*International Journal of Education and Development using Information and Communication Technology (IJEDICT)*, 2005, Vol. 1, Issue I, pp. 53-71.

# Measuring Africa's e-readiness in the global networked economy: A nine-country data analysis

**Princely Ifinedo**
**University of Jyväskylä, Finland**

## ABSTRACT

This paper assesses the integration of Africa into the global economy by computing the e-readiness for nine African countries. The measuring tool used is simple and incorporates a variety of indicators used by comparable tools. Overall, the mean e-readiness of Africa is poor in comparison to other economies. Particularly, Sub-Saharan Africa (SSA) - with the exception of South Africa and its neighbors - has a poor e-readiness score; on the other hand, North African countries fared better than those in SSA. Furthermore, the paper highlights areas of relative strengths where policy makers in the region could exploit as efforts are made towards integrating Africa into the global networked economy.

***Keywords:*** *Information Age, Global networked economy, E-readiness, Africa*

## INTRODUCTION

The world has witnessed the birth of a new era - The *Information Age.* It is akin to a global wave sweeping through all corners of the world; albeit, its impact in Africa is minimal at this point in time. Many researchers have advanced a variety of reasons why African and other developing countries lag behind in this revolution (see, Odedra et al 1993; Molla 2000; WSIS 2004, Ifinedo 2005); however, not many have focused on the e-readiness aspects, which is the primary focus of this article. Further, it has to be noted that African nations are beginning to make progress towards adopting reforms that could help them embrace this new order (WEF 2002; Mbarika et al 2002; UNECA 2004; WSIS 2004; Hamilton et al 2004). Basically, African countries tend not to have the same infrastructural facilities and support as the developed West, which are in fact prerequisites for the new order.

The term digital divide is used to refer to such differing standards or imbalances between countries fully poised to reap the benefits of the information age and those that are unable (The Bridge Organization 2001); sadly, digital divide may also exist within the confines of a single nation. Our scan of development reports and relevant literature suggest that countries with lower competitiveness in the global networked economy are synonymous with those on the wrong side of the digital divide (see WDI 2001; Dutta et al 2003; ASPA 2003; WSIS 2004; EIU 2004; KAM 2002). Regardless, the information age is bringing about gradual, but remarkable shifts in our global society, for both the developed and developing countries. It is increasingly becoming common to see more and more nations across the globe shift away from erstwhile agrarian and industrial economies to one that is knowledge-based in which information resource utilization thrives. Such economies go by various names: network economy (Hart, 2003), knowledge economy (Neff 1998), *E*-economy (Turner 2001) and information economy (Castells 1999a), amongst others.

African countries cannot afford to stand by the sideline and watch as the rest of the world integrates into this network economy. Avgerou (1998, p.4) writes that "At the present, most developing countries are severely disadvantaged within a global economy which is increasingly

more technology and information intensive: Unequal distribution of resources, such as telecommunications and technical skills, causes concern about the ability of developing countries to participate in the emerging world economy." If we as researchers ignore the current situation in Africa with respect to its poor use of ICT (e.g., Dutta et al 2003; ITU 2004) and its slow pace of integration within the global information economy (IMD 2001; WDI 2001; WEF 2004), this would only mean that the gulf between Africa and the rest of the world could be wider and historical patterns of inequality get reinforced (Heeks 2002; Avgerou 1998). In the bid to fuel discussions regarding the competitiveness of African countries in the global economy, this paper seeks to assess Africa's performance vis-à-vis other economies in the network economy with its discourse about Africa's e-readiness. Importantly, e-readiness of some African countries has been assessed by some organizations including the World Bank, World Economic Forum [WEF] and others (see, The Bridges Organization 2001). However, this study aims at closely looking at the e-readiness of nine African countries using the same measurement tool for the purpose of comparisons. Furthermore, it is hoped that by comparing the scores for the chosen nations; each would be able to compare itself with equals. That may in turn provide an opportunity for healthy rivalry and the need to learn from the "good practices" of better-performing countries.

The rest of the paper is organised thus: Section 2 presents the overview of the countries and the reasons for their choice. Also, the concept of e-readiness is succinctly discussed. Section 3 introduces the methodology, which covers the specific e-readiness tool used herein. In Section 4 the e-readiness of the selected countries is assessed and the average for Africa assessed. Finally, the paper presents its suggestions and conclusion.

## E-READINESS CONCEPT AND OVERVIEW OF AFRICA

By and large, Africa is not a rich continent (World Bank 2001b). In terms of geography, Africa tends to be described as consisting two regions – North Africa and Sub Saharan Africa (SSA). The northern part is comparable with the Middle East economically and culturally (World Bank Group 2004b). On the other hand, SSA is associated with poverty, high illiteracy rate, civil strife and chronic under-development (World Bank Group 2001b, 2004b; Mbarika et al 2004; ITU 2004). Furthermore, South Africa (also known as the Republic of South Africa) tends to be excluded from the rest of SSA because of its relative high socio-economic indicators.

To produce a comprehensive review of the e-readiness of each of the fifty-five (55) countries in Africa is beyond the scope of this study. Moreover, in some instances data is unavailable for some of the countries in Africa. For example, no country data was provided for Senegal in the World Bank database, (see KAM 2002). In this paper, nine countries from the two regions of Africa as delineated above are selected primarily for the reason of data availability. They are as follows: Nigeria (NGR), Ghana (GHA), Cote d'Ivoire (CIV), Kenya (KEN), South Africa (RSA), Mauritius (MAU), Botswana (BOT), Egypt (EGY) and Tunisia (TUN). Henceforth, the abbreviations will be used in representing each. Secondarily, the countries above were chosen for illustration purposes in so far as they enable us to present a picture regarding the discourse. Further, their choice is informed by the classification made by Woherem (1996, p 77) wherein African countries were categorized into three broad groups:

- Category one – those with *very low* infrastructure, literacy level, GDP per capita, educational and technical endowments, etc., for example, Togo, Cote d'Ivoire
- Category two – those with *fairly good* infrastructure, adequate educational and technical endowments better than those of countries in category one, for example, Kenya.
- Category three – those with *relatively large* amounts of infrastructure, good educational and technical endowments, for example, Nigeria, South Africa

Additionally, geographical and regional groupings were taken into consideration; the selection extends to countries from the following regional groupings: Economic Community of West African States (ECOWAS), The East African Community (EAC), Southern African Development Community (SADC) and the Arab Maghreb Union (UMA) in our attempt to present a fairly representative view of comparable countries on the continent. However, we are not claiming that this group of nine countries alone represents the whole of Africa, in all matters.

Having discussed the justification for the selection, let's now turn our attention to understanding the concept of e-readiness. Essentially, e-readiness is used to capture how nations across the globe fare in terms of creating, diffusing, adopting and using the various components of a networked economy. The e-readiness assessment of a nation provides policy makers with a detailed scorecard of their economy's competitiveness relative to international counterparts in the digital era. According to the Bridge Organization (2001), "E-readiness assessment tools and models can be divided into two main categories: those that focus on basic infrastructure or a nation's readiness for business or economic growth, and those that focus on the ability of the overall society to benefit from ICT". These two categories that their report describes as 'e-economy' assessment tools and 'e-society' assessment tools are not mutually exclusive. In general, a majority of the e-readiness tools and models are said to be *descriptive* tools because they tend to explain or describe what happened and *diagnostic* tools because they identify problem areas – as we intend to do in this study - but do not indicate how to address the problems.

