A Framework of Factors for Determining e-Readiness in Emerging Societies

Darren Edwin Naidoo and
Rembrandt Klopper

Abstract

During the last decade, leaders in government, business, and social organizations around the world have considered how best to harness the power of Information and Communication Technology (ICT) for development. Experts have pointed out that in order for developing countries to put ICT to effective use, they must first be "e-Ready" in terms of ICT infrastructure, the accessibility of ICT to the population, and the legal and regulatory framework. Developing-country leaders have been urged to use e-Readiness assessment to measure and plan for ICT integration, focus efforts from within, and identify areas where external aid is required. Several e-Readiness initiatives have been launched to help developing countries in this area, and numerous e-Readiness assessment tools have been created and used by different groups, each looking at various aspects of ICT, society, and the economy (Bridges.org, 2005). The underlining focus of the study was to look at the potential of being e-Ready in conjunction with the social and economic success that the society can achieve in sustaining ICT initiatives. It also includes a comparative analysis of the economic and social statistics of KwaZulu-Natal and South Africa with the statistical calculations of the data collected from the questionnaire (to analyse the e-Readiness capacity of honours students). The researchers agrees with the International Telecommunication Union (2003) when they recommend that to measure the ICT picture in full, new multi-stakeholder partnerships will be required involving not only the statistical agencies that are traditionally responsible

for conducting surveys, but also policy-makers, the private sector, civil society, multilateral organisations and others involved in the ICT arena. The potential of being e-Ready in conjunction with the social and economic success that the society can achieve in sustaining ICT initiatives seems to be a difficult but a worthwhile achievement.

Key Concepts

e-Readiness, e-Readiness definition, e-Readiness Rankings, e-Commerce, e-Business, ICT Initiatives, Digital Divide and Information Communication and Technology in South Africa.

Introduction

The results reported in this contribution are presented as prolegomena for an empirical of e-Readiness in South Africa. The framework may also be useful for research regarding the degree of readiness of other emerging economies to use information communication technologies to transform their economies from regional to globally integrated economies.

The technological gains of the last several decades lie at the core of surges of wealth and wellbeing in the most prosperous countries of the world. Electronic commerce and related applications of ICTs have become engines for economic growth and productivity and are changing the shape of the world in which people live. Yet the developed world is reaping the majority of these gains. The divide between rich and poor countries, long observed with regard to economic wealth and social conditions, is equally prevalent and troublesome in the realm of ICT. While the growth of the Internet and the continuing "digitalisation of society" are much-heralded events in more developed countries, many leaders in developing nations are left wondering how they can participate in the rapid changes going on around them (Information Technologies Group, 2000).

The transformative power of ICTs as a tool for poverty reduction and wealth creation are well documented. Gillis & Mitchell (2002) explains that ICT can be framed and applied as a potent tool in reducing poverty, extending health services, expanding educational opportunities and generally

improving the quality of life for many of the world's disadvantaged. However, it is critical that such framing recognizes that these desired outcomes are only plausible when ICT deployment is accompanied by concurrent public policies supporting equitable access to social institutions such as health care, education, government, and other benefits potentially available through the application of digital tools and telecommunications. ICT is an important tool, but not a solution in itself for economic or social problems. ICT has been identified as a key enabler in the achievement of regional and rural success, particularly in terms of economic and business development. ICT has more effectively supported the development and implementation of community driven strategies to boost employment, education, training, and enterprise development; also by revitalising a sense of community, building regional capacity, enhancing democracy and increasing social capital.

Literature that Relates to e-Readiness

The past decade has seen the worldwide adoption of electronic forms of communication via the Internet, mobile phones, the convergence of mobile communication and computing by means Smart PDAs and Smart Phones, and their use in e-Commerce, e-Government, e-Research and e-Entertainment enabling end users it to be connected anywhere/anytime (Information Technology Group, 2000). CSPP (2000) describes this as the networked world, which entails a transformation in the nature of economies, societies and governments, as well as interpersonal and international relations. The World Bank claims that to put ICT to effective use, a country must be "e-Ready" in terms of infrastructure, the accessibility of ICT to the population at large, and the effect of the legal and regulatory framework on ICT use. If the digital divide is to be narrowed, all of these issues must be addressed in a coherent, achievable strategy that is tailored to meet the local needs of particular countries (Bridges.org, 2001).

The researchers employed the following terms to identify the appropriate references for the electronic literature review presented in this section: e-Readiness, e-Readiness definition, e-Readiness Rankings, e-Commerce, e-Business, ICT Initiatives, Digital Divide and Information

Communication and Technology in South Africa. Only six articles indexed on those terms were identified on Science Direct and EBSCO host with relevancy to e-Commerce Adoption, e-Readiness Assessment, and e-Business. Keyword searches on Google Suggest and Vivisimo in May and August of 2005 for information about e-Readiness and the above-mentioned terms yielded approximately 138,298 results. The number from Google Suggest, Vivisimo and Science Direct indicates that e-Readiness is an emerging research topic and that there are not many resources available. Other websites such as the digitaldivide.net and bridges.org were used more continuously when searching for information about ICT and e-Readiness, as these websites specialise in the mentioned terms.

Definition of e-Readiness

The definitions for e-Readiness vary in scope, depending on the study done. Most took a general view of e-Readiness as the extent to which the country is prepared to integrate into the global information society/ networked world/ digital economy (Bridges.org, 2005). McConnell International (2000) argues that e-Readiness measures the capacity of nations to participate in the digital economy. The Bridges.org (2003a) defines e-Readiness as the ability of the ICT networks to successfully adapt to the social and economic advancement.

