

**Trends and Challenges Facing Developing World in Adoption and Use of ICTs: A View
Towards Bridging the Digital Divide**

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ABSTRACT

This paper examines the trends and challenges facing the developing world, particularly African nations in their adoption and use of ICTs in the information age, and offers some views towards bridging the “digital divide” between the developing world and the developed world. The paper suggests some frameworks for formulating ICT strategies to sustain the growth of ICTs in the developing world as a measure of bridging the digital divide.

Keywords: ICT, Digital Divide, Developing World, Strategy Formulation, New Economy.

INTRODUCTION

The subject of technological change and development in the developing world, particularly Africa, has received increasing scholarly and public attention in recent years. There are a number of publications on how information and communication technologies (ICTs) could offer business opportunities to enable developing nations to advance in their developments.

Perhaps the most significant study was published in 2003 by the United Nations Development Program (UNDP): “*Human Development Report 2001: Making new technologies work for human development*”. The UNDP report, which covers the entire developing world, offers many valuable insights into the role of technology and development. But the report while offering scores of examples of the role of innovation in social and material change pays scant attention to the role of location and the relationship between geography and innovation. Location, according to Zachary (2003) is crucial to understanding technological capacity – and creating policies to expand it, especially in the areas of computing and communications.

Indeed, an article by Pankaj Ghemawat in 2001 and cited by DuBois (2004) also eloquently addresses the problem of distance, not only geographic distance, but also cultural, administrative and economic distance that separate countries. DuBois (2004) refers to geographical distance as:

“the simple notion that as the distance between trading partners [countries] increases, the likelihood that they will trade falls. Administrative distance refers to the differences in the legal and regulatory environments of the trading nations which may impede trade, [and] economic distance may mean dramatic differences in the adoption and diffusion of technological innovations in some host countries” (p. ii).

Some of the publications on the subject paint the bright and promising pictures about the use of ICTs as a means of generating quick wealth, bridging the *digital divide* and consequently accelerating national and regional development (e.g., Moyo, 1996; Morales-Gomez and Melesse, 1998; Ditsa, 2005). Much attention has however not been paid to the underlying factors that can and will inhibit a successful adoption, diffusion and use of these technologies in the development of the developing world.

This paper presents some underlying factors contributing to the “digital divide” between the developing world (particularly Africa) and the developed world and presents some views towards bridging the “digital divide”. The focus of the paper is a bit more on sub-Saharan Africa, particularly Ghana, Nigeria and South Africa, which can be generalized to the developing world situations. The paper is structured such that the “digital divide” is first explained with some of the strategic policies leading to it. This is followed by the new economy and the advocacy for adopting an evolutionary technological intake in the developing world. Next is a brief overview of technological breakthroughs and poverty reduction. The paper continues by taking a look at the challenges faced by ICT projects in the developing world. Some ICT initiatives in Ghana and South Africa are briefly then presented. Finally, the paper suggests some models for formulating and maintaining ICT strategies in the developing world and concludes with some suggestions towards bridging the digital divide.

The New Economy

The information age has introduced what is termed the *new economy*, which the *Wired* magazine described as:

“... a world in which people work with their brains instead of their hands. A world in which communications technology creates global competition - not just for running shoes and laptop computers, but also for bank loans and other services that can't be packed into a crate and shipped. A world in which innovation is more important than mass production. A world in which investment buys new concepts or the means to create them, rather than new machines. A world in which rapid change is a constant. A world at least as different from what came before it as the industrial age was from its agricultural predecessor. A world so different its emergence can only

be described as a revolution” (*Wired* magazine’s, *Encyclopedia of the New Economy* <http://hotwired.wired.com/special/ene/>).

Others referred to the phenomenon as the *knowledge economy*; *digital society*; *the network era*; etc. Jessup and Valacich (2008) simply called it the *digital world*.

The realization of the *new economy* underscores the fact that ICTs have become a very important part of and drives the direction of the contemporary economy of the world. Sadly, it has been argued that in the new economy there is a *digital divide*, where those with access to ICT have great advantages over those without access (Jessup and Valacich, 2008).

