

# **THE AFRICAN INTERNET: IMPACT, WINNERS AND LOSERS.**

A Paper on the impact of the Internet on human development in Africa.

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'Africa has to foster in its population a spirit of looking for original technological solutions based on the socio-economic circumstances of people and societies instead of being a perpetual (indiscriminate) consumer of Western products and services.'

[Dr. Batsirai M. Chivyanga, City University, UK.]

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This paper was compiled from research conducted exclusively on the Internet - as an example of the impact of the Internet on research and education in Africa. All correspondence was via email while most books; reports and articles were obtained through web searches.

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## ABSTRACT

This background paper on the *Impact of the Internet on Human Development in Africa* is in response to the calls for Research and Development (R&D) on innovative applications of ICTs for socio-economic development. It attempts to analyze the impact of the African Internet on development initiatives as the basis for the consolidation of related empirical evidence.

Starting with a review of the complex subject of Internet economics and *how to measure the impact of the Internet*, the author presents a *Conceptual Framework* towards that end. The next section reviews the *Status of the African Internet*. With an appreciation of the process of impact analysis in place, the subsequent sections attempt to elaborate the *elusive correlation* between the Internet and broadbased development.

The scope of this study as well as the lack of quantitative data limits the computation of empirical evidence on the positive and negative impacts of the Internet in Africa. The paper does however present anecdotal evidence on the benefits of the Internet under the broad categories of developmental imperatives set out by the Digital Opportunity initiative as based on the UN Millennium Declaration.

The focus on the Millennium Declaration and the UNDP Human Development Report 2001 is based on the fact that African countries are member states of the UN, which supports the national development agendas through the UNDP. The anecdotal evidence presented in this paper takes into account the recommendations of the DOI and the UNDP HDR 2001 for the creation of national *development dynamics* in the emerging *network age*.

After the review of anecdotal evidence, this study concludes with a call for further country specific multidisciplinary research. Such research should be based on a reliable conceptual framework for impact analysis and involve both qualitative and quantitative studies.

It is the author's<sup>1</sup> hope that the balance of this paper shall be beneficial to the *Second International Conference* of the African Youth Foundation (AYF) on *Technology and Human Development in Africa* between 6th-7th June 2002 in Bonn, Germany.

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## INTRODUCTION

An understanding of Internet economics is necessary in impact analysis and ICT policy formulation<sup>2</sup>. However, cross-country evidence on the impact of the Internet on economic growth is sparse and in many cases, non-existent. Studies on the impact of ICT investment in Australia<sup>3</sup> and the U.S.A<sup>4</sup> have indicated general positive effects of ICT adoption on the sector productivity. The relationship between ICTs and productivity is however elusive. There have been instances when the observed correlation between IT investment and productivity has been broadly negative<sup>5</sup> (Pohjola, 1998). However, recent studies have reversed the correlation especially in the case of the manufacturing sector in the United States.

Similar attempts to justify the potential impacts of the Internet on development in Africa have been inhibited by the lack of empirical evidence of observed impact on actual applications. The formulation of effective Internet policy however requires such broad and in-depth analysis of the implications. Previous attempts at impact analysis have tended to be technologically deterministic<sup>6</sup>. That is, they have tended to be based on a prior reasoning about the nature and expected impacts of the technologies and the skills needed to use them effectively<sup>7</sup>. Such shortcomings have resulted in formulation of Internet policy on a generalized and at times inappropriate basis.

It has thus been argued that since the impact of ICTs depends on, among others, users' attitudes and expectations, institutions' organization and management, impact analysis should be carried-out using generalized and expanded treatments of both qualitative and quantitative techniques, rather than simply quantitative tools<sup>8</sup>. ICT initiatives must also take account the local situations in individual countries, since blanket development recommendations will often not work. This view is emphasized thus;

*'Theory, anecdote and available empirical evidence do suggest that ICTs have an impact on economic growth. At the same time, we should not overestimate its scale. The Internet is likely to change the world – and especially business practices—significantly, but this does not necessarily mean faster or different patterns of cross-country growth, even while it probably does suggest different sectoral patterns of development. New technologies are always destructive as well as being creative. The balance appears to have been positive in the case of telephony, and the limited evidence we have suggests that this might well be the case with the Internet*

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<sup>2</sup> Daly, John, 1999, A Measure of the Impact of the Internet: A Tutorial, iMP - Information Impacts Magazine, [http://www.cisp.org/imp/december\\_99/12\\_99daly.htm](http://www.cisp.org/imp/december_99/12_99daly.htm)

<sup>3</sup> Houghton, John W., 2000, Impact of the ICT Industry in Australia, Australian Computer society (ACS), [www.acs.org.au](http://www.acs.org.au)

<sup>4</sup> see: Impact of Adoption - [www.idrc.ca/books/focus/807/chp04.html](http://www.idrc.ca/books/focus/807/chp04.html)

<sup>4</sup> Grace, Jeremy, et. al., 2001, Technology and Broadbased Development: A Partial Review of Evidence, The World Bank, February 2001. [www.worldbank.org/ict/](http://www.worldbank.org/ict/)

<sup>6</sup> "Studying the Impacts of the Internet Without Assuming Technological Determinism," in Nicolas, David and Ian Rowlands (editors), The Internet: Its Impact and Evaluation, ASLIB, 2000. (<http://www.aslib.co.uk/pubs/2001/08/04.html>)

<sup>7</sup> Adeya, Catherine N., Information and Communication Technologies in Africa: A Review and Selective Annotated Bibliography 1990-2000, INASP, 2001. [www.inasp.org.uk/pubs/ict/section1.html](http://www.inasp.org.uk/pubs/ict/section1.html)

<sup>8</sup> Digital Opportunity Initiative [DOI] Final Report, Creating an Development Dynamic, 2001 [www.opt-init.org](http://www.opt-init.org)

*as well. However, that is likely to depend on how governments respond to the new technology.*<sup>9</sup>

With this in mind, it has further been argued that “there is very little ICTs research and development (R&D) work that seeks to develop applications that are unique to Africans<sup>10</sup>”. This calls for R&D aimed at developing specific and appropriate solutions for African development problems.

It is therefore clear that ICTs, and thus the Internet, cannot offer a panacea for all development problems. As a result, the Digital Opportunity Initiative suggests that the real benefits lie in the application of ICT to create powerful social and economic networks by dramatically improving communication and the exchange of information. The solution does not therefore lie in the technology per se. This may be seen clearly in cases where ICT has served to reinforce the impact of prevailing conditions such as inefficient management.

This paper focuses on the perceived surplus of benefits of Internet adoption and use to subscribers and service providers over the cost of subscriptions and cost of service provision, respectively. Although these benefits may be presented in a *descriptive* manner, there is need to *measure* the qualitative and quantitative indicators of Internet impacts. Various laws and economic models are applied in the subsequent review on *Measuring the impacts of the Internet* (next section).

While conducting Internet impact assessment, it should be noted that adoption of ICTs involves a substantial learning curve and a high level of investment from users, whether they are individuals or organizations. There have been suggestions of a probable *lag effect* on impact after adoption of ICT due to a need for learning and eventual manifestation of cumulative effects<sup>11</sup>.

Another challenging aspect of impact analysis is the issue of *causality*. Impact analysis requires that one have the ability to sustain causal attribution through lengthening chains of indirect impacts. For example...;

*‘...the Internet may contribute to restructuring of the economy in some advanced countries, but it is not possible to definitively identify how much of the observed change is due to the Internet and how much is due to other factors.’*<sup>12</sup>

The causality problem situation is aggravated by the current state of technological convergence that presents a gray area between the impacts of various new and conventional technologies within what are perceived as complex adaptive systems.