E-Readiness is generally defined as the degree to which a society is prepared to participate in digital economy with the underlying concept that the digital economy can help to build a better society (Krull, 2003). Finally, the researchers conclude that e-Readiness is generally defined as the degree to which a society is prepared to participate in this so-called networked world (Information Technology Group, 2000) with the underlying concept that the Networked Economy can help to build a better society (see also Choucri, 2003).

E-Readiness Attributes

Other readiness guides have used different categorised attributes as tools of measurement depending on the type of study conducted, which will be discussed later. Depending upon the objective for Assessment, an Attribute is chosen and Indicators under the same worked out for the Assessment. The wide range of Indicators under each main attribute category can be classified in the following:

- Network Access: What are the availability, cost and quality of ICT networks, services and equipment?
- Networked Learning: Does the educational system integrate ICTs into its processes to improve learning. Are there technical training programs in the community that can train and prepare an ICT workforce?
- Networked Society: To what extent are individuals using ICTs at work and in their personal lives. Are there significant opportunities available for those with ICT skills?
- Networked Economy: How are businesses and governments using ICTs to interact with the public and with each other?
- Network Policy: To what extent does the policy environment promote or hinder the growth of ICT adoption and use? (Information Technology Group, 2000).

CSPP (2000) notes that there are many criteria that could be used to assess readiness for the networked world, but selected five key categories that represent the elements that need to be in place to capture the benefits of the networked world. (1) The Network (infrastructure) - the backbone technologies and infrastructure that connect you to the Network. (2) Networked Places (access) - where you spend your time and need to be connected. (3) Networked Applications and Services - how you use your connectedness to make it meaningful and purposeful. (4) Networked Economy - the role of the network in driving the economy. (5) Networked World Enablers (policy, privacy, security, ubiquity) - key levers to expediting the networked world.

E-Readiness Rankings

The Economist Intelligence Unit (2005) has published annual e-Readiness rankings of the world's largest economies since 2000. Most recently 65 countries were assessed on their ability to promote and support digital business and ICT Services. The e-Readiness rankings of the Economist Intelligence Unit are a weighted collection of nearly 100 quantitative and qualitative criteria, organised into six distinct categories measuring the various components of a country's social, political, economic and of course

technological development. These categories are in turn, weighted according to their assumed importance as influencing factors and will be discussed later by the researchers.

In 2005, the Economist Intelligence Unit's ranking methodology has undergone modification (i.e. criteria that no longer accurately reflect the shape of the digital economy have been removed, and many criteria have been re-weighted to reflect their increasing importance in determining e-Readiness). The latter include broadband access and Internet security, as both fast and secure Internet connectivity are proving to be the key enabling qualities for effective e-Business. They added new metrics such as the penetration of public-access wireless "hotspots", due to their belief that Internet connectivity has to be not just mobile but ubiquitous. Also new, more precise means of measuring performance in some criteria have been developed, including in the areas of Internet security, ICT spending and education.

The Economist Intelligence Unit 2005 notes that ICT infrastructure sparks a virtuous cycle, because as country's citizens become more connected to the Internet, their increased usage shifts the country's economy towards building technologies and businesses to exploit the Internet. Therefore, such countries become more competitive not only because their citizens and corporations are online, but also because being online jumpstarts growth in high-value technology businesses. This is why e-Readiness rankings measure a country's accumulated telecoms and computer infrastructure, and accord it the heaviest weight of all e-Readiness determinants. They have also increased the importance of broadband (both fixed and mobile), which is why many e-Ready leaders (including the resurgent US) have seen their rankings rise. They have also refined the measurement of some other aspects of connectivity, such as the security of Internet servers, and the amount of Gross Domestic Product (GDP) that goes into ICT spending. In conclusion the Economist Intelligence Unit (2005) has also measured the knock-on effect that "boxes and wires" have on a country's digital economy, and due to this introduced they have introduced quantitative measures of innovation and qualitative measures of entrepreneurship.

The six categories (and their weight in the model) and criteria are as follows:

- Connectivity and Technology Infrastructure (Weight in overall score: 25%)
- Business Criteria (Weight in overall score: 20%)
- Consumer Business Adoption (Weight in overall score: 20%)
- Legal and Policy Environment (Weight in overall score: 15%)
- Social and Cultural Environment (Weight in overall score: 15%)
- Supporting e-Services (Weight in overall score: 5%), (The Economist Intelligence Unit, 2005).

The researchers repeatedly tried to contact the Economist Intelligence Unit about how the indices for the e-Readiness Index are constituted, but they never responded to our queries. The researchers therefore concluded that they did not want to share this information due to confidentiality or competitive intelligence.

Regional Patterns of e-Readiness and Country Highlights

Silicon Valley in the United States is not the only high-tech enabler of ICT, because Switzerland and Denmark also score highly in all e-Readiness categories due to their respective IT service and biometrics industries (Economist Intelligence Unit, 2005). Denmark maintains its number one position in the e-Readiness rankings due to its superiority in both infrastructure and innovation. In second place was the United States, which fell to 6th place largely because its broadband development lagged other global leaders. In fourth place was Switzerland, who climbed upward in the rankings owing to its steady growth in broadband, which included WiFi as one of the new connectivity categories introduced this year and healthy ICT investment. Due to faster ICT progress of other countries and refinements in the Economist Intelligence Unit measurement model, West European countries have dwindled a bit, compared to the US, Switzerland, Hong Kong (6th) and Australia (10th). The UK (5th) previously was second in 2004, continued to enjoy high levels of connectivity and benefits from substantial government commitment to achieving information society objectives, but

was weak in the educational area. Norway (9th) remained a global leader in ICT infrastructure but has not leveraged these physical assets into intellectual property assets. South Korea's (18th) investment in IT is low and they have not really prioritised their security infrastructure investments compared to other e-Readiness leaders.

