that Africa has been trailing behind Asia in ICT readiness and that the difference has persisted over time¹⁷. This situation is however bound to change as a number of African countries are getting networked to the global undersea fiber optic infrastructure and rolling out their national backbone ICT networks, particularly

¹⁶ INSEAD — originally Institut Européen d'Administration des Affaires — is a Graduate business school based in Fontainebleau, near Paris, France.

¹⁷ We would however caution against a direct inter-temporal comparison of the NRI index as its construction has been varying (presumably improved) over time. Hence, the construction of 2004-05 admitted of both positive and negative values (was defined on the entire real line, \mathbb{R}), while the one for 2009-10 was defined on the positive real line (\mathbb{R}^+).

for the coastal countries including those that are fairly close to the coast such as Zimbabwe, Malawi and Ethiopia. However, the real opportunity for Africa lies in mobile internet, given the already deep and accelerating mobile penetration rates across Africa.



ACBF's Experience and Potential for Leveraging ICT for Capacity Development in Africa

The African Capacity building Foundation (ACBF) has traditionally targeted the capacity strengthening of institutions responsible for government transparency, accountability and effectiveness, notably core public-sector institutions comprising central banks, internal revenue authorities, ministries of finance and planning, supreme audit institutions, central statistical offices, local government associations; dynamic oversight entities including parliaments and parliamentary institutions, umbrella civil society organizations and the media; private-sector associations or chambers of commerce; development policy units or think tanks; higher education and training institutions; and communities of practice comprising country-level knowledge networks (CLKNETs) and six technical advisory panels and networks (TAPNETs), one for each of the Foundation's core competency areas including gender as a cross-cutting issue. ACBF assistance has been channeled through full-fledged project or program support to specific entities and through small catalytic or seed grants to cultivate new ideas and start-up entities. While the majority of interventions are national, ACBF has also supported Africa's regional economic communities (RECs) and carefully-selected regional programs to strengthen capacity for regional integration and the management of regional public goods.

Over the years, ACBF has moved with the tide regarding the extent to which it has financed and leveraged ICT in its projects and programs, although considerable

room exists for improvement. Since around 2005, the Foundation has provided institutional support to fund the purchase of ICT office equipment and software, internet connectivity, and website development and maintenance for the majority of its projects and programs in order to increase their efficiency and effectiveness. This is important since a good number of donors have balked at providing institutional support at all, let alone ICT, in favor of program activities. In addition to this minimum, across-the-board contribution, the Foundation has recognized the need to expressly harness the interactivity of the internet (web 2.0) for those interventions that lend themselves to interaction with stakeholders or members, although this effort has been hampered by the inaccessibility of the internet across much of Africa.

Key among these programs are the country-level knowledge networks (CLKNETs) that are expressly designed to be e-based in order to leapfrog the difficulty of convening physical meetings for far-lung stakeholders across the countries, as well as to leverage ICT for fostering the participation of a country's professional diaspora community thereby mitigating the pernicious effects of the brain drain. A key feature of CLKNETs is that qualified subject-matter specialists convene and moderate online stakeholder discussions to harvest consensus on well-defined, pertinent development issues of the day and package the outcome into policy memoranda for systematic dissemination to high-level policy forums, relevant policymakers and institutions. However, the program has met with some challenges, notably the limited access to high-speed broadband across much of SSA, a problem that, as discussed previously, is likely to ease-up with the growing connectivity of countries to the global infrastructure for fixed-line broadband and the vast potential that lies in mobile internet. There are four operational CLKNETs in Kenya, Burkina Faso, Ghana, and Cape Verde. ACBF is in the process of distilling lessons learnt to guide further innovation and scaling-up, including a serious consideration of the shift to the mobile phone as the ICT platform of choice for CLKNETs.

The six highly specialized ACBF-supported Technical Advisory Panels and Networks (TAP-NETs) — one for each of the six core-competency areas — stand to benefit from a greater exploitation of ICT than presently, through such facilities as online meetings, conferences and discussion forums on issues germane to capacity development for Africa. TAPNET membership comprises both African and non-African scholars on Africa from across the world. TAPNETs are maturing into organic communities of practice, with reasonably low member attrition after some initial teething problems, and have been a valuable resource for augmenting the Foundation's internal capacity as well as responding to increasing demand for knowledge services from its stakeholders and partners in capacity development. The networks operate largely through mailing lists (groups) and web portals maintained at the ACBF Secretariat, with provision for one physical meeting per year. However, the functionality of the TAPNET portals has been rather limited to posting information (web 1.0), thereby falling shy of the full interactivity (web 2.0) of the internet that makes ICT such a dynamic factor in development. Considerable scope therefore exists to bring the full facility of ICT to bear on the

operation of the TAPNETs in order to turn them into more dynamic, real-time and rapid-response networks.

Conclusions and Recommendations

The last several years have witnessed rapid technological change and business process innovation with the effect of increasing the availability and accessibility of mobile phones to the poor in both urban and rural areas across Africa and the developing world. The mobile phone, given its unique leapfrogging characteristics, is being imaginatively leveraged to resolve nagging development problems in agricultural development, primary healthcare and epidemiology, public service delivery, elections and human rights monitoring, financial-sector development, and education to name but a few. However, the foregoing survey of the literature suggests some serious capacity issues in formulating and implementing national ICT policies in Africa, which is manifested by the Continent's largely poor showing in international league tables for ICT development.

Although ACBF has been alive to the importance of harnessing ICT for capacity development as is evidenced by the current generation of projects, we advocate the next generation of projects that go a great deal further in exploiting the ubiquity and interactivity of the mobile phone as well as the steadily progressing internet connectivity across Africa. Particular areas of intervention that lend themselves readily to stakeholder interaction include initiatives for enhancing government effectiveness, accountability and transparency throughout the value chain from the design, implementation and monitoring-and-evaluation of public-service delivery programs. The target institutions in that regard include parliaments, ministries of finance and planning, central banks, central statistical offices, the media and anti-corruption agencies. These areas are well within the domain of the Foundation's core competency areas. ACBF should also pilot nontraditional ICT-based projects in emergent and resurgent areas of development endeavor notably agriculture and rural development, e-government, public health and epidemiology with central design features informed by the ICT innovations that have been profiled in this paper, particularly centered on the mobile phone platform and mobile internet as truly leapfrogging ICT technologies for Africa.

Last but not least, there is scope for intervention in capacity building for ICT development itself, given the systemic capacity weaknesses of many African countries in ICT as shown by their consistently poor showing in international league tables. ACBF could humbly focus on supporting the formulation, implementation and monitoring-and-evaluation of national ICT policies in select countries through the institutional strengthening of telecoms administration and regulation particularly in those countries with lower mobile penetration rates such as Ethiopia. The goal should be to exploit the deepening mobile-phone and internet penetration rate to build sustainable capacity for poverty reduction across Africa.

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