In particular, several organizations and bodies have come up with measures and indices to measure e-readiness. The Bridges Organization (2001) provides a comprehensive coverage on many of the tools and their sources. Some of the organizations that have developed tools or models for measuring e-readiness of nations include, amongst others, The Center for International Development at Harvard University, The Asian Pacific Economic Cooperation (APEC), Electronic Commerce Steering Group, McConnell International. Bui et al (2003, p 6-7) have discussed some of the shortcomings associated with some of those e-readiness models and indices. Mainly, concerns are raised about the completeness, inconsistencies in description and computation, to mention but a few. They went further to propose a methodology that improves upon these other indices. Of note, other robust e-readiness tools available include those of the World Bank (see KAM 2002) and the Economist Intelligence Unit (EIU 2004), which at the best have less building blocks (see below for detail) in comparison with that by Bui and colleagues. Regardless, a nation's level of preparedness for the network economy or e-readiness may not be easy to fully represent by indices for a variety of reasons including reliability, availability and completeness of data. Above all, the Bui et al (2003) tool is chosen for its robustness in its assessment of 'e-economy' and 'e-society' indicators, unlike some of the other tools that are restrictive in their coverage or tend to concentrate only on either of the two classes.

## METHODOLOGY

Bui et al (2002; 2003) developed a simple tool for assessing e-readiness that has been validated and used by other researchers (e.g., Davidrajuh 2004). The tool incorporates various components or factors of "macro-economy"; i.e. demand, supply and societal infrastructure forces. These forces span both 'e-economy' and 'e-society'. The tool is ease to extend and use. Furthermore, it accommodates a large set of indicators that are missing in other tools (see The Bridges Organization 2001). Particularly, a majority of the e-readiness tools available are not as extensive in their composition, some are not easy to use, others are not readily available (Bui et al 2002; 2003; Al-Solbi and Mayhew 2003; The Bridges Organization 2001).

In addition, Bui et al (2003) acquiesce that it is challenging to present a comprehensive model encompassing all the driving forces of an economy with respect to its competitiveness and e-readiness. Their e-readiness tool consists of three basic building blocks, see figure 1. The three basic building blocks are divided into eight major factors, and each of these major factors has a set of indicators. The major factors and some of the indicators are shown in Table 1 below. See subsequent tables for more detail.

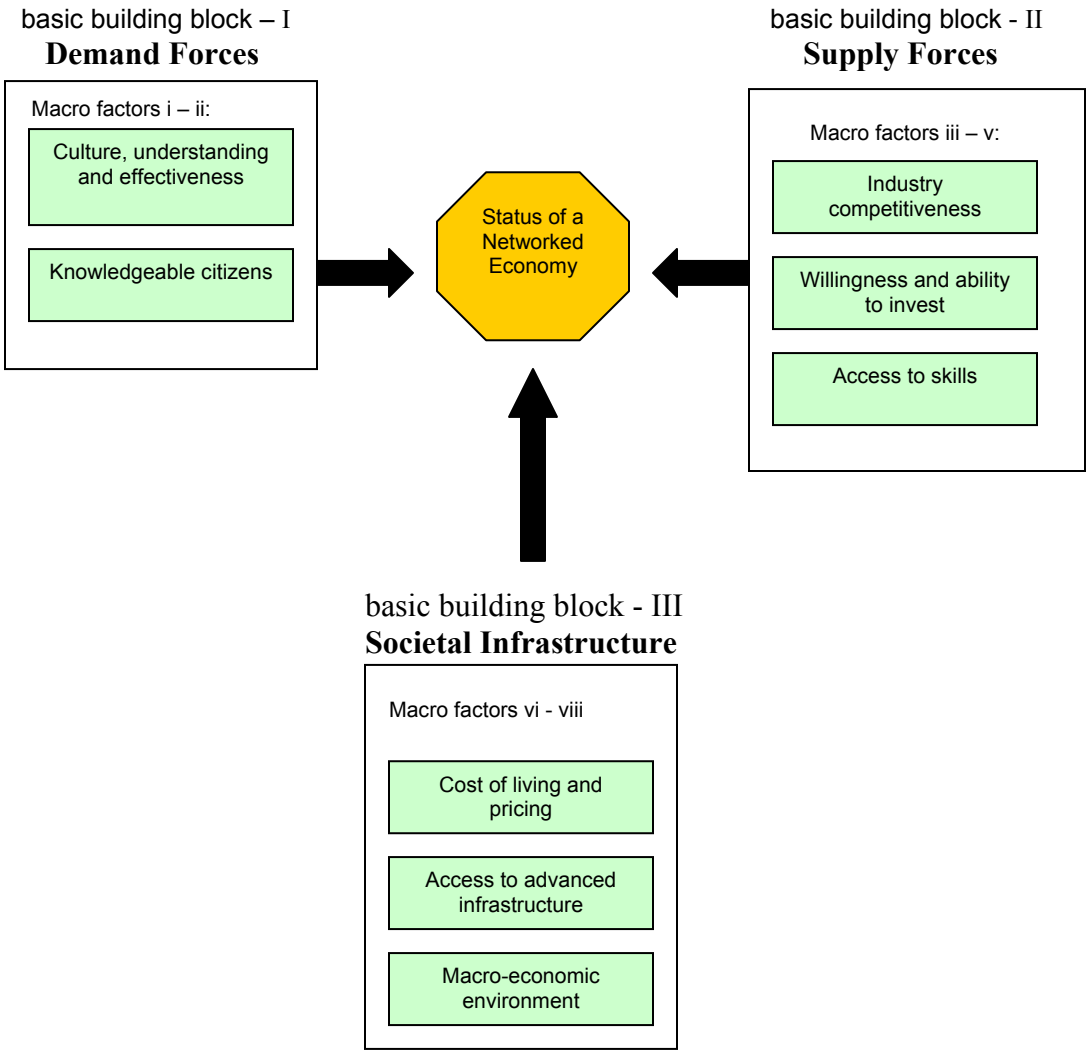



**Figure 1: Components of e-readiness measuring tool**
(adapted from Bui et al 2002; Davidrajuh 2004)

**Table 1: The Three Basic Building Blocks**

| |
|---|
| I: **Demand forces:**<br>i. Culture, understanding and effectiveness: 4 indicators. Examples include *National culture is open to foreign influence, English language, etc.* |
| ii. Knowledgeable citizens: 6 indicators. Examples include *Adult literacy rate, tertiary enrolment, secondary enrolment, etc.* |
| II: **Supply forces**:<br>i. Industry competitiveness: 7 indicators. Examples include *Technology Achievement Index (TAI), Gross tertiary Science and Engineering enrolment ratio, etc.* |
| ii. Access to skilled workforce: 6 indicators. Examples include *Public spending on education as percentage of GDP, University education meets the needs of economy, etc.* |
| iii. Willingness and ability to invest: 4 indicators. Examples include *Composite ICRG risk rating, Availability of venture capita, etc.* |
| III: **Societal Infrastructure**:<br>i. Cost of living and pricing: 3 indicators. Examples include *International cost of living (COL) based on US$ 100, Inflation rate – CPI in percentage, etc.* |
| ii. Access to advanced infrastructure: 10 indicators. Examples include *Telephone per 100 people (Teledensity), Mobile phones per 100 people, etc.* |
| iii. Macro economic environment: 12 indicators. Examples include *Trade as a percentage of GDP, Adequacy of regulations and supervision of financial institutions, etc.* |

In computing the e-readiness for each country, the formula proposed by Bui et al (2003, p. 8) is followed. The tool uses a total of 52 indicators.

$$\text{E-readiness}_i = \sum_{j=1,n} w_{ij}\, e_{ij} / n$$

Where

E-readiness: the overall e-readiness score
i: country
j: each of the 52 indicators
$w_{ij:}$ relative weights assigned each indicator
$e_{ij:}$ individual score for each indicator on a scale of 1 to 5 (1: the worst score & 5: the best score).
n: total number of indicators

Specifically, the Bui and colleagues' e-readiness computing procedure is adapted in this paper as follows:

i. select the list of countries whose e-readiness is to be computed and compared;
ii. gather data on the individual 52 indicators for each country;
iii. create a "normalised" (see, Bui et al., 2003, p 8.) scale for the indicator and assign the closest value for each country;
iv. sort the data in step (ii) to create 8 groups of data;
v. compute the average for all the building blocks;
vi. arrive at the e-readiness for each country.