E-Business plays a role in some countries, but not enough to transform parts of their economy. Examples include India (49th) and China (54th) who according to the Economist Intelligence Unit (2005) consume close to one-third of the world's ICT investment, and both countries continue to attract the large share of the world's technology-earmarked foreign direct investment. India's outsourcing industry is continually fuelled by large ICT skills base and China's phenomenal technology manufacturing sector, both of which are fundamental to the global ICT economy. However, both countries continue don't improve in terms of e-Readiness (three places down in 2005 for India, two places for China), due to the fact stated by the Economist Intelligence Unit (2005) that the billions of dollars in ICT investment and revenue are tiny compared to their overall economy. Considering that, such ICT usage does not even represent enough of the population penetration. Countries like India are profiting from a global arbitrage opportunity, supplying lower cost information technology (IT)-enabled skills to their more wired peers.

Some countries lack in their e-Readiness rankings due to their lack of e-Leadership. Examples are the regional leaders of Central and Eastern Europe and Latin America, Estonia (26th) and Chile (31st) respectively. The Economist Intelligence Unit (2005) notes that \ these markets score higher than the global average in its respective core competencies of E-Government and online services. However, they still lack in infrastructure and E-Business adoption.

South African e-Readiness View

The e-business forum (2005) noted the following Statistics of South Africa. South Africa has a Population (m) of 46.8; Working population (m) of 30.8; Nominal GDP US$ 237.6 billion, US$ 522.8 billion (at PPP); GDP per head US$ 5,080.0, US$ 11,170.0 (at PPP), Inflation at 4.3%; Average Wage (monthly) US$ 1,070; National corporate tax rate 30%; Indirect tax 14% (VAT) and Currency is the Rand. South Africa's 2004 Connectivity

Statistics were: Number of telephone main lines (per 100 people) - 9.1; Number of mobile subscribers (per 100 people) - 39.9; Number of Internet users (per 100 people) - 8.1; and Number of personal computers (stock per 1,000 pop) – 109.

Of all the regions McConnell International (2000) notes that the Middle East and Africa presents the greatest, challenge to e-Business, even when taking into consideration the cultural tendency to share ICT access among multiple users, the thin infrastructure remains an enormous barrier to improvements in other areas. They state that this region has nearly 15 % of the world's population; but the African continent possesses just 2 % of the world's total number of telephones and less than 0.1 % of all Internet users regions. McConnell International (2000) notes that South Africa needs slight improvement with e-Leadership and Information security and shows improvement with regards to the province of Gauteng, which has approved plans to begin construction on an "Innovation Hub" (an incubator and training centre for rising high-tech enterprises). Docktor (2002) notes medium levels of PC penetration, medium-high levels of bandwidth quality, medium-high levels of e-Leadership, and medium-high levels of information security concerning South Africa.

SOUTH AFRICA

Digital Access Index (2003): 0.45; (78)

- Fixed telephone subscribers per 100 inhabitants: 9.5
- Mobile cellular subscribers per 100 inhabitants: 30.4
- Internet access tariff as % of Gross national Income (GNI) per capita 15.4
- Adult literacy 85.6%
- Combined primary, secondary and tertiary school enrolment level: 78%
- International Internet bandwidth per capita: 12.4 (kbit/s)
- Broadband subscribers per 100 inhabitants: 0
- Internet users per 100 inhabitants: 6.8

World Telecommunication indicators (2005)

- Main telephone lines per 100 inhabitants: no data
- Mobile cellular subscribers per 100 inhabitants: 43.1
- Internet users per 100 inhabitants: 7.9

Figure 1: Digital Access Index of South Africa (Maplecroft.Net, 2005)

The Digital Access Index (DAI) of South Africa is an index value of 0.45 and an index ranking of 78 – as seen in the above figure according to Maplecroft.Net (2005). The DAI forms part of International Telecommunication Union's (ITUs) 2003 edition of the World Telecommunication Development Report published to coincide with the first World Summit on the Information Society (WSIS). The index measures the overall ability of individuals in a country to access and use ICTs. The DAI embraces eight indicators grouped into five categories (in brackets – note the specific DAI data for South Africa): infrastructure (0.23), affordability (0.85), knowledge (0.83), quality (0.26) and usage (0.08). The above figure 2.3 also features three single indicators obtained from the ITU World Telecommunication Indicators Database (2005): main telephone lines (no data), mobile cellular telephone subscribers (43.1) and internet users (7.9) per 100 inhabitants. This 2004 data is intended as a supplement to existing DAI data and not a replacement, despite presenting information that is more recent to equivalent DAI indicators. The DAI is presented as a composite measure of access to ICTs and is still viewed as the most comprehensive and recent overall measure of digital inclusion.

Bridges.org (2003a) describe that there was evidence of growth in the e-Commerce sector, notably in South Africa, which is forecast to generate $ 0.5 billion worth of business in 2002 and to grow to $ 6.1 billion by 2006. However, they concluded that if this level of growth of Africa's share of global e-Commerce in 2006 would only be 0.05% of the world's total. They have noted that South Africa has shown a commitment towards the integration of ICT as an essential part of their economy, and for social and academic advancement and that its has begun to introduce legislation that helps, rather than hinders, the growth of, access to and the affordability of ICT Bridges.org (2003a) state that it is important to remember that there

remains a digital divide, usually based on geographical (e.g. rural/urban), socio-economic or cultural factors, or even gender. South Africa, have already enacted legislation designed to facilitate the growth of e-Commerce, and all have high rates of fixed and mobile teledensity. However, there remains a challenge in terms of the deregulation and liberalization of the telecommunications sector, as well as the establishment of an independent and effective regulator.