The Digital Divide

Information technology was introduced into development in the early 1970s. This introduction was facilitated by international development agencies, such as the UNDP and World Bank, who supported a large number of IT related development projects in the 1970s and 1980s (Berman, 1992). Once again, there was the familiar progression of initial enthusiasm and optimism leading to top-down strategies of implementation which accompanied the implementations of earlier technologies. The apparent “push” rather than “pull” implementation strategies by developing countries appeared to have resulted in significant failures (Heeks, 2002) and has often worsened the development states of most developing countries (Berman, 1992; Brohman, 1996). This “push” rather than “pull” strategies also resulted in the ripple effects of widening the gap between the developed and the developing countries in their adoption and use of ICTs.

There is therefore an increasing focus on the growing disparity between the involvements of developed and developing countries in the new *information age*. While developed countries

are harnessing the information age to revolutionize their industries, developing countries on the other hand appeared not to have the capabilities to do so. The “disparities [which] exist in access to and use of information and communications technology between countries and between groups within countries” (Bridges.org 2001) is what is referred to today as the *digital divide*. The digital divide is also defined as “the gap between individuals, households, businesses and geographic areas at different socio-economic levels with regard both to their opportunities to access information and communication technologies (ICTs) and their use of the Internet for a wide variety of activities” (OECD, 2001, p. 5). Jessup and Valacich (2008, p.410) also define it as: “the gap between those individuals in our society who are computer literate and have access to information resources like the Internet and those who do not”, while Mahra (2008) defines it simply as “the troubling gap between those who use computers and the internet and those who do not”.

The United Nations also aims at raising awareness of the digital divide through the World Information Society Day which takes place yearly on May 17

(http://en.wikipedia.org/wiki/Digital_divide).

Whatever the definition and attempts by world bodies, this gap will continue to widen unless and until developing countries recognize the role these technologies can and should play in their development and then take urgent and proactive actions to bridge the gap between them and their developed counterparts. Projects such as the *One Laptop per Child* offer a partial solution to overcoming the digital divide as they tend to rely heavily upon open standards and free open source software.

Intermediate Technology

In his book, “Small is Beautiful”, Schumacher (1999 - first published in 1973) highlights another gap in terms of the level of technology deployment in developing countries. He states:

We can call the indigenous technology of a typical developing country – symbolically speaking – a £1-technology, while that of the developed countries could be called a £1,000-technology. The gap between these two technologies is so enormous that a transition from the one to the other is simply impossible. In fact, the current attempt of the developing countries to infiltrate the £1,000-technology into their economies inevitably kills off the £1-technology at an alarming rate, destroying traditional workplaces much faster than modern workplaces can be created, and thus leaves the poor in a more desperate and helpless position than ever before. If effective help is to be brought to those who need it most, a technology is required which would range in some intermediate position between the £1-technology and the £1,000-technology. Let us call it – again symbolically speaking – a £100-technology (pp. 149 –150).

Thus, Schumacher contends that such an intermediate technology would be immensely more productive than the indigenous technology (which is often in a condition of decay), but also be immensely cheaper than the sophisticated, highly capital-intensive technology of modern industry. Put another way, Schumacher is advocating for an evolutionary process in technological intake by developing countries rather than leapfrogging as advocated by others such as Fontaine (1999). It would be important to add that such an evolutionary process would not only make ICTs succeed in Africa and the developing world, but would also suit the limited resources problems facing the developing countries.

Technological Breakthroughs and Poverty Reduction

Advance information technology – from computing to communications – played a crucial role in the creation of wealth and the rise in the quality of life in industrialized countries in the 20th century (Zachary, 2003).

ICTs are a technological breakthrough of the 20th century. Like all technological breakthroughs before it, starting from the steam engine to sending man to the moon, there are the promised opportunities of: erasing poverty from the face of the earth; bridging the gap between the “have” and the “have-nots”; bringing the developing countries to the status of their developed counterparts. Some of the problems of these missed opportunities lie in the desperation for “quick fixes” without addressing fundamental factors that impact on the sustainability of the advantages gained from the use of these technologies.