In obtaining the 52 indicators or measures, data and information from reputable organizations such as The World Bank, ITU, Heritage Foundation, Transparency International, were used.

All the 52 indicators are evaluated on a 1-5 scale for each country. In "normalising" the scale, which simply refers to the scaling of indicators or measures to fit our 5-interval scale, we use

proportionality constant (simple proportions) in reducing the measures to. Take for example, an indicator, say "adult literacy (%)" in which Botswana, Kenya, Nigeria and Cote d'Ivoire have 82.7%, 79.7%, 60.6% and 50.9%, respectively (see WDI 2001; CIA 2004), on our 5-interval scale, this would correspond to 4, 4, 3, 2.5, respectively. Some may argue that boundaries such as 100-80, 79-60, etc. may suffice for our representation, in as much as we concur with such observations, the objective of this exercise differs somewhat. We aim to capture and represent as reliable as we can the performance of African countries vis-à-vis other nations across the globe. Using our "adult literacy" example, we know that there are countries in the world with 99.9% on this particular measure. Estonia is one example. As such, our scale representation above is justified.

Realistically, the best score of "5" is assigned the best performing nation in the world on any indicator and the scores for each of our nine countries computed by proportions. This process is called "normalization" by Bui and colleague. This study took great care as it "normalizes" (reduces) indicators or measures from the different sources that we consulted with, in the bid to have such data fit our 5-interval scale.

By the same token, we admit that a modicum of subjectivity is applied where necessary. For instance, on the "English language usage" indicator, which no data is provided by any of the reputable organizations, the colonial legacy and history as well as the literacy rate of each country, is factored in, to produce values for each country. Also, wherever no data exists from the reputable organizations, we use the lowest score of one "1" for that measure. Thus, we present the results and discussions in the next section.

## THE E-READINESS RESULTS AND DISCUSSION

**Table 2: Measuring the Demand Forces**

| **Major factor (MF)-1: Culture, understanding and effectiveness** (sources: KAM, 2002; WDI, 2001;WNW, 2004; HDR, 2003) | **NGR** | **BOT** | **GHA** | **KEN** | **CIV** | **RSA** | **MAR** | **EGY** | **TUN** |
|---|---|---|---|---|---|---|---|---|---|
| *Indicator-1 ($e_1$): National culture is open to foreign influence* | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 2 |
| *Indicator- 2 ($e_2$): English Language usage* | 3 | 4 | 3 | 4 | 1 | 4 | 4 | 2 | 2 |
| *Indicator-3 ($e_3$): Percentage of Urban population* | 3 | 4 | 2.6 | 2.2 | 3 | 2.5 | 2 | 2 | 3 |
| *Indicator- 4 ($e_4$): Percentage of population 65 years or older* | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| **Major factor (MF)-2: Knowledgeable citizens** (sources: KAM, 2002;HDR, 2003; World Bank, 2001a,2004; SIMA, 2004; CIA, 2004) | **NGR** | **BOT** | **GHA** | **KEN** | **CIV** | **RSA** | **MAR** | **EGY** | **TUN** |
| *Indicator- 5 ($e_5$): Adult literacy rate* | 3 | 4 | 3 | 4 | 2 | 4 | 4 | 2.5 | 3 |
| *Indicator- 6 ($e_6$): Secondary school enrolment* | 3 | 3 | 3 | 3 | 2 | 4 | 4 | 2.5 | 3 |
| *Indicator-7 ($e_7$): Tertiary enrolment* | 2.5 | 2.5 | 2 | 3 | 1 | 2.7 | 2.5 | 3 | 2.7 |
| *Indicator-8 ($e_8$): 8th grade achievement in Science* | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 4 |
| *Indicator-9 ($e_9$): MGMT education available in First class Business Schools* | 2.8 | 2.5 | 1 | 1 | 1 | 3.8 | 2 | 2.7 | 2 |
| *Indicator-10 ($e_{10}$): Flexibility of people to adapt to new challenges* | 2 | 2 | 2 | 2 | 2 | 2.5 | 2 | 2 | 2 |

In this part of the e-readiness measurement tool, which mainly relates to 'e-society', our selected countries fared poorly on almost all of the indicators with the exception of the indicator relating to the percentage of population 65 years or older. Average scores (3 is the midpoint score) were noticeable for other measures such as the percentage of urban population, secondary school enrolment, etc. The results seem to indicate that countries that were once colonies of the United Kingdom rate better than their Francophone counterparts. In general, low scores on many of the measures above suggest lack of competitiveness.

**Table3: Measuring the Supply Forces**

| **Major factor (MF)-3: Industry Competitiveness** (sources: KAM, 2002; WDI, 2001; IMD,2001) | **NGR** | **BOT** | **GHA** | **KEN** | **CIV** | **RSA** | **MAR** | **EGY** | **TUN** |
|---|---|---|---|---|---|---|---|---|---|
| *Indicator-11: Technology Achievement Index (TAI)* | 1 | 1 | 2 | 2 | 1 | 2.3 | 2 | 2.1 | 2.2 |
| *Indicator-12 ($e_{12}$): Gross tertiary Science and Engineering enrolment ratio* | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| *Indicator-13 ($e_{13}$): Administrative burden for start-ups* | 3 | 3 | 1 | 1 | 1 | 3.2 | 3.1 | 3.2 | 2 |
| *Indicator-14 ($e_{14}$): Patent applications granted by the USPTO 2000 (per million pop.)* | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 |
| *Indicator-15 ($e_{15}$): Indicator-15: Private sector spending on R&D* | 2.4 | 2 | 1 | 1 | 1 | 2.5 | 1 | 2.5 | 1 |
| *Indicator-16 ($e_{16}$): Total expenditure for R&D as % GNI (Gross National Income)* | 1 | 1 | 1 | 1 | 1 | 1.5 | 1 | 1 | 1 |
| *Indicator-17 ($e_{17}$): High-Tech exports as percentage of manufactured exports* | 2 | 1 | 2 | 1 | 1 | 2.1 | 1 | 1 | 1 |
| **Major factor (MF)-4: Skilled workforce** (sources: HDR, 2003; KAM, 2002; WNW, 2004; IMD, 2001) | | | | | | | | | |
| *Indicator-18 ($e_{18}$): Public spending on education as percentage of GDP* | 1 | 2 | 1.5 | 2 | 1 | 4 | 2.3 | 3.3 | 4 |
| *Indicator-19 ($e_{19}$): University education meets the needs of economy* | 1 | 1 | 1 | 1 | 1 | 2.5 | 1 | 1 | 1 |
| *Indicator-20 ($e_{20}$): Indicator-20: Well-educated people do not emigrate abroad* | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| *Indicator-21 ($e_{21}$): Extent of staff training* | 2.7 | 2 | 1 | 1 | 1 | 2.3 | 2 | 2 | 2 |
| *Indicator-22 ($e_{22}$): Research collaboration between companies and universities* | 1.5 | 1 | 1.2 | 2 | 1 | 2.3 | 1.7 | 1.7 | 1 |
| *Indicator-23 ($e_{23}$): Number of technical papers per million people* | 1.1 | 2.1 | 1.2 | 2 | 1 | 2.8 | 1 | 2.2 | 2.2 |
| **Major factor (MF)-5: Investments** (sources: ICRG, 2000; WEF, 2001; SIMA, 2003; World Bank, 2001a, 2004) | | | | | | | | | |
| *Indicator-24 ($e_{24}$): Composite ICRG risk rating* | 3 | 4 | 2.5 | 3 | 2.5 | 3.4 | 2 | 3.5 | 3.6 |
| *Indicator-25 ($e_{25}$): Availability of venture capital* | 1 | 1 | 1 | 1 | 1 | 2.5 | 2 | 2.3 | 1 |
| *Indicator-26 ($e_{26}$): Entrepreneurship among managers* | 2 | 1 | 1 | 1 | 1 | 2.5 | 1 | 1 | 1 |
| *Indicator-27: Foreign Direct Investment as percentage of GDP* | 1.5 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

In the second building block that has indicators for 'e-economy', our selected countries fared even worse (in comparison with the first building block) in almost all the measures. In order to fully compete in the global economy, policy makers in the region must find ways of improving items in this segment.