South Africa was also 32nd in 2004 and 2005, even though as stated by the Economist Intelligence Unit (2005) that the government failed to enforce competition in its fixed-line market effectively, which has seriously impaired broadband and online services development. This ineffective government policing of the liberalisation process has prevented the introduction of a new telecom carrier to compete against the de facto state monopoly - Telkom, which enjoys its monopoly of the fixed-line market after partial privatisation in 2003 and ownership of half of Vodacom, a mobile-phone provider (ebusinessforum, 2005). However the Economist Intelligence Unit (2004) states that Internet services has been modest in South Africa, at 7% of the population. Due to the high cost and inadequate coverage of high-speed connections, which can be blamed partly on the lack of market competition, despite the government's decision to license a second national operator, it has turned down numerous bids.

The ebusinessforum (2005) states that there is fierce competition in the IT industry (Microsoft, Hewlett-Packard and IBM (all US) are among the foreign companies with offices in South Africa), with price, service reliability, and a high demand for after-sales and value-added service South Africa is a middle-ranking country in terms of how conducive the market is to Internet-based opportunities. South Africa now ranks in the world's top 20 countries in terms of the number of Internet sites. In addition to the global technology giants that have moved into the country in recent years, two local companies have grown rapidly, not only in South Africa but worldwide as well. The largest South African technology company is a software systems integrator, Dimension Data. Datatec, a networking and services group, is South Africa's second-largest IT Company. Like Dimension Data, the company has operations throughout Europe, North America, South America, Africa, the Middle East and the Asia and Australasia region, and generates

more than 95% of its revenue outside South Africa. In the competitive mobile market, the dominant firm, Vodacom, targets both the low-end and high-end markets, whereas the focus of the new entrant, Cell C, is on the large low-end market. Caught in the middle, MTN is focusing on subscriber quality and reduction. Despite the size and relative sophistication of the South African telecoms market, the ebusinessforum (2005) argues that, newer services such as the third-generation (3G) universal mobile telecommunications service (UMTS) are not likely to take off in the near future.

Telkom being the only national telecommunications operator is stifling the potential of broadband and low-cost access through a monopolistic stranglehold on the sector. Vosloo (2004) concludes that a number of issues (listed below) should be addressed to improve e-Readiness on a country level.

- The ICT industry should be liberalised.
- South Africa should prepare for the rollout of a second national operator.
- Greater telephone and Internet access should be provided to rural areas through jumpstarting and supporting rural connectivity projects.
- The government should work on ICT cost reduction for the consumer.
- The government should work on universal access and services for the underprivileged.

E-Readiness Recommendations and Next Steps

McConnell International (2000) noted that no nation will become e-Ready overnight and nations who are e-Leaders today are not guaranteed to be tomorrow's. However, due to the nature of the new economy, those nations and businesses that can adapt quickly to new technology, seize new opportunities, and take strategic risks will prosper. Less prepared economies have an opportunity to learn from the global community and leap to higher levels of preparedness. Docktor (2002) lists Institutions, Change Management, Transformation in terms of Efficiency, Effectiveness, Endorsement, Empowerment, Economic & Social Development as

preconditions necessary for Success with regards to where to act with - e-Readiness Capacity.

Bridges.org (2005) deduces that it was time to stop identifying gaps and setting priorities at a high level, if e-Readiness assessment is going to remain useful as a tool, it needs to become far more focused and action-oriented. They note that it was a waste of time in terms of money, writing papers and holding conferences, as anyone working in ICT and development in the country will already know these things. Action plans that say, Capacity in ICT needs to be built in year X by the Government and the Private sector are essentially useless, especially when consultants without any input or buy-in have drawn up the plans from representatives of the government or private sector in the country concerned. Bridges.org (2005) concludes that it is important that we build upon previous work and draw together current efforts in the field of e-Readiness.

Southern African Development Community (SADC) countries have three powerful means of directly improving e-Readiness and harnessing ICT for social and economic advancement within the SADC region: (1) establishing the policy framework for action, (2) building the necessary infrastructure, and (3) undertaking ground-level projects. Beyond direct interventions itself, the government can also act indirectly by creating a favourable environment for the private sector and NGOs to engage. SADC governments are urged to promote ICT through dialogue with all stakeholders, and by setting a leadership example through e-government initiatives. The World Economic Forum (2002) noted that a sound ICT policy framework creates a reliable environment within which business and social programmes can thrive (key issues include trade agreements and tariff standardization, enterprise and entrepreneurship development, e-Commerce promotion and telecommunication liberalization). ICT infrastructure is the broad foundation upon which business and social programmes are built. It includes basic infrastructure like electricity and transportation, and technical infrastructure like network connections and hardware (key issues include: physical access to ICT, standards setting and interoperability, and country code top-level domains). Ground level initiatives spread the benefits of technology throughout society and provide a critical connection between policy considerations and the grassroots community. Ground-level initiatives

are often driven by national policies, such as in the fields of education, entrepreneurship and healthcare (key issues include: public access to ICT in disadvantaged and/or rural communities, e-Government services, and local economic and enterprise development). The World Economic Forum (2002) recommended that South Africa should do the following: With (1) Policy Framework: liberalize ICT industry; implement empowerment policies in line with RDP objectives. (2) Infrastructure: prepare for rollout of second national operator and utilize universal service fund for rural connectivity and Telecentre sustainability. (3) Ground Level Projects: provide more e-Education and training, as well as entrepreneurship development projects in rural areas.

E-Readiness Policies, Initiatives and Strategies

Bridges.org (2003a) notes that the framework for the analysis of e-Readiness policy issues first presented in the World Economic Forum-SADC report has been the basis for examining key issues with an African perspective and drawing comparisons between NEPAD countries. In addition, the template can help policy-makers and stakeholders frame a dialogue on issues that apply to groups of countries at comparative levels, so they can learn from relevant experience and best practice.