Internet applications in Africa continue to grow and many attempts to collate empirical evidence have been out of step with the realities on the ground<sup>13</sup>. This study will review several of these applications for both *winners* and perceived *losers*

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<sup>9</sup> Grace, Jeremy, et. al., 2001, *Technology and Broadbased Development: A Partial Review of Evidence*, The World Bank, February 2001. [www.worldbank.org/ict/](http://www.worldbank.org/ict/)

<sup>10</sup> Chivhanga, Batsirai Mike, *Project Report*, Internet Studies Research Group, City University, UK 2001. <http://www soi.city.ac.uk/research/isrg/papreport.htm>

<sup>11</sup> see: Impact of Adoption - [www.idrc.ca/books/focus/807/chp04.html](http://www.idrc.ca/books/focus/807/chp04.html)

<sup>12</sup> Office of International Affairs, National Research Council, *Internet Counts: Measuring the Impacts of the Internet*, National Academy Press, Washington D.C, 1998.

<sup>13</sup> E. J. Wilson, 'The Information Revolution Comes to Africa.' CSIS Africa Notes, 185, June 1996.

based on the development goals set out in the UN Millennium Declaration. It reviews the analytical framework necessary in *impact measurement*. The study does not however provide the required quantitative analysis for presentation as empirical evidence of the impact of the Internet.

The perceived positive impact of the Internet, though not measured in terms of quantitative indicators, herein validates calls for country specific impact analysis. It is such country-specific studies that would lead to the formulation of relevant National ICT Strategies recommended in the creation of a *Development Dynamic*<sup>14</sup>.

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<sup>14</sup> Digital Opportunity Initiative Final Report, *Creating a Development Dynamic*, 2001. [www.opt-init.org](http://www.opt-init.org)

## A. Measuring the Impacts of the Internet

Studies on how to measure the impact of the Internet on human Development have resulted in several analytical frameworks or models. Some have especially been developed for impact analyses in Africa. The most notable include *Internet Counts*<sup>15</sup>, the Technology Transfer model<sup>16</sup>, IDRC and (Larry) Press models. Attempts have been made to harmonize aspects of these models in a **Conceptual Framework**<sup>17</sup>. The framework, developed by John Daly, is in part a response to the question, "what will the Internet mean for development?" "Development" in the context of the Framework refers to broad-based development goals encompassing issues such as economic growth, participatory governance systems, improvement of health and welfare, improved standards of living, reduction in poverty, and improved knowledge systems. These development goals are in line with the objectives of the UN Millennium Declaration. This paper shall therefore attempt to relate the Conceptual Framework with the impacts associated with the Millennium Declaration.

The Conceptual Framework, illustrated below, assumes a *reductionist approach* to analysis. It thus computes the overall impact of the Internet on a system as a composite aggregate of the impact on constituent subsystems. Such an approach is emphasized in other studies<sup>18</sup> on the impact of ICT in Africa and the development of a national ICT policy. The effectiveness of the Internet as an *enabler*<sup>19</sup> of national development should be determined assessing as an aggregate of the sectoral impacts.

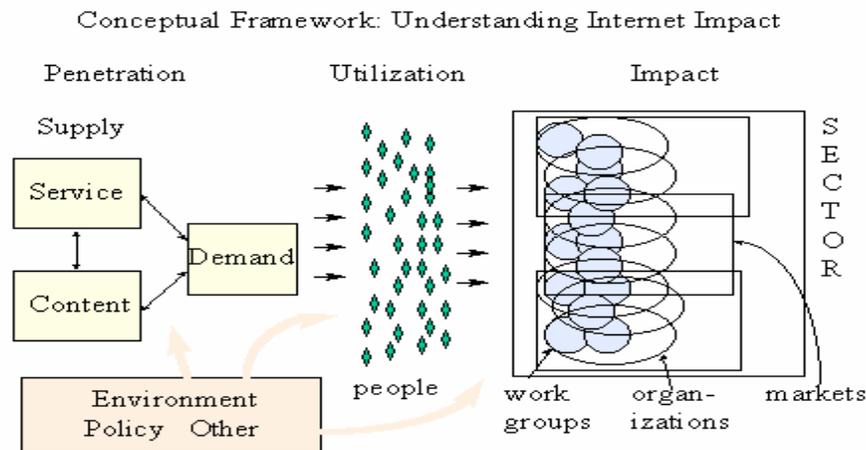


Figure 1: (See: Daly, John A. [16])

The advantage of this Framework is that it is based on the Internet Counts model that is the result of studies conducted in the African countries of Ghana, Kenya and Senegal. Other models based on studies in Europe and America would be unreliable

<sup>15</sup> Office of International Affairs, National Research Council, ***Internet Counts: Measuring the Impacts of the Internet***, National Academy Press, Washington D.C, 1998

<sup>16</sup> Daly, John A. **A CONCEPTUAL FRAMEWORK FOR THE STUDY OF THE IMPACTS OF THE INTERNET**, <http://www.bsos.umd.edu/cidcm/papers/jdaly/concept.htm>

<sup>17</sup> Daly, John A. (- ditto -)

<sup>18</sup> See: Adeya 2000; DOI 2001; Grace Jeremy 2001 & UNDP HDR 2001.

<sup>19</sup> Digital Opportunity Initiative [DOI] Final Report, *Creating an Development Dynamic*, 2001 [www.opt-init.org](http://www.opt-init.org)

due to peculiarities of the African Internet. It should however be noted that the conceptual framework should be applied after assessment of factors unique to each African country and its constituent sectors rather than universally.

The Framework considers three stages in the quantitative study of Internet impact namely, the measure of *Penetration* levels, the level of *Utilisation* and the *Impact* on subsystems. All the analysis takes into account the policy and socio-economic *Environment* of the country or region in question. The subsystems considered range from the individual, family, workgroups, sub-sectors and economic sectors of a country. The overall impact is then calculated as a *composite aggregate* of the sectoral impacts. It should be noted however that the method applied in calculating the aggregate impact is complex and thus makes the framework more relevant as a tool for qualitative analysis of small systems. The framework is best applied as a tool for qualitative analysis on a national scale.

Further, the conceptual framework assumes that the overall system can influence the way the Internet impacts on the subsystems, as in the case where a National ICT (or Internet) Strategy<sup>20</sup> would influence the diffusion and applications of the Internet in specific sectors.

The framework is critical in developing a standardized perspective of Internet impacts. A review of the Technology Transfer model that is accounted for in the framework and applied in the analysis of projects under the Leland Initiative<sup>21</sup> reveals several principles governing the way the Internet affects a socio-economic system. Three driving forces are commonly noted with respect to the economics of the Internet: technological innovation in hardware and software, economics of networks, and effects of new applications. These driving forces are based on the application of Moore's<sup>22</sup> Law, Gilder's Law and Metcalfe's Law in impact analysis. Other principles that should be taken into account include the complexity theory, efficiency theory and organisation and appropriability theories. The application of these laws should be cautiously conducted due to problems associated with causality theory or attribution of impacts to the Internet.

Moore's law states that the processing power of the transistor chip doubles every 18 months, (and this technological change in hardware drives costs down)<sup>23</sup>; Gilder's Law states that communications costs will halve and speed will double every 18 months for the foreseeable future. The latter law thus predicts the doubling<sup>24</sup> of communications power every six months, thus a bandwidth explosion due to advances in fibre-optic network technologies. On the other hand, Metcalfe's law<sup>25</sup> states that if you connect any number, "n," of computers you get "n" squared potential *value*. Thus, inherent in Internet technologies are increasing returns to

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<sup>20</sup> [see DOI]

<sup>21</sup> The Leland Initiative is a project supported by the USAID - <http://info.usaid.gov/regions/afr/leland>

<sup>22</sup> Intel, 2001, "Moore's Law, Overview" [[www.intel.com/research/silicon/mooreslaw.htm](http://www.intel.com/research/silicon/mooreslaw.htm)], February 2001.