To solve these problems, careful planning using complicated but sustainable interventions are required. Most of the time, the outcome may be in the long-term and not immediately visible. For example, good solid economic decisions and choices before deploying ICTs as enablers are very necessary. Stable political environments are required to support the successful implementation, diffusion and use of these technologies. The social environment should be ripe for the implementation of ICT projects. Pressing basic social amenity projects, such as water, electricity, education and healthcare, should take priority over ICT projects in order for the latter to succeed. The cultural atmosphere should be conducive to embrace the use of ICTs. National information infrastructure¹ strategies are necessary and should be formulated. Without regard to these and other factors, any attempt to “leapfrog” ICTs for

¹ National information infrastructure (NII) – the term is used to describe the total set of networked computer technologies, systems, human resources, protocols, standards and all other institutional arrangements that support the processing, management and communication of information within and across the borders of a country. It includes both propriety networks as well as the Internet (Tetteh and Burn, 1999).

development in the developing world may fail, if not very miserably: thus further widening the digital divide between the developing and the developed worlds.

Challenges Faced by ICT Projects in Africa and the Developing World

There are compelling arguments on whether developing countries should focus the very limited resources on ICTs and ignore basic necessities such as clean water, basic education, healthcare and other basic necessities of life that are hard to come by in most developing countries. Although this thinking could be discarded as too narrow, a closer examination would reveal how poverty is eroding most of the abilities required to remain focused and committed to technological breakthroughs and development. Lack of adequate national information infrastructure could affect the organizational technology capabilities, especially those organizations that primarily depend on government for support and funding (Adewumi and Okunoye, 2004).

In Africa, for example, there are about two billion people living on two dollars a day and raising living standards remains an urgent task (Zachary, 2003). This is coupled with very high unemployment in the continent. The Internet, for example, is simply priced beyond the reach of many people in the continent. Computers are still relatively expensive and prices for telephones are not cheap either. Considering the average income of most workers, these seemed beyond the reach of a large number of the peoples. Many companies in the continent cannot even afford the “luxury” of being hooked onto the Internet if they want to make meaningful profits. For information to be truly available and useful, people should be able to cheaply afford and access it anywhere at anytime: and that appears currently to be quite a distance for many in Africa and indeed almost all the developing countries.

At times the basic infrastructure for ICTs barely exists before the proposal for these systems are made and there is barely any viable details of maintenance of these systems worked out over their life cycle. In Ghana, for example, there is a government proposal to connect many classrooms to the Internet. Although this proposal appears to be laudable and in the right direction, it sounds rather ambitious. Having Internet access requires hardware (servers and clients) network (bandwidth, switches and routers) software (servers, development tools, firewalls, application, etc.) and most importantly people to develop, support and maintain the network (programmers, designers, content providers, network support and administrators). Above all, many school buildings in that country are in dire need of maintenance (for those who have one): roofs are falling; walls are dangerously hanging to crumble anytime. The question is how do you maintain Internet equipment and connection in such buildings? To add to that, many schools in the country are in need of basic textbooks and writing materials. And on top of these, computer science departments in the country's universities are ill-equipped, both in human and material resources to produce the needed qualified graduates; and there are, if at all, few computer science or related masters programs, let alone doctoral programs in any of the country's universities. This situation is not much different in most of the developing countries and this poses the dilemma in the allocation of the limited resources by national leaders in the developing world.

Principles Underlying the ICT Sector and other Sectors

To enable many people to afford using telecommunication/ICTs, developing world authorities need to understand the principles underlying this sector. The principles underlying this sector in a nation's economy and development are significantly different from other sectors, such as energy. Hon. John Mahama, an MP and then Minority Spokesperson on Communications in the Ghanaian Parliament, rightly pointed out sometime ago that:

“While conservation is advocated in energy and in many circumstances high tariffs are utilized to restrict consumption, the telecom sector thrives on the principle of universal access and aims at profitability through economies of scale by building up traffic volumes. While you can enjoy electric power all by yourself while the rest of your neighbours remain in darkness, you cannot communicate with yourself. The wider and more affordable the telecom network is, the more valuable and beneficial the system is for everyone. Access and affordability are an in-built concept in the entire product philosophy of communications.