The Framework template is as follows – e-Readiness policy issue (title, and brief description of issue under consideration):

(a) Widely agreed policy recommendation: description of the general consensus on how this issue should be addressed, generally taken from the international perspective

(b) Key proponents of this recommendation: list of the main institutions and organizations that recommend this agreed position on the issue

(c) Issues affecting application in developing countries: explanation of why the way forward recommended by the general consensus at the international level may prove to be tricky given the ground level realities in developing countries; the point is to demonstrate an understanding of the challenges that developing countries face which can limit their ability to effectively implement this policy recommendation

(d) Recommended way forward: a suggestion of where a developing country should start once it has decided that it wants to implement the widely agreed policy recommendation described in (a), despite the fact that it faces the challenges outlined in (c) (Bridges.org, 2003a).

The Bridges.org (2003a) summarises the South African Policies as follows:

- ICT regulatory framework: Has an independent regulator – ICASA. Progressive ICT policy process.
- ICT liberalization + privatization: Managed liberalization of state assets, including ICT. Incumbent (Telkom) is being privatized. Second network operator expected in 2002.
- Macro economic policy: One of the most liberal, free-market supporting policy-GE AR.
- Foreign direct investments: FDI incentives by the DTI (tax holidays and reduced tariffs - WTO member).
- e-Commerce: Electronic Communications and Transactions Act 25 of 2002/6/20 and an advanced e-commerce practice. Interception and monitoring Bill seeks to enable investigation of cyber-crime.

E-Readiness Initiatives

McConnell International (2001) notes that countries with high levels of impact and innovation are developing quicker, enabling businesses, governments and citizens to flourish in the networked economy. They deduced that today's leaders in impact and innovations are the places where business opportunities are more likely to develop in the future. While partnerships are the strongest way to progress, they are not the only significant actions underway to improve e-Readiness. McConnell International (2001) examined over 500 initiatives across all attributes and countries to determine which are making a real difference in e-Readiness - sound, sustainable programs, reforms, and policies that increase Connectivity, strengthen e-Leadership, improve Information Secruity, develop Human Capital and enhance the e-Business climate.

The actions that McConnell International (2001) evaluated include projects and opportunities, which are initiatives, in which companies can still, get involved to shape legislation or participate in funded programs. For some of these projects, such s digital signature laws or privatising telecommunications, implementation is ongoing. The report examined two key aspects of these actions:

- Impact: To create change in society, multiple actions must be taken and many people involved. Actions that would affect larger portions of the population or were more comprehensive in scope and effect are favoured.
- Innovation: New technology and new business models supported by these technologies affect the cost, speed and transparency of service delivery and final product in ways recently unimaginable. Projects and opportunities that use new technology or have a new model or approach that will yield greater benefits are assessed more favourably (McConnell International, 2001).

E-Readiness Strategies

Docktor (2002) equates a definition concerning Strategic Action by saying that to put e-Readiness to work, you will compare - Your Goal + Your Assessment with Global and Future with Global and Future Realities.

The International Telecommunications Union (ITU) e-Strategy Unit (2003) founded four basic pillars for their e-Strategy projects:

- Technology implementation: fostering development of a wide range of technologies, from leading-edge Internet Protocol (IP) infrastructure and multipurpose communication technologies (MCTs) to new applications in the areas of commerce, health, education, agriculture, government and online security
- Capacity building: enabling local people to develop and manage their own projects through effective human resources development
- Policies and strategies: helping governments draw up and implement policies and legislation conducive to stimulating ICT deployment and uptake

- Partnerships/alliances: bringing public and private sector partners together to develop projects that benefit all stakeholders, including the community at large

The Southern African Development Community (SADC) e-Readiness Task Force (2002) noted that relevant and viable strategic recommendations can only be made with a clear understanding of the current realities within each country, in respect of ICT infrastructure, policy and regulatory frameworks, whether ICT is seen to be a national priority, the diffusion and usage of ICT in all the sectors of the country, including government, the financial sector, education, health and others.

Analysis of e-Readiness Assessment Guides and Tools

As indicated before, the e-Readiness definition and e-Readiness Attributes vary, depending on the study that is consulted. An e-Readiness Assessment, when properly applied in a larger process of evaluation, is a first step towards converting good intentions into planned actions that bring real changes to people's lives. E-Readiness assessments are meant to guide development efforts by providing benchmarks for comparison and gauging progress. This is an old process adapted to today's technology realities; determining the current situation in order to plan and advocate specific changes (Budhiraja & Sachdeva, 2002). Electronic Readiness assessment can also be a vital tool for judging the impact of ICT, to replace wild claims and unreliable evidence about the role of ICT in development with concrete data for comparison.

E-Readiness Objective when Conducting a Study

If the objective is e-Governance then the focus of the e-Readiness research should be on Government Process Reengineering and faster and more transparent means of delivering government services to the citizens. Here e-Readiness equals computers, access, and effective usage of computers (hardware and access are not enough for real e-readiness, there must be extensive training programs, locally relevant content, and a local ICT sector). If the objective is on e-Infrastructure then the focus of the study should be on institutions/organisations, hardware and software. Here e-Readiness refers to computers and access. If the objective is on e-Commerce then the focus should be on ICT Business. Here e-Readiness refers to

computers, access, and economy. If the objective is on the society then the focus should be complete population. Here e-Readiness requires basic literacy, poverty, health and other social issues to be addressed first. This can be summarised as follows:

STUDY	FOCUS
1. APEC (Asia Pacific Economic Cooperation)	E-Commerce Readiness
2. CID (Center for International Development)	Society
3. CSPP (Computer Systems Policy Project)	Existing Infrastructure
4. EIU (Economist Intelligence Unit)	E-Business Readiness
5. NRI (CID, Harvard)	Infrastructure, E-Society, Policies, Digital Economy, Education and Government
6. MI (McConnell International)	Infrastructure, Digital Economy, Education and Government

Table 1: **Objective when conducting a study**

Parameters and Weightings

As discussed previously every e-Readiness attribute is further split up into its relative indicators or parameters. The identification of Parameters can be deduced from previous studies done or adapted to suite the changing conditions. Along with defining parameters a base needs to be ascertained. For example, when comparing with different States of the USA a researchers does not look into the number of PCs in the State; the researchers will look into the Number of PCs per total population of the State (Budhiraja & Sachdeva, 2002). The parameters that will be configured will then be categorized as primary and secondary and the sources for the same identified. The secondary sources of data can be the published reports, documents, and data on web. Primary data will be collection of information by conducting surveys etc (Budhiraja & Sachdeva, 2002).