<sup>23</sup> [See Daly]..."In 1975, it cost one million dollars for the leading computer to process one million instructions. In 1994, a personal computer could process one million instructions for forty-five dollars." Huseman, Richard C. and Jon P. Goodman, **Realm of the Red Queen: The Impact of Change on Corporate Structure, Corporate Education, and the Emergence of Knowledge Organizations**, page 7 <http://www.ec2.edu/kworld/knowledge/paper/realm.pdf>

<sup>24</sup> Gilder, George, 2000. *Telecom: How Infinite Bandwidth Will Revolutionize Our World*, New York: Free Press.

<sup>25</sup> Daly, John, 1999, A Measure of the Impact of the Internet: A Tutorial, iMP - Information Impacts Magazine, [http://www.cisp.org/imp/december\\_99/12\\_99daly.htm](http://www.cisp.org/imp/december_99/12_99daly.htm)

increasing network size. These laws have been applied in the call for further research on the potential of new technologies to spur human development<sup>26</sup>. The UNDP has put forward a case for the application of ICTs in what it calls the emerging *network age* based on the above laws. The same laws have further been applied in the recommendations by the Digital Opportunity Initiative for the creation of ICT-based Development Dynamics. An understanding of the conceptual framework is therefore necessary in the assessment of the impact of the Internet on development.

Since the dominant basis of the framework is *Internet Counts*, this paper recommends for a further study and customized application of the *Internet Counts Model*, which outlines the various types and levels of impacts and impact indicators necessary in the accurate quantitative *measurement* of effects of the Internet. In a complex adaptive system as a national economy of an African country, there will be indirect and direct, intended and unintended impacts observed. Observation of Internet impacts is only possible after a definition of the appropriate indicators. The indicators may vary depending on the development objectives under observation. A review of indicators is beyond the scope of this paper although there has been an attempt to describe the observed impacts based on the objectives of the UN Millennium Declaration.

From the foregoing review of the conceptual framework, it is apparent that it is more preferable for quantitative studies of small groups or systems as it is difficult to develop a sampling strategy or to aggregate the information collected in a larger system. The application of the framework on a national level would yield better results for qualitative studies than for quantitative analysis. This may well explain why most studies, including this paper, have tended to assume a qualitative or descriptive approach. There is therefore a need for rigorous quantitative studies on smaller systems for the development of empirical evidence in the justification of the appropriateness of Internet based development interventions in Africa.

It is through such specific quantitative and qualitative studies that African countries will develop *holistic and multi-dimensional*<sup>27</sup> strategies in Internet-based development initiatives. The Conceptual Framework provides the basis for such customized analysis.

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<sup>26</sup> UNDP HDR 2001, *Making New Technologies Work for Human Development*, July 2001. [www.undp.org](http://www.undp.org)

<sup>27</sup> Digital Opportunity Initiative [DOI] Final Report, *Creating an Development Dynamic*, 2001 [www.opt-init.org](http://www.opt-init.org)

## The Status of The African Internet

This sections reviews data on the reported levels of penetration and utilization of the Internet in Africa. It shall be seen that although Africa lags behind in the diffusion and application of the Internet, there is notable progress and that more focussed interventions will be required in developing the African Internet.

According to *The Economist*, Africa has "13% of the world's population but only 0.15 percent of international Internet connections."<sup>28</sup> A host survey by Network Wizards in 2000 shows that Africa generates only 0.4 percent of global content. Excluding South Africa, the rest of Africa generates a mere 0.02 percent of global content<sup>29</sup>.

A connectivity report on [www.NUA.ie](http://www.NUA.ie) states that an "educated guess" as to how many are online worldwide as of August 2001 is 513.41 million - as in Table 1.1. The numbers are derived 'from observing many of the published surveys over the last two years.

<b><u>World Total</u></b>	<b>513.41 million</b>
<a href="#">Africa</a>	4.15 million
<a href="#">Asia/Pacific</a>	143.99 million
<a href="#">Europe</a>	154.63 million
<a href="#">Middle East</a>	4.65million
<a href="#">Canada &amp; USA</a>	180.68 million
<a href="#">Latin America</a>	25.33 million
Table 1.0 [source: <a href="http://www.nua.ie">www.nua.ie</a> ]	

From the above figures, it is clear that although no single source is accurate, the status of the *African Internet* calls for expeditious intervention to enable the continent bridge the gap in Internet penetration and utilization. The current low Internet diffusion or penetration levels do not support significant observable impacts.

Such statistics on the numbers of computers online in Africa as measured by [Network Wizards](#) or as tabulated above, have been rendered unreliable due to two major reasons. First, the widespread use of .com and .net domains instead of the country specific domains such as '.co.za' for South Africa or '.co.ke' for Kenya. Secondly, there is also the frequent use of Network Address Translation (NAT) which allows the re-use of the same address across many computers in different networks. Some countries are thus indicated as having no connections to the Internet while the case may be that there are hundreds online on different domains. It is estimated that there are now over 1.3 million subscribers in Africa. Of these, North Africa accounts for about 250,000 and South Africa for 750,000. The remaining 50 African countries share about 300,000 subscribers. But each computer with an Internet or email connection is estimated to support between three and five users. This puts current estimates of the number of African Internet users at around 4 million in total [as indicated on Table 1.1 above], with only 1.5 million outside of South Africa.

<sup>28</sup> The Economist, November 3-9, 2001, page 106.

<sup>29</sup> Worldbank Global ICT Department, 2000 - [www.worldbank.org/ict/](http://www.worldbank.org/ict/)

It is reported that on average, there is one Internet user for every 200 people in Africa, compared to a world average of about one user for every 30 people, and a North American and European average of about one in every 3 people. It has been observed that users in the cities and towns vastly outnumber rural users. This pattern is applied in defining the rural-urban digital divide in other regions of the world according to the UNDP Human Development Report 2001. Incidentally, it is estimated that 70%<sup>30</sup> of the African population is rural, implying that majority of Africans lack access to the Internet. Such a scenario puts the marginalised population at a disadvantage and has led to claims that such *non-use* of the Internet may have negative effects.

According to a *Status Report*<sup>31</sup> published in May 2001 and supported by more recent mailing list updates from the Balancing-Act, Eritrea - the last African country to connect to the Internet - has shown rapid significant progress in the expansion (penetration) and application (utilisation) of Internet facilities. A key example is the Seawater Farms project ([www.seawaterfarms.com](http://www.seawaterfarms.com)) which within less than a year advertised products on the Internet, in collaboration with its US partner, Seaphire. This is but one of the applications of the Internet in Africa whose study may generate empirical evidence applicable to similar projects in other countries. Eritrea's entry brought all 54 African countries and territories online.

Another country that has reinforced its Internet presence is Nigeria, which, with 20% of the continent's population, has 15 active Internet Service Providers (ISPs), in a pool of upto 40 licensees. Kenya has more than 46 licensed ISPs that have continued to successfully lobby for the improvement of the policy environment for telecommunications Service Providers leading to the reduction in connectivity fees.

There are several African portals such as MailAfrica.net, offering such free web-based e-mail services similar to those of Excite, Hotmail and Yahoo. Such Africa-specific services as Mailafrica.net have registered a marked growth due to the prohibitive cost of local electronic mailbox services. In the same breath, there are web search engines specializing on Africa such as Orientation Africa - <http://af.orientation.com/> and Woyaa - <http://www.woyaa.com/>.