True to this philosophy, telecom/ICT tariffs have continued to decline across the world. Gone are the times when international telephone traffic attracted between 80c and \$1 per minute of talk time. Today there are tariffs as low as between 1c and 2c per minute. In some cases consumers are even offered free talk time at weekends and at off-peak hours. What Telecom companies have done in response to this trend has not been to attempt as a cartel to artificially shore up tariffs. What they have done is to cut waste and trim costs as savagely as possible. To survive in the highly competitive telecom/ICT market one has to be able to deliver service at the lowest possible cost” (Mahama, 2003, pp 1, 2). Without due regard for these principles, telecom/ICTs will still be out of the reach of many people in the developing world: cumulating into high information-illiterate societies and underdevelopment.

Can ICTs save Africa and the Developing World?

Regardless of whether one believes that the electronic network is a panacea or advent of doom, or whether one thinks that both positions are exaggerated and that there are other decisive factors in social, economic and political affairs besides the interplay of computing and communications, there is a minimal common ground to be found. Observers of computerization and new forms of communications agree that these technological systems

ought to promote productivity growth, wealth and human happiness – and perhaps more so in parts of the world that are traditionally marginalized, economically and technologically. In response, skeptics pointed out that technological advancement is a symptom of a healthy society, not the source of one (Zachary, 2003).

Without strong political, social and economic institutions, innovations developed by others cannot easily be imported into a society. Without a strong educational system and baseline of health and safety, the talented people necessary for the application of existing technical knowledge and growth of new know-how will not be available in a society.

The initial problem in Africa is technology advancement which was not much a priority of most African leaders after their independence from colonial rules. And currently few are doing something practical to advance ICTs in their countries through their regional and the continental organizations. Aside from the very poor African countries with those torn by civil wars, the relatively wealthy ones also seemed to be at stand still technologically. For example, in Nigeria, the most populous sub-Saharan African country and the best endowed in terms of oil wealth, a mere 200,000 telephone lines existed in 2003 to serve an estimated 100 million people (Zachary, 2003). The political instabilities in most African countries also gave rise to the bureaucratic crackdown on the communication technology advancement in the African continent: the citizenry should have the least opportunity for communicating with the outside world in order not to “know too much”. For example, in Ghana, the imported upgrade equipment by Mobitel in 2001 (a mobile phone company in that country) to re-launch its services with leading-edge technology and to compete with its rivals was seized by the government for a month, with the accusation that the company imported the equipment

for the secret purpose of designing a surveillance capability into its telephone system and to systematically eavesdrop on Ghanaian telephone conversations.

A whole range of reforms, including improved governance, better forms of conflict prevention, and much greater investment in human capital are necessary steps for increases in the living standards in the developing world. There is the tendency to leapfrog without due regard to a whole range of basic problems that could undermine the advancement of the technology in the developing world. There is the need to begin from where they are else they can be likened to the old Irish joke about the person from the city who asks a farmer how to reach a certain destination only to be told: "If I were you, I wouldn't start from here".

ICT Initiatives in Development in South Africa and Ghana

There are a number of ICT initiatives in most, if not all, the nations in Africa: some of which are barely off the ground. Undoubtedly, South Africa is clearly ahead of the other African nations, particularly sub-Saharan African states, in the use ICTs. The literature revealed that ICT initiatives in developing countries, particularly in sub-Saharan Africa, are dominated by three prevalent initiatives currently (see for example, Bridges.org 2001; Benjamin 2000; and Burton 2000). The three are:

1. Online information resources (providing relevant content);
2. School computer programmes and distance learning programmes;
3. Telecentres.

Perhaps, a brief highlight on the telecentre initiatives in South Africa and Ghana will suffice.

Telecentre Initiatives in South Africa

The telecentre idea first originated from Denmark in the 1980s where *telecottages* were set up in response to the increased marginalization of rural communities (Ernberg 1996; Benjamin 2000; Roman & Colle 2002). It then spread to other European countries with a focus of giving more people access to ICTs. Telecentre is defined variously. Gomez *et al.* (1999), for example defines it as: “a physical space that provides public access to ICTs for educational, personal, social, and economic development”.