**Table 4: Measuring the Societal Infrastructure**

| **Major factor (MF)-6: Cost of living (COL) and pricing** (sources: Mercer, 2004; World Bank,2001a, 2004) | **NGR** | **BOT** | **GHA** | **KEN** | **CIV** | **RSA** | **MAR** | **EGY** | **TUN** |
|---|---|---|---|---|---|---|---|---|---|
| *Indicator-28 ($e_{28}$): International cost of living (COL) based on US$ 100* | 5 | 5 | 5 | 5 | 2 | 5 | 5 | 5 | 5 |
| *Indicator-29 ($e_{29}$): Inflation rate – CPI in percentage* | 4 | 2 | 4 | 2 | 3 | 2.2 | 2 | 2 | 2 |
| *Indicator-30 ($e_{30}$): GDP per capita (PPP) in US$* | 1 | 2.5 | 2 | 2 | 2 | 2.5 | 2.5 | 2 | 2 |
| **Major factor (MF)-7: Advanced infrastructure** (sources: ITU, 2004; Opexcom, 2004; Hamilton et al., 2004; WNW, 2004; TAI, 2001) | | | | | | | | | |
| *Indicator-31($e_{31}$): Telephone per 100 people (Teledensity)* | 1 | 2 | 1 | 1 | 1 | 2.5 | 2.5 | 2.5 | 2.5 |
| *Indicator-32 ($e_{32}$): Mobile phones per 100 people* | 1 | 2 | 1 | 1 | 1 | 2 | 3 | 1 | 2 |
| *Indicator-33 ($e_{33}$): Computers (PCs) per 100 people* | 1 | 2 | 1 | 1 | 1 | 1.5 | 1.5 | 2 | 1.5 |
| *Indicator-34 ($e_{34}$): Internet hosts per 10, 000 people* | 1 | 2 | 1 | 1 | 1 | 2 | 1.5 | 1 | 1 |
| *Indicator-35 ($e_{35}$): International Telecom, cost of call to US* | 1 | 2 | 1 | 1 | 1 | 2.5 | 1 | 1 | 1 |
| *Indicator-36 ($e_{36}$): Investment in Telecom as a percentage of GDP* | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 |
| *Indicator-37 ($e_{37}$): Computer processing power as a % of worldwide MIPS (million instructions per second)* | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| *Indicator-38 ($e_{38}$): E-government* | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2.8 | 1 |
| *Indicator-39 ($e_{39}$): ICT expenditure as a percentage of GDP* | 1 | 1 | 1 | 1 | 1 | 1.5 | 1 | 1 | 1 |
| *Indicator-40 ($e_{40}$): Freedom on the Internet* | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| **Major factor (MF)-8: Macro economic environment** (sources: Heritage Foundation, 2004; KAM, 2002; WNW, 2004; TICP, 2003; Freedom House, 2003; Kaufmann et al., 2001) | | | | | | | | | |
| *Indicator-41($e_{41}$): Trade as a percentage of GDP* | 1 | 3 | 2 | 2 | 2 | 1.5 | 1 | 2.5 | 1 |
| *Indicator-42 ($e_{42}$): Adequacy of regulations and supervision of financial institutions* | 1 | 3 | 2 | 1 | 1 | 3.9 | 1 | 1 | 1 |
| *Indicator-43 ($e_{43}$): Protection of property rights* | 1 | 3 | 1 | 1 | 1 | 2.7 | 2.7 | 2.8 | 2 |
| *Indicator-44 ($e_{44}$): Tariff and non-tariff barriers* | 1 | 3 | 1 | 1 | 1 | 2 | 1 | 1 | 1 |
| *Indicator-45 ($e_{45}$): Soundness of banks* | 3.4 | 3 | 1 | 1 | 1 | 4.6 | 4.3 | 3.4 | 2 |
| *Indicator-46 ($e_{46}$): Local competition* | 3.7 | 3 | 1 | 1 | 1 | 3.8 | 3.2 | 3.8 | 3 |
| *Indicator-47 ($e_{47}$): Regulatory framework* | 1 | 2.3 | 2 | 1 | 1 | 1 | 1 | 1 | 2.2 |
| *Indicator-48 ($e_{48}$): Government effectiveness* | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 3 |
| *Indicator-49 ($e_{49}$): Political stability* | 1 | 2 | 1 | 1 | 1 | 1 | 3.4 | 1 | 2.5 |
| *Indicator-50 ($e_{50}$): Press freedom* | 1 | 3 | 2 | 1 | 1 | 3 | 3 | 1 | 1 |
| *Indicator-51 ($e_{51}$): Rule of law* | 1 | 3 | 2 | 1 | 1 | 1 | 2.7 | 1 | 2.2 |
| *Indicator-52 ($e_{52}$): Control of corruption* | 1 | 3 | 1.5 | 1 | 1 | 2.2 | 2.2 | 1.7 | 2.5 |

The third building block has a mix of the 'e-economy' and 'e-society' indicators. Countries on the continent seem to have less expensive cities, which could be exploited as foreign investors are

wooed. Governments in the region, it appears from the results won't suppress Internet freedom. This is vital for any emerging 'e-society'.

Overall, the economic climate appears unfavorable for our selected countries. The story is the same for the whole of Africa (see, World Bank 2001b). One could also notice that the infrastructural support needed for 'e-economy' and 'e-society' to thrive is lagging behind. Governments in the region have an uphill task in redressing what looks like a hopeless situation. Needless to say that the climate of instability, inept regulatory frameworks and corruption that are often associated with many African countries, exacerbates an already pathetic situation. Simply, in this paper, we aim at highlighting stark realities! Knowing fully well that policy makers at the regional and international levels are the only ones with the resource and power to effect change.

Further, in assigning weight ($w_{ij}$) to each e-readiness ($e_{ij}$) for this study, the author's view is reflected. Here, equal weights of unity (1) for all the indicators are assumed and used for comparisons purposes and simplicity sake. This perspective mirrors sentiments expressed by Bui et al. (2003, p. 13) that "national experts or policy makers would be the best qualified people for [the] task [of assigning such weights]." Different nations may assign differing weights reflecting their national strategies and interests. That said, we proceed to breaking down the scores on the major factors for each nation in Table 5. Subsequently, we compute the e-readiness value for each nation in Table 6.