There is also a rapidly growth in public Internet access centers such as Internet kiosks, cybercafes and internet services in hotels, schools, business centers, police stations and clinics. The public access service is common since institutions and individuals can share the cost of equipment and access amongst a larger number of users. Organizations such as the Kenya Information Society (KIS) have set-up community access centers for marginalised communities based on the same principle. Africa Online, the largest ISP in the continent, offers similar services through the e-Touch franchise programme in which local stores are provided with computers to offer email and Internet access.

According to the report, the projects focussed on development are by regional intergovernmental agencies and international organizations such as the United States Agency for International Development (USAID) Leland Initiative. The report further outlines future projects by organizations such as IDRC, SADC and various UN Agencies.

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<sup>30</sup> Mamadou Keita, PATU [Pan-African Telecommunications Union] Secretary General in ***Getting Africa Connected***, Tele.com magazine, July / August 1999.

<sup>31</sup> Mike Jensen, **The African Internet - A Status Report**, May 2001 - <http://www3.sn.apc.org/africa/afstat.htm>

The development of local content is seen in the fact that [ACMAD](#), [ADB](#), [CEDEAO](#), [COMESA](#), [ECA](#), and [IGAD](#) have built web sites with a substantial amount of information on their activities and their member states. Many African countries lack local content except in cases where the websites are applied in research<sup>32</sup>, such as by the [CGIAR](#) and news services.

During the African Computing & Telecommunications (ACT) Summit<sup>33</sup> in Pretoria in August 2001, delegates at the Africa ISP Forum agreed to develop collaborative mechanisms and practices in order to optimise international bandwidth utilisation and work together to develop the Internet in their countries. Such an objective will only be possible if African governments develop an enabling policy environment based on proven policy models<sup>34</sup>.

It has been observed that more than 40% of all African ISPs rely on satellite links. Growth in the use of VSAT (Very small Aperture Satellite) is due to the bandwidth advantages in that the satellite can transmit and receive a greater capacity of data faster than fixed-line telephone systems. This has led to a lobby by African ISPs for policies that permit unlimited access to VSAT services. Satellite service providers have as a result increased in most of Africa leading to higher bandwidths and service quality.

As seen from the foregoing review, this paper relies on the impact of a very scarce and insufficiently documented resource in its analysis. It will be seen that even with the low connectivity and content levels, the African Internet has had observable far-reaching results across the continent.

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<sup>32</sup> Internet Studies Research Group, **Project Report**, Department of Information Science, City University, UK, 2001. <http://www.soi.city.ac.uk/research/isrg/papreport.htm>

<sup>33</sup> Africa IT Exhibitions and Conferences (AITEC), [www.aitecafrica.com](http://www.aitecafrica.com).

<sup>34</sup> Mugo Macharia, Policy models that work and Africa ignores at its peril (Mr. Macharia is a Policy Analyst, Communications Policy & Practice, USA)

## The Internet and Human Development

It is noteworthy that in this paper and in many others, researchers are cautious in their reference of the implications of Internet technology on development. In some cases, it is cautiously referred to as *likely impact*<sup>35</sup> because many attempts to analyze the implications of ICTs for Africa have tended to be based on a prior reasoning about the nature and expected impacts of the technologies and the skills needed to use them effectively<sup>36</sup>.

The cautious reference to the impact of ICTs is because the causal relationship is complex. Such complexity is based on the fact that impact of ICTs depends on users' attitudes and expectations, as well as on institutions' organization and management. It is also claimed that the *inherent characteristics*<sup>37</sup> of ICTs make it a potential *enabler* with far-reaching development implications. From the Conceptual Framework studied in the preceding section, the causal relationship remains elusive in such a complex adaptive system. The ICTs such as Internet technology operate differently and have unique effects based on the manner in which they are used and the *environment* in which they are applied.

The characteristics inherent in ICTs and, by extension, the Internet are based on the laws and principles reviewed earlier under the Conceptual Framework. The socio-economic impact of the Internet is based on the principles of network economics and the efficiency gains. The impact of adoption has however been simplified as being due to its capacity to improve communication and the exchange (sharing) of information to strengthen and create new economic and social networks (DOI, Jeremy Grace and UNDP HDR).

It has been argued that the technologically marginalised are also the income poor. This means that they cannot on their own acquire the tools necessary to escape<sup>38</sup> poverty and the related information poverty. This relationship has led to calls for focussed deliberate intervention to complement the role of the market as an engine of technological advancement<sup>39</sup>.

The need for intervention suggests that ICTs in themselves can only be useful as a tool. In counties with high levels of penetration, Internet utilisation is expected to be high and thus greater impact levels. Such Internet use cannot be isolated since other factors of socio-economic development must be taken into account. The inherent potential of the Internet, if not appropriately tapped, will result in loss of opportunity.

The Internet can thus be considered a potential enabler or catalyst for the strengthening of development initiatives. There exists anecdotal evidence that the Internet is good for development. However, the impact of the Internet in one system (see Conceptual Framework) does not translate into a guarantee of positive impact in another.

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<sup>35</sup> Grace, Jeremy, et. al., 2001, Technology and Broadbased Development: A Partial Review of evidence, The World Bank, February 2001. [www.worldbank.org/ict/](http://www.worldbank.org/ict/)

<sup>36</sup> Adeya, Catherine N., Information and Communication Technologies in Africa: A Review and Selective Annotated Bibliography 1990-2000, INASP, 2001. [www.inasp.org.uk/pubs/ict/section1.html](http://www.inasp.org.uk/pubs/ict/section1.html)

<sup>37</sup> Digital Opportunity Initiative [DOI] Final Report, *Creating an Development Dynamic*, 2001 [www.opt-init.org](http://www.opt-init.org)

<sup>38</sup> Kenny, Charles, et. al., 2001, ICT and Poverty, The World Bank, [www.worldbank.org/ict/](http://www.worldbank.org/ict/)

<sup>39</sup> UNDP HDR 2001 – [www.undp.org](http://www.undp.org)

Internet-based development initiatives call rigorous R&D prior to implementation and impact analysis during an after project implementation. This will help to formulate initiatives that appreciate multi-disciplinary issues based on complementary qualitative and quantitative techniques.

There is thus a clear need for capacity building for the effective adoption and evaluation of the Internet. This shall ensure that the African Internet impacts positively on the human development through out the continent.

From Mozambique to the Gambia and from Kenya to South Africa, there is anecdotal evidence that the African Internet has had both positive and negative impacts on human development. His evidence is reviewed in the sections under Winners and Losers, respectively.

## B. THE WINNERS

This section of the paper reviews anecdotal evidence of the positive impacts of ICTs in Africa under the five key areas identified by the UN Millennium Summit as development imperatives.

### 1. Health.

Across Africa, the Internet is being used in Telemedicine, monitoring disease outbreaks, reporting and publications. Telemedicine is the process that uses ICTs to transmit medical images, records, and diagnoses to remote locations in order to overcome shortages in regional health-care providers. Telemedicine technologies include Internet related applications such E-mail, satellite transmissions, audio-visual conferencing, and radiotelephony. We shall review some key areas of application.

#### **HealthNet** - [www.healthnet.org](http://www.healthnet.org)

HealthNet is a system of local telecommunications sites used to provide low cost access to healthcare information in developing countries through e-mail. About 19,500 health care workers in more than 150 countries use the system worldwide. Physicians and medical workers connect to the network through local telephone nodes to access services such as physician collaborations, medical databases, consultation and referral scheduling, epidemic alerts, medical libraries, email and shared research reporting databases. HealthNet is provided by a non-profit organization, SatelLife, with assistance from local and international donors.