The determination of weights for a parameter can be arrived by the following three methodologies according to Budhiraja & Sachdeva (2002):

- Equal Weights: The parameters evolved can be assigned equal weights for the purpose of coming out for a Ranking. However, in most cases the same is not advisable for the parameters are not having equal level of importance.
- Subjective Weights: Another approach will be to assign subjective weights based on perception of experts and taking an average of the same. Processes like the Analytical Hierarchical Processes (AHP) can also be used. Again, these processes are based on individual perceptions and can be questioned.
- Objective Weights: Another approach is to use the statistical techniques of analysis. These techniques will assign weights to parameters based on the observed values. Principal Component Analysis is one such technique of assigning objective weight ages to the parameters.

Towards a More Comprehensive Ranking Tool

Bridges.org (2001) deduces two lessons from comparing assessment models: First, the chosen e-Readiness assessment tool must fit the user's goal. The second lesson is that there is a wide range of e-Readiness assessment models available, but each has limitations. Every model evaluated would require re-designing to make it a comprehensive assessment tool. They concluded that the ready-to-use tools are either limited in scope or lack detailed description on how to use the tool in practice. What would a more comprehensive, flexible tool include?

Drawing together the perspectives of the existing tools Bridges.org (2001) deduce the following: The tool should provide (optional) measurements for the range of factors that influence e-Readiness such as existing technology infrastructure; information technology policies (trade, encryption, digital signatures, privacy, etc.); distribution, pricing, and usage of the technology in schools, business, government, and throughout society; basic 'enablers' in society (basic literacy, quality of educational system, political stability, etc.); social and cultural factors the influence technology's diffusion and use; and market conditions (monopolies, regulation, etc.). The tool should describe how these measurements could be used for: economic growth; wide social use of technology; and economic growth in the context of social issues such as consumer protection, privacy, etc. The tool should

clearly describe how to use the tool: when a policy assessment is needed; how the information is to be gathered, and what standards are to be used; who is needed to complete the assessment (diverse range of experts knowledgeable about issue, oversight of process to make sure accurate, etc); how long it should take; what the outcome should look like, including a narrative assessment of the policies, guided by or directly answering the survey questions, with recommendations on what to change; how to recognize majority and minority opinions and leave room for dissent; and what factors are usually under government control, and which are not. Finally, the tool should indicate how to use the results, including identifying potential difficulties with implementation, such as balancing consumer rights, business and labour issues.

ICT in South Africa

Vosloo (2004) notes that South Africa has an environment that is conductive to ICT Growth:

- It has a progressive ICT policy and legislative process.
- e-Government is fully functional.
- Market conditions are supported by a liberal, free market economic policy.

After the first democratic elections, South Africa's challenge was to balance sustainable economic growth with social empowerment. This was addressed by several related ICT initiatives including the South Africa IT Strategy Project (SAITIS) - how to make South Africa regionally and globally competitive and, at the same time, use ICT as an enabler of social equity. This project was developed by the Department of Trade and Industry and the Department of Communication, in consultation with the private sector and other stakeholders. SAITIS has four fundamental objectives: (1) to create a robust, growing and sustainable ICT sector; (2) to increase use of ICT as an enabler for socio-economic development; (3) to create a knowledgeable and growing ICT workforce; and (4) to create a world-class culture of ICT innovation. The specific initiatives sponsored by SAITIS included: providing Internet access in schools; creating an academy for software development training; providing community Internet access points;

and installing public information terminals for access to government services. The SAITIS strategy recognized that the development of the local market could act as a powerful stimulus to the ICT sector and could have substantial socio-economic benefits for other sectors. To do this, the extension of ICT usage needed to take place in four areas - local market development, applications development, information infrastructure development, and achieving ubiquity of access (Accenture Markle Foundation (AMF), 2001).

AMF (2001) notes that the 1996 Telecommunications Act had an important objective - promotion of universal service and affordable provision of telecommunication services. The government therefore organized a number of ministerial clusters: Efficient Governance, Investment and Employment, Human Resource Development, Poverty Eradication and International Affairs, to try to control the cross-sector benefits of ICT. This was done so that they could try to reduce the potential waste of resources and to create reinforcing strategies through coordinated deployment of resources, visible sponsorship and wider stakeholder involvement. The South African ICT sector has been able to build on a relatively good infrastructure and a small, but highly skilled, IT professional base. However, AMF (2001) conclude that most of the development has been limited to small-scale local projects or within foreign-owned companies. South Africa has been able to extend its base of ICT usage with the development of infrastructure and applications made available through government community initiatives, as well as by the private sector, which extended both usage as well as training to its employees. Moreover, that not every citizen is enabled to use ICT because access and technology are only available in primary and secondary towns and not in remote and rural areas. ICT education is improving in some instances but not all schools have infrastructure and computers, and even when they do, they fall into disrepair without maintenance due to a shortage of IT-literate staff to use and maintain them.