**Table 5: Breakdowns of the Major Factors**

| Major factors (MF) | NGR | BOT | GHA | KEN | CIV | RSA | MAR | EGY | TUN | Avg |
|---|---|---|---|---|---|---|---|---|---|---|
| MF-1: Culture, understanding, effectiveness: *emf_1* | 3.25 | 3.75 | 3.15 | 3.3 | 2.75 | 3.63 | 3.25 | 2.75 | 3.00 | 3.20 |
| MF-2: Knowledgeable citizens: *emf_2* | 2.55 | 2.67 | 2.17 | 2.5 | 1.67 | 2.33 | 2.75 | 2.45 | 2.78 | 2.54 |
| MF-3: Industry competitiveness: *emf_3* | 1.77 | 1.57 | 1.43 | 1.29 | 1.14 | 2.23 | 1.59 | 1.83 | 1.46 | 1.59 |
| MF-4: Access to skilled workforce: *emf_4* | 1.38 | 1.52 | 1.15 | 1.50 | 1.00 | 2.48 | 1.50 | 1.87 | 1.87 | 1.56 |
| MF-5: Willingness & ability to invest: *emf_5* | 1.88 | 1.75 | 1.38 | 1.50 | 1.38 | 2.35 | 1.50 | 1.95 | 1.65 | 1.70 |
| MF-6: Cost of living and pricing: *emf_6* | 3.00 | 3.17 | 3.33 | 3 | 2.33 | 3.23 | 3.00 | 3.17 | 3.00 | 3.02 |
| MF-7: Advanced infrastructure: *emf_7* | 1.30 | 1.8 | 1.30 | 1.30 | 1.20 | 2.00 | 1.75 | 1.73 | 1.67 | 1.56 |
| MF-8: Macro economic environment: *emf_8* | 1.44 | 2.78 | 1.79 | 1.42 | 1.42 | 2.31 | 2.29 | 1.77 | 1.95 | 1.91 |

**Table6: The E-readiness of the Nine Countries**

| Basic building block-1: Demand forces (*eDF*): $eDF = \frac{emf\_1 + emf\_2}{2}$ | NGR | BOT | GHA | KEN | CIV | RSA | MAR | EGY | TUN | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2.90 | 3.21 | 2.66 | 2.90 | 2.21 | 3.48 | 3.00 | 2.60 | 2.89 | |
| Basic building block-2: Supply forces (*eSF*): $eSF = \frac{emf\_3 + emf\_4 + emf\_5}{3}$ | 1.68 | 1.61 | 1.32 | 1.43 | 1.17 | 2.35 | 1.53 | 1.88 | 1.66 | |
| Basic building block-3: Societal Infrastructure (*eIF*): $eIF = \frac{emf\_6 + emf\_7 + emf\_8}{3}$ | 1.91 | 2.58 | 2.14 | 1.91 | 1.65 | 2.51 | 2.40 | 2.17 | 2.21 | |
| **E-readiness ($e_r$) for each country** | NGR | BOT | GHA | KEN | CIV | RSA | MAR | EGY | TUN | **mean (m)** |
| $e_r = \frac{eDF + eSF + eIF}{3}$ | 2.16 | 2.47 | 2.04 | 2.08 | 1.68 | 2.78 | 2.31 | 2.22 | 2.25 | **2.22** |

On the whole, the e-readiness value computed for each of the nine countries, in Table 6 above is visibly below the average value of 3 (midpoint of our 1-5 scale). Nonetheless, some of the countries fared relatively well in some of the major factors. Figure 2 below depicts the detailed benchmarking based on the eight major factors using Bui's et al (2003) model.

Apparently, the e-readiness of South Africa is the best, with Botswana coming in second and that of the Cote d'Ivoire came in last. The two North African countries have scores equal to or better than the average for Africa. Also, the average e-readiness for the three countries in the southern part of Africa, in our selection is 2.52, which is better than those of Africa as a whole, at 2.22. Realistically, the Global Competitive Report by (WEF 2004) has Botswana as African's best performing economy. Likewise, South Africa was rated as having the best e-readiness score in Africa (EUI 2003). The country scored 5.79 out 10 (EUI 2003). Invariably, this shows the relative strength of countries in that region of Africa, as this paper has shown. Essentially, as was discussed earlier, that several e-readiness tools tend to be composed of differing indicators, which may explain the variance in the ranking for these two countries, i.e. South Africa and Botswana. We have clearly stated in this work that the e-readiness tool that we used in our analysis is more robust. For instance, the World's Economic Forum's e-readiness ranking, which has fewer indicators and tends to focus more on growth competitiveness of nations than e-readiness measures, *per se*; has the following ratings for some African countries; South Africa (4.53); Botswana (4.30); Ghana (3.78); Kenya (3.45) and Nigeria (3.16) from a total of 7. Importantly, these ratings are not dissimilar with those obtained herein. Thus, we are assured of the reliability of our computations and results.

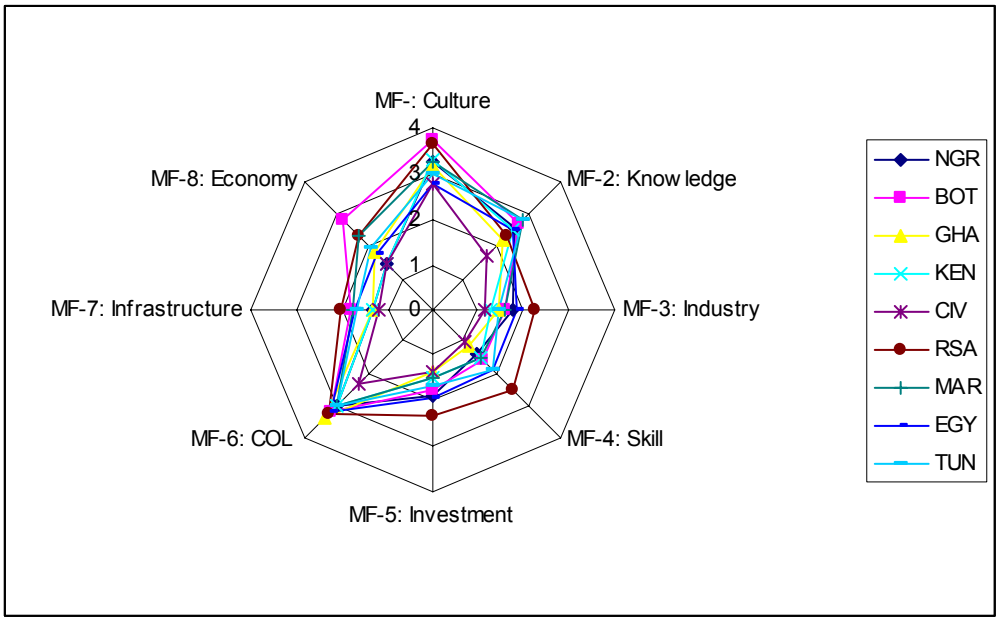
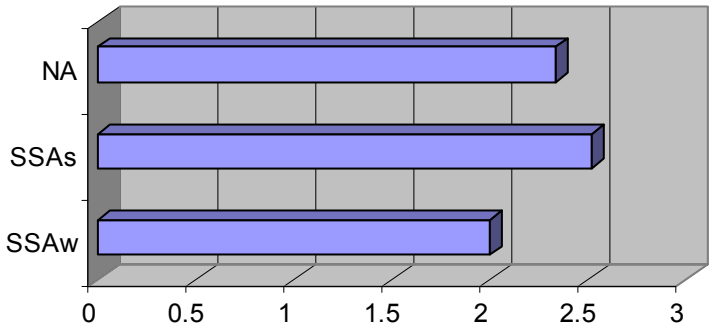



**Figure 2: E-readiness for nine African countries**

For our study, we aggregated the performance of the selected African countries according to regional groups, i.e, SSA (south), SSA (west and east) and North Africa. See Figure 3 below.