**Consultations:** In Mozambique, Tanzania and Uganda surgeons use HealthNet to consult on patient treatments and learn new re-constructive surgery techniques.

**Data transmission:** In Zambia, healthcare workers who once traveled 700 kilometers each week to collect data for clinical trials now use HealthNet to send this information via email. A similar implementation is applied in West Africa, where malaria researchers use the system to submit data for clinical trials conducted at tropical disease research facilities in London and Geneva.

**Appointment Scheduling:** In Ethiopia, physicians use the network to schedule consultations, making it unnecessary for ill patients to travel long distances with no guarantee of seeing a physician.

**Telemedicine:** In the Gambia, nurses on a remote island river use digital cameras and laptops to photograph visible symptoms that they cannot recognize and/or treat. The images are transferred to a physician in Banjul<sup>40</sup> who either prescribes a treatment or forwards the images via e-mail to a company in the UK which can access specialists around the world and report back findings. The same model is being applied to facilitate collaboration among physicians themselves. The application of ICT-intervention in healthcare extends to consultations between experts and medical research.

We now review some disease-specific interventions:

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<sup>40</sup> Grace, Jeremy, et al., 2001, [Technology and Broadbased Development: A partial Review of evidence](http://www.worldbank.org/ict/), The World Bank, February 2001. [www.worldbank.org/ict/](http://www.worldbank.org/ict/)

**Trypanosomiasis:** In the Democratic Republic of Congo, health workers use HealthNet to report progress via e-mail on treating trypanosomiasis to public health organizations in the north of the country.

**Meningitis:** The WHO – [www.who.org](http://www.who.org) has implemented an electronic system to report daily cases of meningitis in sub-Saharan Africa to monitor emerging epidemics. When threshold levels are reached, mass vaccination is required and the Internet is used to rapidly mobilize medical personnel and effectively coordinate laboratories and specialist services. The system provides reliable information to public health officers and professional vaccination teams in the field thus reducing the loss of life from tropical diseases and epidemics.

**Malaria:** One of the continents most pervasive health concerns is malaria. In response, a project in the Republic of South Africa on Mapping Malaria Risk (<http://www.mara.org.za>) collects data on malaria risk and resistance patterns from five regional centers and produces outputs that allow healthcare practitioners and researchers to better treat and study the disease. In a similar application in the Gambia, malaria researchers use HealthNet to submit data to European medical schools for clinical trials.

The impact of the MARA project has been to allow for the development of effective control measures based on regional transmission patterns. This also allows for focus on critical areas and serves as a model for the study and control of other disease.

**HIV-AIDS:** Many physicians in developing countries rely on HealthNet [www.healthnet.org](http://www.healthnet.org) as their sole source of information on the treatment of AIDS and tropical diseases, essential drugs, pediatrics and public health promotion. Related Initiatives in the war against HIV/ AIDS include [www.africaalive.com](http://www.africaalive.com) and the Digital Media Service (DMS) by the WorldSpace Foundation on [www.worldspace.org](http://www.worldspace.org). The DMS service is a satellite broadcast service that provides select text and graphics web-content on among other issues HIV/AIDS to marginalised populations. These services have improved access to relevant data for research in health and disease prevention and treatment in Africa.

**RESCURE Project:** Experts in Africans are experimenting with a wide variety of other ICTs in health service delivery such as the **RESCURE Project** in Uganda on [www.iicd.org](http://www.iicd.org).

**Summary:** As is evident from the foregoing review, Internet-based interventions in health range from linking rural providers to the Internet, using satellites to transmit information (often between continents), automating surveillance, extending of coverage and reduction of communication costs. There are several concerns on the relevance and impact of ICT-based intervention. These include quantitative analyses of the impact and the cost efficiency of Internet-based interventions. As a result, best practices in this area are largely anecdotal. There is thus a need for more rigorous studies to ensure that Internet-based interventions are justified<sup>41</sup>.

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<sup>41</sup> Grace, Jeremy, et al., 2001, *Technology and Broadbased Development: A partial Review of evidence*, The World Bank, February 2001. [www.worldbank.org/ict/](http://www.worldbank.org/ict/)

## 2. Economic opportunity.

At the Millenium Summit, world governments committed themselves "to decrease by 50 percent the proportion of people in extreme poverty by 2015 (1990 baseline)"<sup>42</sup> thus making poverty eradication a priority. The issue of income poverty is hereafter examined in relation to the economic opportunity and equity availed by the Internet to African countries.

The technological and economic change underlying this transformation of the global communications network offers great opportunities for less-developed economies and for poverty reduction. The impact may be either indirect or direct. Indirectly, the Internet is applied in the promotion of exports of goods and services. This is achieved through improving the function of markets and increasing the quality and efficiency of government services. The direct impact by allowing the poor to access markets, to demand services, to receive education, and to learn new skills. The following is a review of the impact of some key implementations.

**Naushad Trading Company**, <http://www.ntclimited.com>: The Naushad Trading Company in Kenya, sells local wood-carvings, pottery, and baskets and has seen revenue growth from US\$ 10,000 to over US\$ 2 million in the two years since it went on-line<sup>43</sup>. Consumers and shopkeepers can constantly access updated color pictures of NTCLimited's product line, place orders, and make inquiries of other types of handicrafts. A similar implementation underdevelopment is **The Made in Kenya Network**, [www.made-in-kenya.net](http://www.made-in-kenya.net) which aims at networking Kenyan personalities, manufacturers and tourism organizations in a promotion campaign for Kenyan products, destinations and personalities locally and in the Diaspora. Many other African craft makers are selling their wares in the world-wide web, supported by NGOs such as PeopleLink<sup>44</sup>.

**PeopLINK**, <http://www.peoplink.org> is a not-for-profit organization that provides developing country artisans and handicraft manufacturers with digital cameras and displays their products on its web site. PeopLINK also handles orders at its central headquarters, which provides artisans with an international customer base, eliminates middlemen, and results in increased sales and profits to the manufacturers.

**In Tanzania**<sup>45</sup>, there are attempts at a transition from an agriculture-based economy to a knowledge-based economy involving policy and infrastructural changes. Emphasis on internet provision to secondary cities and rural areas has resulted in a number of ISPs offering Internet trading to farmers and other businesses to sell their products around the world.

**In Morocco**, a local Internet service provider has won a contract to digitize the paper archives of the National Library of France. They are scanned in France and sent by satellite link to Rabat where keyboard operators edit them. This project demonstrates the role of the Internet in overcoming regional and continental barriers to economic opportunity.

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<sup>42</sup> United Nations. 2000. United Nations Millennium Declaration. <http://www.un.org/millennium/declaration>

<sup>43</sup> Charles Kenny, et al., 2001, **ICTs and Poverty**, WorldBank, 2001.

<sup>44</sup> Mike Jensen, 2001, **Afriboxes, Telecentres, Cafes: ICT Africa**.

<sup>45</sup> Digital Opportunity Initiative [DOI] Final Report, *Creating an Development Dynamic*, 2001 [www.opt-init.org](http://www.opt-init.org)

**In Togo and Mauritius**<sup>46</sup> call centers now provide telephone support services for international companies with customers in Europe and North America. Callers don't realize they're calling Mauritius or Togo. They pick up the phone, dial a local number and are routed through to one of these countries, where operators provide the support that they require. This Internet-based project has offered employment to the people of Togo and Mauritius who would have otherwise been forced to migrate to the respective countries in Europe and North America.

**In Cape Verde** "virtual security guards"<sup>47</sup> have found jobs using the Internet to monitor webcams in office parks on the East Coast of the US. They notify local rapid response teams there if they see anything amiss.