Vosloo (2004) notes that there are two major influences on South African Government policies and programmes (including ICT-related ones), namely Batho Pele and the New Partnership for Africa's Development (NEPAD). Batho Pele – meaning "people first" – is a policy framework and

practical implementation strategy for the transformation of public sector delivery. It is made up of a number of principles, two of which are to "provide more and better information" and "increase openness and transparency" - DPSA (as *cited* in Vosloo, 2004). NEPAD is a pan-African pledge by African leaders to eradicate poverty in their countries through sustainable growth and development. It is a comprehensive and long-term programme, which has identified ICT as a major contributor to achieving its goals.

Due to South Africa's lively ICT policy environment the SA Government encourages healthy debate and the policy-making process, which allows for generally consultative and forward thinking. A variety of legislation covers a range of issues such as e-Commerce transactions between citizens, businesses and government; ICT security issues such as online privacy and the regulation of the ICT market. These ICT policies are generally conducive to the growth of the ICT sector, except for the slow implementation of a second national telecommunications operator, required to alleviate the dampening monopoly of Telkom (Vosloo 2004).

Conclusion

This study has presented a framework of factors to determine the degree of e-readiness of emerging economies. It has been shown that the framework includes the following factors: network access, networked learning, networked society, networked economy, and network policy that are weighted to establish global comparative rankings of countries according to six categories of criteria, namely connectivity and technology infrastructure, business criteria, rate of consumer business adoption, the legal and policy environment, the social and cultural environment, and supporting e-Services.

McConnell International (2000) notes that no nation will become "e-Ready" overnight; and nations that are today's e-Leaders are not guaranteed to be tomorrow's leaders. However, due to the nature of the new economy, those nations and businesses that can adapt quickly to new technology, seize new opportunities, and take strategic risks will prosper. Less prepared economies have an opportunity to learn from the global community and leap to higher levels of preparedness. Maplecroft.Net (2005) acknowledges that – whilst there is no 'one size fits all' approach, experiences of successful

projects suggest a need to avoid over-ambitious top-down initiatives and ensure multi-stakeholder involvement. ICT can trigger a 'development dynamic' that gains momentum as targeted steps are taken in key areas such as policy, infrastructure, human capacity, entrepreneurship and development of locally relevant content and applications.

The following broad conclusions can however be made - Development initiatives need to be more equitably spread across all sectors (e-Learning, e-Health, e-Government, etc.); Development initiatives need to be coordinated; Private-public partnerships are encouraged; Appropriate research and development is encouraged and Workshops are encouraged to enhance stakeholder consultation (Bridges.org, 2003b).

As concluded by the SADC e-Readiness Task Force (2002), South Africa is at the forefront of the SADC region with regard to ICT development, although further development in the ICT, as well as the economic arena, must take place before South Africa can be compared to the developed countries, or some developing countries in Asia and South America. It can, however, immediately provide a role model to, and render assistance to, fellow member states in the SADC region. Moreover, Africa's leaders recognize the part that ICT has to play. Indeed, it is seen as the cornerstone on which many of the solutions to the problems facing Africa will be built. However, ICT has to be more available to people in terms of physical access, affordability, appropriate technology and locally relevant content. Achieving e-readiness across Africa will require bold and ambitious steps. Legal and regulatory frameworks will need to be overhauled, sometimes in the face of opposition. Innovative uses of technology will need to be found to deliver ICT where it is needed most. Content that is relevant to local needs must be produced and distributed. Governments and policy-makers will need help and advice to make tough decisions. Understanding the problems, and having a range of recommendations and solutions that are in a local context, will help Africa's current and future leaders and administrators to achieve their aims (Bridges.org, 2003).

With the recent introduction of a Second network Operator (SNO) and 3G services in South Africa - huge changes in affordability and access (newer technologies such as wireless do not depend on installed infrastructures) due competition will be experienced and will also cause

developments and opportunities. The researchers recommends that South Africa should take on the following activities – such as responding to development needs, by deriving and delivering services that directly influence targeted populations and improve their standard of living, demonstrating innovative, tailored solutions by identifying local conditions and constraints, working in close partnership with stakeholders (international institutions, carriers, governments, local authorities and communities), and Developing win-win approaches to ensure lasting commitment from all stakeholders (Maplecroft.NET, 2005).

The solutions to Africa's problems must come from within the continent, and Africa evidently is ready to rise to the challenge (Bridges.org, 2003). The potential of being e-Ready in conjunction with the social and economic success that the society can achieve in sustaining ICT initiatives seems to be a difficult but a worthwhile achievement.

References

Accenture Markle Foundation, United Nations Development Programme. 2001. July. *Creating a Development Dynamic: Final Report of the Digital Opportunity Initiative.* Retrieved May 13, 2005 from http://www.opt-init.org/framework.html

APEC Readiness Initiative. 2000. e-*Commerce Readiness Assessment G.* Retrieved September 25, 2005 from http://www.ecommerce.gov/apec/docs/readiness_guide_files/readiness_guide_5.pdf

Bridges.org. 2001. 14 March. *Comparison of E-Readiness Assessment Models.* Retrieved August 9, 2005 from http://www.bridges.org/ereadiness/comparison.html

Bridges.org. 2003a. 7 January. *World Economic Forum-NEPAD e-Africa Commission e-Readiness Policy Programme: Building Capacity to Narrow the Digital Divide in Africa from Within.* Retrieved August 9, 2005 from http://www.bridges.org

Bridges.org. 2003b. October. *Inventory and Analysis of South African ICT Initiatives: Government, Private Sector and Civil society.* Retrieved August 9, 2005 from http://www.bridges.org

Bridges.org. 2004. *Spanning the Digital Divide: Understanding and Tackling the Issues.* Retrieved August 9, 2005 from http://www.bridges.org

Bridges.org. 2005, 11 May. *E-Ready for What? E-Readiness in Developing Countries: Current Status and Prospects toward the Millennium Development Goals.* Retrieved August 9, 2005 from http://www.bridges.org