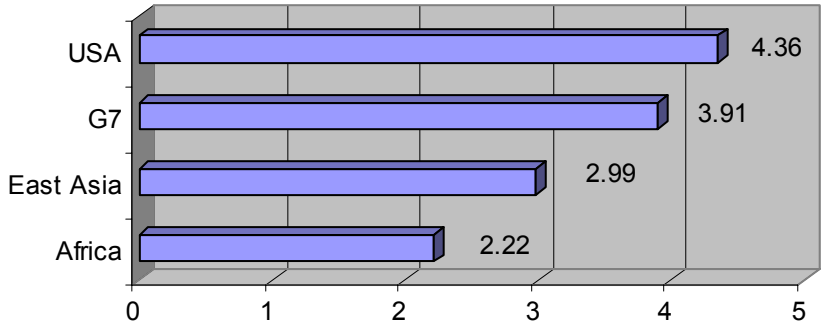



Legend: SSAw (Sub-Saharan West and East), SSAs (Sub-Saharan South), NA(North Africa)

**Figure 3: E-readiness of region of Africa**

Also, Figure 4 below compares the e-readiness of Africa with those of other well-known economies using the same e-readiness tool (see Bui et al 2003). Notably, East Asia, the US, and the G7 averages were given by Bui et al. (2003) as 2.99, 4.36 and 3.91, respectively. Glaringly, the e-readiness of Africa, which was arrived at with computations for our selected nine countries suggests that the continent is not prepared or compares poorly with other economies in the global networked economy. This finding may not be unexpected given the vast accounts of

inadequacies confronting Africa on many fronts including economic, social and technological. Nonetheless, our focus also extends to finding specific areas where Africa could exploit comparative advantages. Such will be discussed below.




Legend: G7 (Group of 7 developed western countries), USA (United Stares of America)

**Figure 4: The e-readiness of Africa and other economies**

The information in Figure 3 shows that the southern part of Africa with South Africa, Botswana and Mauritius as examples is perhaps relatively better prepared for the global networked economy than other parts of Africa. As can be seen, Africa scored lowly on most of the indicators, with the exception of factors relating to “Culture, understanding, effectiveness”, which includes English language usage and population demographics. African countries tend to have a large portion of their population be less than 65 years, which is a positive indication for vibrancy and growth.

The cost of living in Africa is lower in comparison with other continents. African countries performed averagely on the “International cost of living” factor. Inflation rates are within acceptable limits, at least, for our sample countries. Apart from Dakar (Senegal) and Abidjan (Cote d’Ivoire) that were listed among the top 50 most expensive cities in the world (Mercer 2004), most SSA cities are relatively inexpensive when compared to cities the developed world. Further, the colonial legacy and history of some of the selected countries may be a useful arsenal towards integrating into the global economy. For example, English is the official languages in Nigeria, Ghana and Kenya.

Despite this poor showing by Africa with regard to integrating within the networked economy, all hope is not lost as African governments have realised or are beginning to realize the need to formulate policies that could help them overcome their apparent backwardness and connect to the global network economy (Molla 2000; Mbarika et al 2002; WEF 2002; Hamilton et al 2004; UNECA 2004; WSIS 2004). For example, many African governments now operate within the directives of The World Summit on the Information Society (WSIS 2004) and similar world bodies (see G8 DOT Force 2001; UN ICT TASK Force 2004) as they set about implementing of key recommendations. Example to cite include the formulation of National IT polices. Also, regional partnerships are being developed. Enabling economic climate that include deregulation and liberalization policies are emerging on the continent (WEF 2002; Ifinedo 2005).

Given the chronic socio-economic problems (World Bank 2001a; Sachs and Warner 1997) and technological inadequacies (Odedra et al 1993; Woherem, 1996; WSIS 2004) confronting Africa, it is not expected that the transition would be an easy exercise. Relatedly, a recent World Bank publication (World Bank 2004a) concludes that the overall socio-economic development and progress is being hampered by poor governance and corruption in the developing countries including SSA. This suggests that in order for Africa to integrate into the networked economy, initiatives and commitment from governments in the region may be needed. Africa fared poorly on indicators relating to governance, corruption and so on.

Additionally, the import of ICT in the socio-economic transformation of the region cannot be overemphasized. For example, Woherem (1996) and Avgerou (1998) have eloquently argued how ICT can help uplift developing countries especially those in Africa from the fathoms depths of inadequacies and deprivations, if government policies and strategies are well developed. On the contrary, others have sounded a note of caution that technology (IT) alone may not be panacea for the malaise plaguing under-developed countries (Castells 1999b). Suffice to say that sound leadership and commitment may be needed to help steer developing nations (including those in Africa) towards occupying a befitting place in the changing world, in which reliance on knowledge and information is paramount. Our desire to assess the e-readiness of African countries is borne out of the understanding that the preparedness of Africa vis-à-vis other economies in the networked economy would help focus the attention of policy-makers in the region on areas where improvement can be effected, or opportunities exploited

Cynics may argue that there is little or no hope for Africa in the networked world. On the contrary, evidence suggests that countries that have taken it up upon themselves to bring about a change have succeeded. For example, India went from nowhere to where it is today by focusing on areas where it posses comparative advantages (see Nair and Prasad 2002). Similarly, other countries in East Asia have streamlined their national IT policies towards improving the lot of their citizens; at the same time, seizing on opportunities wherever possible in the global economy (see Kraemer and Dedrick 1995). African countries can do likewise, when each country on the continent understands its relative position to other countries in the world and sees the need for a change by marshalling resources that could hasten its integration within the global networked economy. For instance, South Africa set its priorities in the 1990's regarding its economic policy and development goals as that country matches towards the *information age.* Arguably, South Africa's performance on e-readiness is the result of those well-nurtured policies (Miller 1999; Molla 2000; WEF 2002), amongst other factors. Other African countries only need to look at South Africa's e-readiness value here, in this study, or elsewhere (EIU 2003) with regard to its level of integration and preparedness in the global economy to appreciate what they should be doing. The Republic of South Africa has scores that were well above the average on many of the measures in this study in comparison with other selected countries.

The suggestions for African policy-makers are discussed as follows: In light of the fact that African countries are seen to perform fairly well on the "culture, understanding, effectiveness" factor; these could be used as springboards towards improving their overall position in the networked economy. How? African governments may take a cue from the practices of some East Asian countries such as the Philippines that found ways of using its rather limited resources in hooking up to the global networked economy. Kraemer and Dedrick (1995) write about how countries in East Asia (including The Philippines) engineered their national IT policy for sustainable development in the global IT industry. Africa, with its abundant human resources, relatively low cost of living expenses, wages and the use of the English language by some African countries can utilize their advantages on such indicators. For example, business opportunities involving data, call/telecentres, business process outsourcing (BPO) and similar services for organizations in the developed world could be looked into. Of note, we are not arguing that exploiting such opportunities alone can bridge gaps in economical and technological

inadequacies seen in the region, rather any opportunity available, as with such indicators should not lie fallow. By the same token, African governments must take it upon themselves to turn a new leaf. They could make efforts to improve on some of the indicators in the 'e-economy' and 'e-society' enablers such as “government effectiveness”, “regulatory framework”, “administrative start-ups” and other related items in which they fared poorly. Apparently, such items as those in the foregoing are within their purview.

It must be emphasized also that there are hosts of factors such as “export-related items” and others that the developed countries’ will, assistance or generosity may be sought. This is a necessity because in the networked economy, the actions of one region/nation – specifically those in the developing countries - alone might not suffice in helping it bridge the digital divide or improve upon its e-readiness value. Candidly, in order to help Africa, which is “relatively isolated both economically and technologically” (Plemming 2004) realize the objectives of the Millennium Development Goals (UNDP 2002); governments (leadership) in the region and the wider international community must truly appreciate the lack of preparedness by African countries in integrating itself into the networked economy. African governments on their own part must get their acts together, given their reputation for nonchalance on crucial issues of political and socio-economic development (e.g., Sachs and Warner 1997; Ifidon 1996). By the same token, the developed world must move beyond mere rhetoric and truly seek measures to improve Africa’s standing. For example, the inflow of foreign direct investment (FDI) to Africa, which is at about 5% of the world’s total (World Bank 2004) could be improved. This will go along way in improving the e-readiness for the continent.