The next major development in telecentre occurred when the International Telecommunication Unit (ITU) issued a report titled, *The Missing Link* (also known as the Maitland Report). The report went on to note the growing disparity between the rich and poor countries of the world in terms of their access to ICTs (Benjamin 2000). International organizations, such as International Development Research Centre (IDRC) in Canada, various United Nations organisations such as UNESCO, UNDP, the Economic Commission for Africa (ECA), the World Bank and the World Links Organization, joined in the crusade in support of spreading the telecentre idea (Mayanja 2001). The World Bank (1998), for example, canvassed the idea with statements like: “[telecentres are] a powerful engine of rural development and a preferred instrument in the fight against poverty.”

The South African government embraced the idea by setting up telecentres across the country. There has been a number of studies (e.g., Benjamin and Dahms 1999; Benjamin 2000 and 2001; Burton 2000; Trusler, 2004) to investigate the success or otherwise of these centres. The overall findings of these studies indicate that while the initiatives are becoming more and more widespread, the embedding of the processes which they facilitate is not occurring at any significant level. Burton for example states that:

It is clear that while existing telecentre facilities offer a variety of services that are both desired and needed by many communities, these facilities remain under-utilised by the majority of communities in which they are located. Reasons for this range from cost and pricing issues to mere awareness of the facilities. (Burton 2000).

Jonathan Trusler who recently studied a rural multi-purpose community centre (MPCC) in South Africa also concludes that:

... it appears that the attempt to use '£1,000-technology' presented an impossible transition, not in terms of use – but rather in terms of ownership. We could see the computer training conducted by the PM as an attempt to 'leap-frog' certain developmental stages. Intuitively, if we had substituted the £1,000-technology (the MPCC) with a more intermediate technology (say a small-scale hydroponics plant) ownership and empowerment could have been significantly greater (Trusler, 2004).

These studies indicate the telecentre initiative is laudable, but more research is required to make them meet the objective of ICTs enabling development in South Africa.

Telecentre Initiatives in Ghana

Ghana prides itself for being number one in sub-Saharan Africa and Africa for implementing a number of ICT initiatives. For example, Ghana claims to have: the first Africa's only 10mbps wireless and voice technology; the first EDGE-capable network in Africa; the first full Internet connectivity in sub-Sahara Africa. These, however, appeared to be cultural. Studies (see for example, Hofstede, 1994; Hasan and Ditsa, 1999) show that it is generally endemic in the West African culture to rush in for new technologies without much regard or adequate plan for maintenance.

In line with the telecentre initiative, Ghana launched two telecentres, but on a much global scale. The first is the Kofi Annan Centre of Excellence on Information and Communication Technology (ICT) or simple called Kofi Annan ICT Centre. This state-of the art centre established in December 2003, with the support of the Indian Government, has the objective of facilitating information flow both within and outside the country so that work processes become more efficient and less costly. Early indications are however that this may be unachievable because of the cost of access which is too expensive to most people who need it.

The other telecentre-style initiative on a grand scale is the Ghana Technology Park (www.Ghanaweb.com, accessed April, 2008). This initiative is in collaboration with the UN, the University City Science Centre in Philadelphia, Innovation Philadelphia and Ghana Cyber Group, Inc. in New York.

The Ghana Technology Park will be a strategic base for companies targeting emerging markets in the ECOWAS region. Ultimately, the Park will seek to become West Africa's biggest IT infrastructure with thousands of young professionals working for ICT firms in software development, business services, e-Commerce, consultancy, education & training, sales & marketing, and business process outsourcing" (Owusu, 2004).

The Technology Park is to be an upscale business and technology complex featuring units for large-scale business process outsourcing, conference and call centres and other facilities to stimulate the growth of technology firms in Ghana. Much of the details on the Park can be found on (www.ghanacybergroup.com/). But in brief, the Park will have: High-tech serviced offices for rent; Voice over Internet Protocol (VoIP); 200 PC cybercafe; a 24-hour digital copy centre; Corporate wireless ISP; Digital lab for R&D; and Outsourcing and call centres.

The description shows this to be a grand initiative, the funding for which Ghana won at the expense of Senegal, Cameroon, Kenya and the Malawi who also presented similar proposals for the UN funding.

The current Ghana Government as well as its predecessors appeared to be involved and taking the lead in these initiatives. However, the strategy to sustain and have these initiatives growing to matured stages to bridge the “digital divide” appears to be lacking. Compared with South Africa, Ghana has little or no research strategy to investigate the success or failures of these projects. It remains however to be seen if these two initiatives described above will enable Ghana to incrementally minimize the “digital divide”.