Budhiraja, R & S Sachdeva 2002. *e-Readiness Assessment.* Retrieved September 25, 2005 from http://www.bridges.org/resources/ereadiness.html

Choucri, N, V Maugis, S Madnick & M Siegel 2003, May. *GLOBAL e-READINESS - for WHAT?.* Retrieved September 25, 2005 from http://ebusiness.mit.edu

Colorado State University. 2005. Overview: Reliability and Validity. Retrieved October 6, 2005 from http://writing.colostate.edu/guides/research/relval/index.cfm

CSPP. 2000. *The CSPP Readiness Guide: For Living in the Networked world.* Retrieved August 23, 2005 from http://www.cspp.org/readinessguide/intro.cfm

Doktor, R 2002. *Accelerating E-Government...E-Readiness at Work.* Retrieved July 29, 2005 from http://www.mcconnellinternational.com

ebusinessforum. 2005. *Doing e-Business in South Africa.* Retrieved August 9, 2005 from http://www.ebusinessforum.com/index.asp

Electronic Communications and Transactions Act 25 of 2002/6/20

Formby, H Rival at last for Telkom. *Sunday Times – Business Times*, 11 December 2005: 3.

Gates, B & M Mitchell 2002. 9th August. *Can ICT Stimulate Economic Development?* Retrieved March 10, 2005 from http://digitaldivide.net/articles/view.php?ArticleID=186

Gillis, B & M Mitchell 2002. 9 August. *Can ICT Stimulate Economic Development?* Retrieved March 10, 2005 from http://www.digitaldivide.net/articles/view.php?ArticleID=186

Herselman, M 2005. *ICT Policy for South Africa: New Developments.* Retrieved May 13, 2005 from http://www.actapress.com/Abstract.aspx?paperId=11463

Information Technologies Group. 2000. *Readiness for the Networked A Guide for Developing Countries World.* Retrieved May 13, 2005 from http://www.readinessguide.org

International Telecommunications Union 2003, December. *World Telecommunication Development Report 2003 - Access Indicators for the Information Society.* Retrieved November 14, 2005 from http:/www.itu.int/ITUD/ict/publications/wtdr_03/material/WTDR2003Sum_e.pdf

International Telecommunications Union. 2004. *ITU Indicators – Digital Access Index (DAI).* Retrieved November 14, 2005 from http://www.itu.int/ITU-D/ict/dai/.html

ITU E-Strategy Unit 2003. *Empowering Development.* Retrieved August 9, 2005 from http://www.itu.int/ITU-D/e-strategy

Krull, A. 2003. *ICT Infrastructure and E-readiness Assessment Report – ESTONIA.* Retrieved September 25, 2005 from http://www.google.com

KZN DEDT. 2002. *The Department of Economic Development - Core Business.* Retrieved October 21, 2005 from http://www.kzndeat.gov.za /over_dedt/core.html

Maplecroft.Net. 2005. *Global Map of Digital Inclusion.* Retrieved November 14, 2005 from http://maps.maplecroft.net/digital

McConnell International. 2000. August. *Risk E-Business: Seizing the Opportunity of Global E-Readiness.* Retrieved May 5, 2005 from http://www.mcconnellinternational.com/ereadiness/EReadinessReport.htm

McConnell International. 2001. May. *Ready? Net. Go! - Partnerships Leading the Global Economy.* Retrieved May 5, 2005 from http://www.mcconnellinternational.com

Mukhopadhyay, D & Venkataramana, Y. 2003. 21 July. *E-Readiness Assessment of States.* Retrieved May 5, 2005 from http://www.google.com

Nua Internet Surveys. 2002. *How Many Online? – Africa.* Retrieved November 8, 2005 from http://www.nua.ie/surveys/how_many_online/index.html

Pearlman, B 2002. 9 April. Inside the Digital Divide: *Connecting Youth to Opportunities in the New Economy.* Retrieved March 10, 2005 from

http://www.digitaldivide.net/articles/view.php?ArticleID=259

The Southern African Development Community (SADC) e-Readiness Task Force 2002. *SADC e-Readiness Review and Strategy - Recommendations of the SADC e-Readiness Task Force.* Retrieved July 29, 2005 from http://www.weforum.org/site/knowledge navigator.nsf/Content/_S7144

The Economist Intelligence Unit. 2004. *The 2004 e-readiness Rankings A White Paper from the Economist Intelligence Unit.* Retrieved May 5, 2005 from http://www.eiu.com/2004eReadinessRankings

The Economist Intelligence Unit. 2005. *The 2005 e-readiness Rankings A White Paper from the Economist Intelligence Unit.* Retrieved May 5, 2005 from http://www.eiu.com/2005eReadinessRankings

Turner, R 2002. 12 March. *Extending the Information Revolution – IT Utilization by Non-profits and Community.* . Retrieved March 10, 2005 from http://digitaldivide.net/articles/view.php?ArticleID=227.

Twist, K 2000. 4 December. *Addressing the Demand for an Information Age Workforce.* Retrieved March 10, 2005 from http://digitaldivide. net/articles/view.php?ArticleID=156

Vosloo, S 2004, September. e-*Government and the e-Readiness of Non-Profit Organisations in the Western Cape.* Cape Town : Department of Information Systems -University of Cape Town.

World Economic Forum 2002, January. *Better, Faster, Cheaper: Developing and Leveraging World Class ICT Networks for Social and Economic Advancement.* Retrieved August 9, 2005 from http://www. bridges.org/e-policy/sadc_wef/sadc_wef_ereadiness.pdf

Darren Edwin Naidoo
Rembrandt Klopper
School of Information Systems & Technology
University of KwaZulu-Natal
Durban