**In Kenya**, the Wikyo Akala Project – [www.ecosandals.com](http://www.ecosandals.com) – 'seeks to train young adults in a marketable skill, provide a basic education, and then provide that young adult with a job that integrates them into the world market'. The project recruits sandal-makers from the Korogocho slum dumping grounds in Nairobi who is then trained in sandal making, computing, and other academic skills. The project thus facilitates the removal of the young adults from unstable street environments and into a structured program engaging in global electronic commerce and communication. Other project aspects benefiting from Internet-based invention are the production of the Korogocho Times and the project's daily response to customers worldwide – [www.agoakenya.com](http://www.agoakenya.com).

**Global Technology Network - GTN** - <http://www.usgtn.org> – is a USAID project designed to facilitate the creation of strategic alliances between African firms and those in the USA. By matching U.S. technology firms with potential joint-venture partners located in the developing world and assisting in technology transfer, the GTN enables Africa firms to achieve sustainable development using American technology and services. In Kenya, the project is involved in the implementation of the African Growth and Opportunity Act [AGOA], thus empowering Kenyan manufacturers of the relevant export product.

**Summary:** There is a variety of ways through which the Internet is being applied in bridging the economic opportunity gap between the technologically marginalised and the information affluent segments of society. The positive impact of focussed micro-economic application of the Internet, when viewed in light of the *Conceptual Framework*, portends far-reaching macro-economic implications.

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<sup>46</sup> Mike Jensen, 2001, **Afriboxes, Telecentres, Cafes: ICT Africa.**

<sup>47</sup> (Ditto).

### 3. Empowerment and participation.

Public participation, citizen and gender empowerment is significant aspects of good governance. Improved government service provision is reliant on information flows. Participation in governance also requires information technology – ICTs allow the voices of the poor to be heard. Quantifiable benefits in sectors such as education, health-care, and environmental preservation exist outside Africa. We shall review some of the related cases in Africa.

**Kenya Elections 2002** website – [www.nationaudio.com/elections](http://www.nationaudio.com/elections) – as an initiative of the Nation Media Group in Kenya, offers both historical and up-to-date information on Kenya’s political election landscape. The website offers Kenyans worldwide with the opportunity to participate in online polls on election issues, access data for information or political research. It has given Kenyans in the Diaspora an opportunity to take part in politics back home.

**SANGONet** - [www.sn.apc.org/sangonet](http://www.sn.apc.org/sangonet) - is an electronic information and communications network for development and human rights workers in Southern Africa. It provides relevant information to people working on development issues by allowing them to communicate with each other on its website, and by building capacity in electronic communications within non-governmental, community-based, government and private sector organizations. SANGONet’s priorities include open government, ICT, education, health, economy, labor, women, human rights and the environment. SANGONet is a member of the non-profit Association for Progressive Communications (APC). SANGONet empowers people and organizations to make decisions based on relevant information. Small to medium-sized organizations which face a lack of ICT skills, are taking advantage of SANGONet's low cost support services and training programs to improve their internal capabilities and operations.

In Tanzania, the NGO **EcoNews** ([www.econews.org](http://www.econews.org)) developed a website focused on the plight of mostly illiterate Maasai farmers who were threatened with eviction from their traditional pasturelands by a change in management planning at the local government level. By making the farmers’ case on the World Wide Web and networking with international NGOs, EcoNews was able to bring international attention to the problem, which caused donor governments to raise the issue with Tanzanian officials leading to the withdrawal of the plan.

In Kenya, **LawAfrica** - [www.lawafrica.com](http://www.lawafrica.com) – has developed an internet portal for the legal fraternity which provides access to legal documents, The Kenya Gazette, a Directory of Legal Practitioners, Case notes, employment vacancy announcements and publications such as The Online Advocate. The impact has been the provision of legal data to the public, the networking of legal practitioners in East Africa with assistance from the Law Society of Kenya [[www.lsk.or.ke](http://www.lsk.or.ke)] and provision of a forum for Law students in Kenya. The website offers access to the Constitution Review Commission of Kenya (CRCK) website on [www.kenyaconstitution.org](http://www.kenyaconstitution.org) which provides on the constitutional review process.

**WEDNET** on [www.apc.org](http://www.apc.org): The first operational activities associating gender and ICTs appeared in 1995 in Africa. Other implementations include the Association for Progressive Communications (APC) women's networking programme, the Women's Environmental and Development Network (WEDNET), and a women's information and communication network on the South African SANGONet – **WomensNet** – [www.womensnet.org](http://www.womensnet.org). This has been in response to a UNECA – Padis survey of

African users that found that only 14, 17, and 16 percent of Internet users in Ethiopia, Senegal, and Zambia, respectively, were female. The impact has been in improved networking for African women although language remains a barrier for mostly, women in francophone countries.

**The Kenyan Community Abroad [KCA]** - [www.kenyansabroad.org](http://www.kenyansabroad.org) has applied the Internet in networking Kenyan citizens in the Diaspora in order to improve communication and participation in governance issues back in Kenya. A website and several discussion groups allow for improved information flows, access to Kenyan publications and discussions on matters ranging from telecommunications liberalization to campaigns for the legalization of dual-citizenship.

**The Internet and Culture:** Since language is a major aspect of African culture, there have been initiatives aimed at promoting the use of African languages on the Internet. The pioneering example is by a Kenyan ISP MailAfrica.net on [www.mailafrica.net](http://www.mailafrica.net) followed by SwiftGlobal [www.swiftglobal.com](http://www.swiftglobal.com). The two have encouraged the application of African dialects on the Internet in an attempt to remove the language barrier on the Internet by providing an interface in African languages. The resultant effect has been the growth in communication in local dialects especially in Kenya.

Bringing diverse cultural traditions to a global audience through the (Internet) can act to raise awareness of national traditions that would otherwise remain inaccessible. There have been calls for African countries to ensure that the adoption of these technologies does not destroy their cultural heritage. Dr. Catherine Adeya of the Institute for New Technologies (INTECH) has claimed that 'ICTs could, in fact, have a positive impact on the cultural renaissance of Africa, by increasing the flow of information about its cultural heritage within the continent and the Diaspora, particularly for the future generations'<sup>48</sup>.

**Summary:** The African Internet has enabled better civic participation and gender empowerment. There is also a cultural dimension in Africa in cases where it is being applied towards the preservation of cultural heritage of African communities. It is on this latter premise that The Made in Kenya Network - [www.made-in-kenya.net](http://www.made-in-kenya.net) - intends to promote economic growth alongside Kenya's rich cultural heritage through its website.

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<sup>48</sup> Adeya, Catherine N., *Information and Communication Technologies in Africa: A Review and Selective Annotated Bibliography 1990-2000*, INASP, 2001. [www.inasp.org.uk/pubs/ict/section1.html](http://www.inasp.org.uk/pubs/ict/section1.html)

## 4. Education.

Delegates at the Millennium Summit resolved to “achieve universal access and completion of primary education by 2015 (baseline 1990)”. The observed impact of the Internet in fostering the achievement of this objective for Africa is assessed hereafter.

As UNESCO notes, “assessing the cost-effectiveness of ICT in education is difficult, if not impossible, for at least four reasons – lack of meaningful data, variability in the implementation of ICTs, difficulty in generalizing from specific programs, and difficulty in assessing the value of qualitative educational differences.” The effectiveness of “Virtual Classrooms<sup>49</sup>” and the benefits of Internet access on educational achievement are more difficult to measure. These programs have emerged only recently and systematic evaluations are rare. As a result, the role of the Internet in elimination of illiteracy and improvement of distance education shall be assessed based on anecdotal evidence.

**The University of South Africa (UNISA)** - [www.unisa.co.za](http://www.unisa.co.za) – provides educational programs via the Internet and online classrooms, video and audio lectures and correspondence instruction. Students can also access UNISA's well-equipped library over the Internet.