FORMULATING ICT STRATEGIES

Returning to the old Irish joke, the formulation of ICT strategies must start from “here”. ICTs are subject to the growth stage model of IT or DP as it was then. Formulating strategies for ICTs and using IT growth models, such as Sutherland and Galliers model (see Galliers and Sutherland, in Galliers, Leidner and Baker, 1999) to evaluate and maintain the ICTs growth is very necessary for the developing world. Applying Sutherland and Galliers model to the various ICT organizations in the developing world would help identify the stages that the ICTs are in the organizations and then strategies formulated for their growth to the matured stages. Applying the model would mean first identifying the right stages of each of the “Seven Ss” (Strategy, Structure, Systems, Staff, Style, Skills and Superordinate goals) and then formulating the right recommendations and strategies to move the identified stages to the matured stages. Of course, as the model states, one need not work slavishly through all

the elements of each stage. However, it is necessary all prerequisites of the previous stages are satisfied in order to satisfactorily attain and maintain a stage.

Significant differences however exist in different firms. Strategy formulation for ICTs seems to be inherently more complex in some firms than others. The strategic modes for sectors (Delivery, Dependent, Drive and Delayed) will vary and so is the sector ICT management too (see Earl, 1989). For example, the strategic mode for the Delivery sector may be Infrastructure-led, whereas the strategic mode for the Dependent sector may be Business-led, while the strategic mode for the Drive sector may be Opportunity-led (Earl, 1989). This suggests that sector identification for the appropriate ICT strategy is very important. Using McFarlan and McKenny's "Strategic Grid" could also help position firms appropriately in the developing world for the right ICT management (see Earl, 1989).

Additionally, there is also the challenge of attracting multinational corporations for the development of ICTs in the developing world. A review of the experience of a large American IT company in Ghana, for example, reveals the potential for multinational corporations to transform the IT landscape in Africa (see Zachary, 2003). It also reveals the limitations of contributions of foreign corporation to the technological development. Most multinational corporations will be attracted to Africa for cheap labour, as pertains in India and China, and conditions must be made favourable for this to take place. This will mean changing or implementing policies to suit these multinational corporations. There will also be the need for basic communications infrastructure to be in place to support these corporations. Property acquisition laws in some developing countries also need to be amended to attract these multinational corporations. The need for education towards "progress culture" to ward off resistance to advancement as obtained in most developing

world cultures is required. The availability of local entrepreneurs, which is lacking, needs a boost. Above all, there is the need for African states to pull their resources together, learn from their developing counterparts, such India, the Koreas, Malaysia and Singapore who are far ahead in this area, in order to bridge the digital divide.

Another problem African states face, especially those in the West African region, is how to prevent or minimize the brain drain hitting the nations. In spite of the lack of human resource in this sector, indeed other sectors too, most of the elite well trained Africans in this sector, *myself included*, leave their nations for the developed world for “greener pastures”. According to UNESCO, as many as 30,000 Africans living outside of the continent hold doctoral degrees: it may be more. The elite migration pattern especially in the West African region is high. For example, by one estimate cited in the World Competitive Yearbook 2001, 26 percent of professional educated in Ghana today live in the developed countries, compared with about 3 percent of the professionals educated by China and India who live abroad. The challenge then is: how do African states make conditions favourable in order to retain their own educated professionals? To provide valid answers to this question will require a research study in this direction.

Conclusion and Further Suggestions

This paper examined the trends and challenges facing African nations in this ICT era and offered some views towards bridging the digital divide between the developing and the developed worlds. The paper suggested some frameworks for formulating ICT strategies to sustain the growth of ICTs in Africa. Further suggestions towards bridging the “digital divide” are as follows:

- Developing countries must be willing to invest in ICT to bring about the much needed change;
- To avoid pitfalls, the components of the information system must be properly laid out to resolve all ambiguities;
- Training/awareness drive must be properly coordinated and implemented;
- Consultants of repute must be engaged from onset to ensure that international standards are conformed to and enforced;
- Discard the notion that once a computerization project starts it must produce result immediately;
- Attempt must not be made to solve all problems all at once: as doing so will almost likely result in project failures.

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