On the technological front, an overhaul of the technology transfer process (TTP) to Africa (Udo and Edoho 2000) may be necessary. A TTP that is complete – acquire, make, repair and adapt, and not just a dumping ground of technology is crucial, if Africa is to improve its e-readiness score. Likewise, in order for Africa to better its e-readiness position, its level of participation or ownership of key resources such as the Internet needs to be addressed. African nations may need to claim more control over their share of the global Internet resource, now controlled mostly by foreign corporate interests (Mutume 2004; Wade 2001). Mutume (2004) notes that South Africa is one African country calling for change in the governance of the Internet. This *status quo* may explain why for the indicators of Internet use and computer processing power as a % of worldwide (MIPS), to some degree, Africa’s showing will continue to be insignificant. Redressing the imbalance with the crucial resource of the Internet – and its governance - will provide better and fairer opportunities for developing countries in Africa to tackle the long-standing question of the digital divide (see, Wade 2001). Moreover, integrating into the global 'e-economy’ or developing a modern 'e-society' for citizens of any nation depends on this technological resource amongst other related infrastructure.

## CONCLUDING COMMENTS

In this paper we compute the e-readiness of some African countries with the view to assessing the preparedness or competitiveness of the continent in the global networked economy. A simple e-readiness measuring tool was used. In general, Africa’s s e-readiness was seen to be uncompetitive vis-à-vis other economies. Our findings indicate that South Africa leads the rest of Africa in terms of e-readiness. Likewise, southern African countries have e-readiness scores that are relatively better than that of Africa’s average. Countries in western and eastern parts of Africa performed poorly - below Africa’s average - whilst those in North Africa have scores that compare with Africa’s average. Collectively, Africa’s e-readiness is poor within the global economy. Nonetheless, a couple of areas of strengths were highlighted where Africa could exploit. Also, the paper succinctly discussed the measures that might help Africa improve its position in the

increasingly global networked economy. The issue of leadership and commitment by African governments as well as the reticence of the developed and richer international community in providing the ingredients to help bridge the widening digital divide between Africa and the rest of the world were noted in this discourse.

Avgerou's (1998) observation of the severely disadvantaged position of developing countries including those in Africa within a global economy with regard to technology and information resource is a situation that needs to be addressed adequately and promptly. To be complacent about redressing some of the areas demanding attention, as identified in this study "will only reinforce historical patterns of inequality" (Heeks 2002, p.18). The onus is with the African leadership and the international community. Furthermore, Heeks (2002) comments above are not dissimilar with those of the late President of Cote d'Ivoire – F. Houphouet-Boigny – where he commented that "after, having missed the industrial revolution, Africa should not once more miss the computer revolution." He continues: "…countries that neglect this domain in their development process are increasingly widening the gap between themselves and the developed countries, who will find in this a new reason to exercise more monopoly over power" (Maombe-Neko 1996, p. 67).

Thus, the contribution of the paper is seen in its attempt to assess the e-readiness and/or competitiveness of some African countries in order to provide a picture of its performance and preparedness in the world. The findings of this study may entice regional policy makers to further investigate what actions or strategies enabled some parts of Africa to perform better than others; as such create an atmosphere of emulation and healthy rivalry between nations on the continent.

On the whole, there are limitations to this paper: First, most e-readiness tools are descriptive and diagnostic by nature, the same applies with this effort. Second, the historical nature of the data used is another limiting factor. However, this may not be much of a problem given that comparisons are made for countries within the same time frame. Moreover, data source(s) for each indicator used in the study is same. Third, the unavailability of data on some items, which this study assigned "worse" score, may in fact not be totally correct. Perhaps, this underscores the sorts of problems often associated with meta-analytical methods studies of this nature.

Nonetheless, this endeavor has not been diminished by the limitations above as areas of strength and weakness vis-à-vis nations were well-presented. Without doubt, a picture of Africa's performance regarding her e-readiness within the global economy is presented. Finally, it is hoped that African policy makers and governments can make the most of the information herein; in particular, as they seek input for national development plans. Also, each country's e-readiness score could be compared with future scores in order to assess trends in e-readiness for each country. Lastly, it is not claimed herein that our e-readiness scores for the selected countries (and for Africa) in this study represent the final word for such an exercise. Rather we acknowledged that there are differing perspectives on the subject of e-readiness assessment to which this endeavour is just a part.

**Acknowledgments**

The author appreciates the suggestions offered by the two anonymous reviewers of this paper.

## REFERENCES

Al-Solbi, A. and Mayhew, P.J. (2003), "A Comparison of E-Readiness Assessment Tools with Particular for use in Relevance to Developing Countries", In *Proceeding of the 2003 International Business Information Management Conference*, Cairo, Egypt.

ASPA (2003), *Benchmarking E-Government: Global Perspective*. Retrieved September 12, 2004, from the World Wide Web: http://www.unpan.org/e-government/.

Avgerou, C. (1998), "How can IT Enable Economic Growth in Developing Countries?" *Information Technology for Development*. vol.8, no.1, pp.1 – 14.

Bui, T., Sebastian, I., Jones, W. and Naklada, S. (2002), "E-Commerce Readiness in East Asian APEC Economies", *The Pacific Research Institute for Information Systems Management (PRIISM),* Honolulu, Hawaii, USA.

Bui, T. X., Sankaran, S. and Sebastian, I. M. (2003), "A framework for measuring national e-readiness", *International Journal of Electronic Business*, vol.1, no.1, pp.3 - 22.

Castells, M. (1999a), *The Information Age: Economy, Society and Culture*. Blackwell Publishing, Oxford.

Castells, M. (1999b), "Information Technology, Globalization and Social Development," *UNRISD Discussion Paper No. 114*, United Nations.

CIA (2004), *CIA World Factbook*. Retrieved February 1, 2004, from the World Wide Web: http://www.cia.gov/cia/publications/.

Davidrajuh, R. (2004), "Measuring and Improving E-Readiness of Norway", In *Proceedings of the 2004 International Business Information Management (IBIM) Conference*, Amman, Jordan, 4 - 6 July 2004, pp.1- 10.

Dutta, S., Lanvin, B. and Paua, F. (2003), *Global Information Technology Report 2002-2003*. Oxford University Press, New York.

EIU (2004), *Economist Intelligence Unit E-readiness Rankings 2004*. Retrieved September 9, 2004, from the World Wide Web: http://graphics.eiu.com/files/ad_pdfs/ERR2004.pdf.

G8 DOT Force (2001), *Issue Objectives for the Genoa Summit Meeting 2001: DOT Force*. Retrieved Decmber 2, 2004, from the World Wide Web: http://www.g8.utoronto.ca/.

Hart, D. M. (2003), *The Emergence of Entrepreneurship Policy: Governance, Start-Ups, and Growth in the U.S. Knowledge Economy*. Cambridge University Press, Cambridge.

Hamilton, P., Jensen, M. and Southwood, R. (2004), *African Internet Country Market Profiles*. Retrieved February 1, 2005, from the World Wide Web: http://www.balancingact-africa.com/profile1.html.

Heeks, R. (2002), "e-Government in Africa: Promise and Practice", *Institute for Development Policy and Management, Paper No. 13,* University of Manchester, UK.

Heritage Foundation (2004), *Human Development Report [HDR] Indicators (2003)*. Retrieved September 11, 2004, from the World Wide Web: http://hdr.undp.org/reports/global/2003/pdf/hdr03_HDI.pdf.