UNISA's distance learning programs provide education to over 120,000 students per annum, mostly from Africa and other developing countries. This has resulted in savings to students who pay upto 80 percent less than those of residential universities. The programs allow students to obtain higher education at their own pace while they work to support their families. The organization provides professional employment opportunities within South Africa to 3,000 staff members including academic, administration and support staff.

**In the Gambia**, a project dubbed *Resurrecting the Dinosaur* - [www.geocities.com/sohclara](http://www.geocities.com/sohclara) – strives to create a recycling network for computers and forming a network of skilled IT professionals in the Gambia. Based on the idea that “one man’s trash is another man’s treasure”, the project was initially focused on providing computer equipment to Gambian Schools through donations. However, it moved further to integrate the computers into the school curriculum and foster an entire generation of Gambians who would be computer literate. The rural people were trained to communicate with each other through E-mail and to access troubleshooting information over the Internet. Thus the project applied the Internet in education and in ensuring some degree of project sustainability as the local community could carry out equipment maintenance.

**SchoolNet SA** (<http://www.school.za>) is an organization established in November 1997 to assist all South Africans in preparing for the information society. It assists in the development of a national educational network that forms the ‘knowledge backbone’ of the country’s information highway. The objective is to transform from an industrial model to a knowledge-based model and thereby making South Africa globally competitive. SchoolNet has created awareness of the use of ICT in education through press articles, conferences and seminars, electronic media and the Internet.

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<sup>49</sup> John A. Daly, [The Implications for Africa of U.S. Experience in Information and Communication Technologies and Higher Education.](#) (A Draft paper for the UNECA meeting in 2001) obtained from the author through direct correspondence).

It also lobbies for and advocates the utilisation of ICTs such as the Internet in education at all levels of government, business and civil society<sup>50</sup>. In an attempt to translate the gains a continental plane, the African Development Forum (ADF' 99), representatives of African youth proposed a 'SchoolNet', a continent-wide initiative, to drive developments of ICT for youth in individual countries<sup>51</sup>. The Schoolnet initiative has resulted in improved access to educational information and improved communication between institutions.

**African Virtual University [AVU]** [www.avu.org](http://www.avu.org), at the Kenyatta University in Kenya, is meeting the demands for skilled and knowledgeable workers through the application of the Internet in skills transfer. It is a continent-wide network of universities that have joined with the World Bank to bring courses in computer science and business management to African students and professionals. The Kenyan center works with the New Jersey Institute of Technology [NJIT] thus providing an e-learning experience to African students in the specified areas of training. This is achieved through a satellite link for telecast of lectures and through the access of training material from the Internet. This results in improved accessibility to high quality education as well as employment opportunities due to higher education. Travel and overhead expenses for students in remote locations are also reduced.

**SUMMARY:** Although the Internet has had positive impact on education, several issues have led to calls for R&D and cautious project implementation. Initially, there needs to be more research<sup>52</sup> on education and training issues, as the development of human capital is crucial if African countries are to be competitive in the global information society.

It has been argued that although it is important to strengthen ICT capacities in African Institutions, care should be taken not to lose the skilled labour through brain drain. That brain drain might be traditional, or increasingly it might be "virtual brain drain" as in the case of online volunteers and virtual workers. Such a scenario would result in the loss of the resources necessary in the use of Internet technology to increase productivity.

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<sup>50</sup> Butcher, N. (April 1998) The Possibilities and Pitfalls of Harnessing ICTs to Accelerate Social Development: A South African Perspective. SAIDE: Johannesburg

<sup>51</sup> By Lewis Machipisa, 1999, DEVELOPMENT-AFRICA: Youth Demand Access to Information Technology. IPS-World News, [http://www.oneworld.org/ips2/oct99/19\\_09\\_090.html](http://www.oneworld.org/ips2/oct99/19_09_090.html)

<sup>52</sup> Adeya, Catherine N., Information and Communication Technologies in Africa: A Review and Selective Annotated Bibliography 1990-2000, INASP, 2001. [www.inasp.org.uk/pubs/ict/section1.html](http://www.inasp.org.uk/pubs/ict/section1.html)

## 5. Environment.

The Millennium Summit resolved that “all countries to be implementing a current national strategy for sustainable (environmental) development by 2005”. The relationship of the Internet with this development objective is difficult to appreciate unless one takes into account the prevailing global environmental issues. Major global environmental concern is the *climate change* phenomenon or global warming and the depletion of non-renewable natural resources.

ICTs can contribute to environmental stewardship through environmental information sharing between researchers, government agencies and NGOs, as inherently an energy efficient component of economic activity and in citizen empowerment is through information networks for capacity building. We shall review some of the notable initiatives.

**E-Law** (<http://www.elaw.org>) is an Internet-based NGO that facilitates the development and practice of public interest environmental law. National and local environmental advocates such as RECONCILE (Resource Conflict International) in Kenya use the E-LAW network to exchange legal, scientific and technical information, as well as ideas, precedents, and strategies in support of environmental preservation.

**In Ghana**, environmental decisions have been hampered by limited and scattered data. A new Environmental Information Network [EIN] has helped link key institutions. Despite a steep learning curve, it has brought faster and greater information to improve the process of environmental decision making<sup>53</sup>.

**In Kenya**, the East African Wildlife Society – [www.eawls.org](http://www.eawls.org) - launched a campaign for protection of Kenyan Forests by seeking to counter a forest excision plan of the Kenyan government. The ongoing campaign has been soliciting support from citizens through the organization’s website, e-mail-based support to complement the media campaign. This has resulted in increased awareness and participation by Kenyans worldwide who readily forward the campaign e-mails to others. The project is optimistic that the campaign will result in the withdrawal of the government’s excision plan.

**Climate-L:** The Climate Change Network ([www.ccn.org](http://www.ccn.org)) mailing list is an Internet based mailing list that provides up-to-date data on climate change issues and conferences. This allows for awareness and participation in global warming and other climate issues. Although this initiative is not unique to Africa, the data

**Africa-bio:** ([www.africabio.org](http://www.africabio.org)) is an Internet based journal on biotechnology in Africa. The initiative provides data for bio-policy and environmental policy researchers. It is a useful tool for capacity building on issues of biotechnology and the environment in Africa as it acts as a clearing house and portal for Africa’s biotechnology community.

**Food Security:** Other evidence of the impact of the Internet on the environment, food security and rural development is outlined in “ICTs, Rural Development and Food Security” on [www.fao.org/sd/cddirect/cdre0055b.htm](http://www.fao.org/sd/cddirect/cdre0055b.htm).

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<sup>53</sup> Russell Southwood, The BalancingAct-Africa, UK. [www.balancingact-africa.org.uk](http://www.balancingact-africa.org.uk)

**UNFCCC:** ([www.unfccc.org](http://www.unfccc.org)) The UN Framework Convention on Climate Change website has specific information on Africa's environment in the context of such global initiatives as the Kyoto Protocol. There is a programme known as CC:Train based on [www.unitar.org](http://www.unitar.org). UNITAR and the Climate Change Secretariat (UNFCCC) established it jointly in 1993 in order to directly address the problems developing countries face in managing climate change issues. The section of the website specific to CC:Train<sup>54</sup> provides training material for capacity building in LDCs (Least Developed Countries). Distance learning and workshops have improved the capacity of African policy makers to address climate change issues and apply ICTs towards that objective.

**Summary:** The Internet is thus being applied in combating climate change, which has been termed as 'the greatest challenge that (the current) generation will have to face<sup>55</sup>'. The main applications are in improving awareness, capacity building and in research on environmental issues. Some lobby groups, such as EcoNews – [www.econews.org](http://www.econews.org) - have used the Internet in addressing environmental issues.

Although the data addressed in this case may be sparse, there is an appreciable positive impact of the Internet on the objectives of the initiatives reviewed.

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<sup>54</sup> Report of the Executive Director of the United Nations Institute for Training and Research, General Assembly Official Records, Fifty-fifth session, Supplement No.14 (A/55/14), United Nations, New York, 2000 (reportga.doc on [www.unitar.org](http://www.unitar.org))

<sup>55</sup> Kofi Annan, UN Secretary General, "CONTAINING CLIMATE CHANGE: A GLOBAL CHALLENGE" Medford, Massachusetts, 20 May 2001 (Commencement speech at Fletcher School of Law and Diplomacy, Tufts University) – [www.fletcher.tufts.edu](http://www.fletcher.tufts.edu)

## C. THE LOSERS

As is the case with every technology, the Internet can have either positive or negative impacts depending on how it is applied. The negative impacts may result from non-use or from indirect unintended effects. As seen earlier, the elements at play in a complex adaptive system may give rise to random effects within small systems, which may have a ripple effect on the larger system. This section reviews cases in which negative implications have been observed and those perceived as losers on the African Internet.

It has been argued that over-reliance on anecdotal evidence as justification for ICT projects can lead to poorly designed programs and haphazard implementation schemes that do not account for local conditions. Such projects would fail to meet their objectives or may even harm the welfare of supposed beneficiaries. This aspect is evident from the Conceptual Framework and Technology Transfer model and has led to calls by the DOI for rigorous R&D prior to implementation.

**In the Republic of South Africa,** approximately 25 percent of ICT-skilled workers leave the country each year (DOI 2001); meanwhile demand is growing at 40 percent per annum. Thus the employment opportunity provided under the South Africa IT Strategy Project (SAITIS) is being applied in other countries where the environment is more attractive to these highly skilled IT workers – a form of brain drain. Some of the workers lost are Internet experts who migrate to implement systems in Europe and North America.

**Virtual Brain Drain:** There are several initiatives in Africa, which have resulted in loss of the skilled labour through 'virtual' brain drain. These include cases where online volunteers and virtual workers have offered their skills to organizations overseas instead of in the local projects. Although online workers<sup>56</sup> benefit in terms of employment, their countries lose their advanced research and technical skills.

**Opportunity costs:** Investments in ICTs inevitably result in opportunity costs as they divert investment from other developmental needs and priorities. This scenario is acknowledged in the Human Development Report 2001 in which calls are made for the adoption for customized and well-researched solutions. Nations that divert funds to Internet initiatives without adequate planning may lose

**Poor Implementation:** One study estimates that up to 80% of public sector IT applications (such as the Internet) result either in partial or total failure (Heeks, 1999a, 1999b). Although the study was based on other nations in the developing world, the figure suggests that the implementation of Internet-based initiatives by governments has applied flawed methods. Such losers fail to realize that ICTs are not a panacea but a tool for implementing development solutions.

**Organisation Theory:** As seen earlier, Internet impacts depend on factors including organisation structure and efficiency. The large inefficient public sectors in Africa hinder the effective implementation of Internet-based initiatives. This is because ICT uptake in the public sector has to contend with political patronage and bureaucratic administrative cultures that place a premium on information control as a source of

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<sup>56</sup> see "virtual security guards" under section 2. [Economic Opportunity](#) (Winners)

power. Such systems are inherently biased towards secrecy and result in poor project implementation or information deficiencies where initiatives are completed.

**Women:** Gender is a critical factor in the assessment of the level of human development in a country. On the African Internet, women are the perceived losers as users are predominantly male. A study in 1998 by Capacity Building for Electronic Communication in Africa<sup>57</sup> that 86, 83, and 64 percent of Internet users in Ethiopia, Senegal, and Zambia, respectively, were male. A similar gender-based digital divide is suggested in the UNDP HDR 2001. Therefore, African women should be equipped with the necessary skills for utilization of ICTs so as to improve on the positive impacts of the Internet.

**Illiteracy:** The role of the Internet in fighting illiteracy is hindered on one hand by conventional illiteracy and by computer illiteracy on the other. As a result, the illiterate is at a disadvantage in the utilisation of the Internet unless specific solutions are formulated. The CABECA<sup>58</sup> 1998 study found that 87 percent of Zimbabwean and 98 percent of Ethiopian Internet users had a university degree. As a result, Africans with low or no formal education are losers on the African Internet.

**Rural-Urban Divide:** There was a 100 to 1 ratio in 1998 between homes in urban South Africa with private telephone access<sup>59</sup> compared with those in rural areas. This lack of telecommunication facilities in most rural areas in Africa places the income poor rural communities at risk of further marginalisation in relation to the urban population. The relative scarcity amongst these rural areas suggests the possibility of greater inequality within the rural community. To reinforce this view is the Intermediate Technology Development Group (ITDG)<sup>60</sup> assessment on ICT stating that, the development of a 'global information society' threatens to "create a new divide between the 'information rich' and 'information poor' people of the world". The threat is compounded "as poorer and marginalised people in developing countries are excluded from the benefits of new communication technologies". The capacity of the Internet to empower, if not equitably deployed, will continue to spur the digital and income divide faster.

**African Culture:** The Africa Internet lacks the relevant local content especially in local dialects and cultural heritage<sup>61</sup>. Since the dominant language is English, this places francophone and other dialects at a disadvantage in Internet communications. There are, however, initiatives that have come up to counter the potentially negative 'cultural baggage' embodied in the transfer of Internet technology.

**Summary:** To minimise the losses due to adoption of the Internet, governments, the private sector and civil society should foster universal access, capacity, financial systems and R&D through a favourable policy framework. This calls for customized adoption of recommendations by the UNDP HDR 2001 and DOI in Creating a Development Dynamic through holistic National ICT strategies.

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<sup>57</sup> see Grace, Jeremy.

<sup>58</sup> - ditto -.

<sup>59</sup> CABECA 1998 study in Grace, Jeremy.

<sup>60</sup> ICT on [www.itdg.org.uk](http://www.itdg.org.uk)

<sup>61</sup> Internet Studies Research Group, **Project Report**, Department of Information Science, City University, UK, 2001. <http://www.soi.city.ac.uk/research/isrg/papreport.htm>

## **CONCLUSION: The Internet and Development Dynamics in Africa**

It is clear from the balance of this paper that if appropriately deployed in an enabling environment, the Internet can be a critical tool in achieving developmental goals in Africa. This finding is in line with recommendations for the creation of ICT-enabled socio-economic networks or development dynamics as a spur for development.

There is also evidence that the adoption of the Internet must be based on original technological solutions developed through multi-disciplinary R&D appreciative of the socio-economic circumstances of the African people and societies. The network model and development dynamic recommended by the UNDP and DOI respectively, should act only as guidelines for the development of country-specific solutions.

A country's overall development strategy should form the basis of its unique development dynamic or national ICT strategy. Technology such as the Internet should be applied only as a tool in the achievement of a country's developmental goals. This paper addresses the generalized development objectives of UN member states in Africa but calls for evaluation based on more specific goals under the categories reviewed.

One of the principle issues on the minds of African policy makers should be how to balance capacity building and economic opportunity in order to counter brain drain. The other should be an issue of balance between technology and preservation of cultural heritage since technology transfer embodies some degree of culture. The third consideration should be in the adoption of customized strategies within different socio-economic sectors while retaining contextual reference to the National strategy.

With the above consideration of the factors necessary in the effective adoption of the Internet, this paper recommends continued qualitative and quantitative research in development of empirical evidence as well as in the formulation of appropriate technology solutions for Africa.

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