Ifidon, A.F. (1996), "Citizenship, Statehood and the Problem of Democratisation in Nigeria". *Africa Development*, vol.4, no.21, pp.93-107.

Ifinedo P.E. (2004), "E-government - Precursors, Problems, Practices and Prospects: A Case of Nigeria", In *Proceedings of the 2004 International Business Information Management (IBIM) Conference*, Amman, Jordan, 4 - 6 July 2004.

Ifinedo, P. (2005), "E-government Initiative in a Developing Country: Strategies and Implementation in Nigeria". In Head, M. (Ed.) *Proceedings of the 26th McMaster World Congress on Electronic Business.* Hamilton, Ontario, Canada, January 19-21, 2005, pp. 1-11.

IMD (2001), *World Competitive Yearbook*. Retrieved September 12, 2004, from the World Wide Web: http://www.imd.ch.

International Country Risk Guide. (2000), *International Country Risk Guide*. Retrieved September 2, 2004, from the World Wide Web: http://www.prsgroup.com/icrg/icrgcountries.html.

ITU (2004), *International Telecommunications Union: Africa, ICTs, Indicators 2003*. Retrieved June 21, 2004, from the World Wide Web: http://www.itu.int/ITU-D/ict/statistics/at_glance/af_ictindicators.html.

Kaufmann, D., Kraay, A. and Zoido-Lobaton, P. (2001), "Governance Matters II: Updated Indicators for 2000/01", *World Bank working paper*. Retrieved September 11, 2004, from the World Wide Web: http://www.worldbank.org/wbi/governance/wp-governance.html.

KAM (2002), *Knowledge Assessment Matrix*. Retrieved September 9, 2004, from the World Wide Web: www1.worldbank.org/gdlnscripts/programs/kam2002/kamscript.exe/show_page.

Kraemer, K. L. and Dedrick, J. (1995), *National Technology Policy and Computer Production in Asia-Pacific Countries, Paper 47*, Center for Research on Information Technology and Organizations, University of California, Irvine, USA.

Maombe-Neko, Y. (1996), "The Cultural and Socio Impact of New Information Technologies in Africa". In Odedra-Straub, M. (Ed.) *Global Information Technology and Socio-Economic Development.* Ivy League Publishing, New Hampshire , pp.63–69.

Mbarika, V., Jensen, M., Meso, P. (2002), "Cyberspace across Sub-Saharan Africa: From Technological Desert Towards Emergent Sustainable Growth", *Communications of the ACM*. vol.45, no.12, pp.17-21.

Mercer. (2004), *Mercer Human Resource Consulting*. Retrieved September 12, 2004, from the World Wide Web: http://www.mercerhr.com.

Miller, J. (1999), "Entering The Information Age: Setting priorities in South Africa", *2nd. International Al Shaam Conference on Information Technology*, 26-29 April, Damascus, Syria.

Molla, A. (2000), "Downloading or uploading? The information economy and Africa current status". *Information for Development*. vol.9, pp.205-221.

Mutume, G. (2004), *Africa Calls for More Cyber-Rights*. Panos, London. Retrieved September 12, 2004, from the World Wide Web: http://allafrica.com/stories/200411020428.html.

Nair, K. G. K and Prasad, P. N. (2002), "Development through Information Technology in Developing Countries: Experiences from an Indian State", *Electronic Journal for Information Systems in Developing Countries.* vol.8, pp.1-13.

Neff, D. (1998), *The Knowledge Economy*. Butterworth-Heinemann, Boston .

Odedra, M., Lawrie, M., Bennett, M. and Goodman, S. (1993), "Sub-Saharan Africa: A Technological Desert", *Communication of the ACM*. vol.36, no.2, pp.25–29.

Opexcom. (2004), *Opex Communications*. Retrieved September 12, 2004, from the World Wide Web: http://www.opexld.com.

Plemming, S. (2004), "New atlas shows fast pace of changing world", *Yahoo News Online*. Retrieved November 2, 2004, from the World Wide Web: http://uk.news.yahoo.com/041014/325/f4k70.html.

Sachs, J. D. and Warner, A. M. (1997), "Sources of slow growth in African economies", *Journal of African Economies*. vol. **6**, issue3, pp. 335-376.

SIMA (2003), *Statistical Information Management and Analysis*. Retrieved September 12, 2004, from the World Wide Web: http://www.devdata.worldbank.org/query/.

TAI (2001), *Technology Achievement Index*. Retrieved September 12, 2004, from the World Wide Web: http://www.undp.org/hdr2001/indicator/.

The Bridges Organization (2001), *Comparison of E-Readiness Assessment Models*. Retrieved May 5, 2004, from the World Wide Web: http://www.bridges.org/ereadiness/tools.html..

TICP (2003), *Transparency International Corruption Perceptions Index*. Retrieved September 11, 2004, from the World Wide Web: http://www.transparency.org/cpi/2003/cpi2003.en.html.

Turner, C. (2001 ), *The Information E-Conomy: Business Strategies for Competing in the Global Age.* Kogan Page Ltd, London .

Udo, G. J. and Edoho, F. M. (2000), "Information Technology Transfer to African Nations: an Economic Development Mandate", *Journal of Technology Transfer*. vol.25, no.3, pp.329-342.

UNDP (2002), *United Nations Development Progra*mmes. Retrieved February 3, 2004, from the World Wide Web: http://www.undp.org/mdg/.

UN (2004), *ICT TASK Force*. Retrieved December 2, 2004, from the World Wide Web: http://www.unicttaskforce.org/index.html.

UNECA (2004), *United Nations Economic Commission for Africa*. Retrieved September 3, 2004, from the World Wide Web: http://www.uneca.org/aisi/nici/nici_country_pages.htm.

Wade, R. (2001), "OECD/UNDP conference on the Knowledge Economy", *OECD*, Paris, 5-6 March, 2001.

WDI (2001), *World Development Indicators*. Retrieved September 12, 2004, from the World Wide Web: http://www.worldbank.org/data/wdi2001/.

WNW (2004), *World-News Watch Country Reports*. Retrieved September 6, 2004, from the World Wide Web: http://www.world-news-watch.com/news.

Woherem, E. E. (1996), "Strategy for Indigenisation of Information Technology in Africa" In Odedra-Straub, M. (Ed.) *Global Information Technology and Socio-Economic Development*. Ivy League Publishing, New Hampshire, pp.70–80.

World Bank (2001a), Retrieved February 3, 2004, from the World Wide Web: http://www.worldbank.org/wdr/2000/pdfs/engtable2.pdf.

World Bank (2001b), *Prospects for Developing countries and World Trade*. Retrieved February 2, 2004, from the World Wide Web: http://www.worldbank.org/prospects/gep2001/chapt1.pdf.

World Bank Organization (2004a), *Population dynamics*. Retrieved September 12, 2004, from the World Wide Web: http://www.worldbank.org.

World Bank Organization (2004b), *Country Report*. Retrieved September 12, 2004, from the World Wide Web: http://www.worldbank.org.

World Economic Forum (2001), *Global Competitiveness Report*, 2001. Retrieved September 2, 2004, from the World Wide Web: http://www.weforum.org.

World Economic Forum (2002), *Southern African Development Community – World Economic Forum Consultation Report on e-Readiness*. Retrieved December 20, 2004, from the World Wide Web: http://www.weforum.org/pdf/DigitalDivide/SADC.pdf.

World Economic Forum (2004), *The Networked Readiness Index Rankings 2003*. Retrieved October 5, 2004, from the World Wide Web: http://www.weforum.org/.

WSIS (2004), *The World Summit on the Information Society*. Retrieved September 12, 2004, from the World Wide Web: http://www.itu.int/wsis/.



Original article at: http://ijedict.dec.uwi.edu//viewarticle.php?id=12&layout=html