

NEXT GENERATION ICT POLICY IN SOUTH AFRICA: TOWARDS A HUMAN DEVELOPMENT-BASED ICT POLICY

Walter Brown
Monash University South Africa, South Africa

Irwin Brown
University of Cape Town, South Africa

Abstract This chapter discusses the critical link between human development and information and communications technology (ICT) policy in South Africa. Through a review of relevant literature, the status of human development and ICT growth in South Africa was investigated. The findings showed that South Africa is lagging behind many similar developing countries in terms of both ICT growth and human development. The South African ICT policy environment was analysed and found to lack a strong emphasis on human development. A human development-based ICT policy is advocated, and recommendations for achieving this are made.

Keywords: Human development, ICT policy, Next Generation Networks

1. Introduction

According to the United Nations Development Programme's (UNDP) Human Development Reports, South Africa's Human Development Index (HDI) ranking (a measure of the population's life expectancy, education, literacy, and gross domestic product (GDP) per capita) declined 35 places between 1990 and 2005, while nearly all other developing countries showed significant gains [36]. Numerous papers have been written on how ICTs can contribute towards human development [7]. In South Africa, this clearly has not happened, despite its ICT infrastructure being one of the most sophisticated in Africa [2]. ICT diffusion and utilization in South Africa is limited to a small segment of the population whose HDIs are equivalent to many high income economies [2]. A large proportion of the population remains disadvantaged, with very low ICT service levels, and HDI levels equivalent to many low income economies [2]. As a result South Africa's average HDI of 121 places the country below countries with similar population levels, but significantly smaller economies such as Colombia (HDI rank 70), Thailand (74), Vietnam (109), and Egypt (111) [36].

The focus of general ICT policy tends to be on the technology and ownership structures. This chapter suggests an urgent need for a rethink towards a more human development-based ICT policy in order to extend modern ICT services for the benefit of all South Africans. In the next section a review of the state of South Africa's human development and ICT growth is presented, followed by a discussion and critique of the current South African ICT policy focus. Implications of the findings are then considered. In conclusion, recommendations for moving towards a more human development-based ICT policy focus are made.

2. Human development in South Africa

Human development has been defined as “the process of enlarging people’s choices. Their three essential choices are to lead a long and healthy life, to acquire knowledge and to have access to the resources needed for a decent standard of living” [23]. The UNDP has developed a means of assessing human development in a nation through the use of the HDI [36]. The state of human development in South Africa is well documented in reports compiled and published by the UNDP [36]. These reports and others show that South Africa is a complex country, deeply divided into a developed “first economy”, and an under-developed “second economy” [29]. Those few within the “first economy” reside and work in highly developed first world enclaves with access to sophisticated ICT infrastructure. The majority operate in the “second economy”, residing in deprived urban enclaves, or in rural areas afflicted by extreme and chronic poverty [30].

As mentioned, South Africa is, as a result, ranked 121st on the HDI index, placing it in the lower half of the medium human development classification [36]. The lowest ranked country is Niger at 177 [36]. In this section, key South African issues relating to the HDI are discussed, followed by a review of South Africa’s ICT growth in comparison to other countries.

2.1 Economic and social inequalities

The standard of living of a country is assessed by GDP per capita [36]. South Africa performs well on this indicator in comparison to other African countries. However, the GDP per capita masks the level of inequality between socio-economic groups within a country since it presents an overall average score. To assess the level of economic inequality in a country the Gini coefficient is used [36]. South Africa’s inequality is reflected in a high Gini coefficient of 57.8. The richest 10% of its citizens consume 33.1 times more than the poorest 10%. Only one country, Botswana, has a higher GDP per capita and lower HDI rank than South Africa [36]. The implication is that both Botswana and South Africa are inefficient users of national wealth for human development.

South Africa’s history of race-based segregation has led to social inequalities along racial lines. These exacerbate the economic inequalities reflected by the Gini coefficient. Classification along racial lines has been retained by the post-

apartheid South Africa as a means for monitoring progress in efforts aimed at reversing racially based inequalities [9, 31]. Despite constituting 79% of the population, 76% of the lowest wage earners are Black South Africans [31]. 75% of the highest wage earners are White South Africans who represent just 10% of the population [31]. Reversing this social divide has proven to be extremely complex. Used appropriately, and with enabling policies, ICTs can and should be used to help reduce these inequalities.

2.2 *Life expectancy*

Life expectancy at birth reflects the ability of a population to lead a long and healthy life [36]. It is as such heavily influenced by poverty and health pandemics such as HIV/AIDS. South Africa has declining levels of life expectancy [36]. Poverty and the HIV/AIDS crisis are the primary causes. South Africa's average life expectancy is 31 years below Japan's 82.3 years [36]. As with standard of living indicators, life expectancy amongst the economically advantaged is high, but the decline is evident amongst the disadvantaged majority. It follows that ICT policy focused on the use of ICTs to assist in poverty eradication and health work should be a key priority in South Africa.

2.3 *Access to mother tongue education*

Education, and its less tangible but more profound concepts of knowledge and wisdom, is a critical component of human development [36]. Post-apartheid South Africa has succeeded well in expanding school enrolment to all South Africans, but quality remains problematic as reflected by the country's poor performance in the International Reading Literacy Survey of 2006 [14]. This chapter highlights just one possible contributing factor to poor educational performance - access to mother tongue education at an early age. With just 13% of young African children able to access early childhood education in their home language, compared to 62% in the next lowest region, East Asia and Pacific [35], Africa's children are clearly at a significant disadvantage. They are obliged to learn how to learn in a foreign language from a very early age. South Africa, with eleven official languages [2] and several more regional dialects, faces a daunting task in delivering high quality cost-effective education to all its citizens. ICTs present an invaluable opportunity to ameliorate this national challenge. To be effective, ICTs need supportive policies and regulatory systems that focus on education as an important component of human development.

2.4 *ICT growth in South Africa*

The analysis of human development has shown that South Africa faces immense challenges related to inequalities in standard of living, life expectancy, and education. ICTs can play an enabling role in addressing these challenges. In this section, South Africa's ICT growth over the past few decades is compared

against other countries with similar characteristics. The costs associated with enabling technologies such as broadband interconnectivity are highlighted.

In the 1970's, South Africa shared similarities in population, economic levels and ICT development with Colombia, South Korea and Spain (see Figure 1). During the past thirty years South Korea's GDP per capita grew forty-fold, and Spain's thirteen-fold while South Africa's GDP per capita only quadrupled, barely keeping up with inflation [20]. To support economic growth during the same period, South Korea's fixed line access grew by a factor of 31.8 compared to South Africa's 2.7. In the early 1980's, South Korea introduced a national development policy of "One Family One Telephone", and delivered on it [27]. By 2005/2006, South Korea had joined the ranks of high income countries, and led the world in the Digital Opportunity Index (DOI), a new composite measure of ICT development that takes into account ICT access, use and affordability [19]. In contrast, Colombia and South Africa were ranked 80 and 86 respectively on the DOI [19]. This contrast reveals the close interrelationship between ICT development and economic development, with each reinforcing the other.

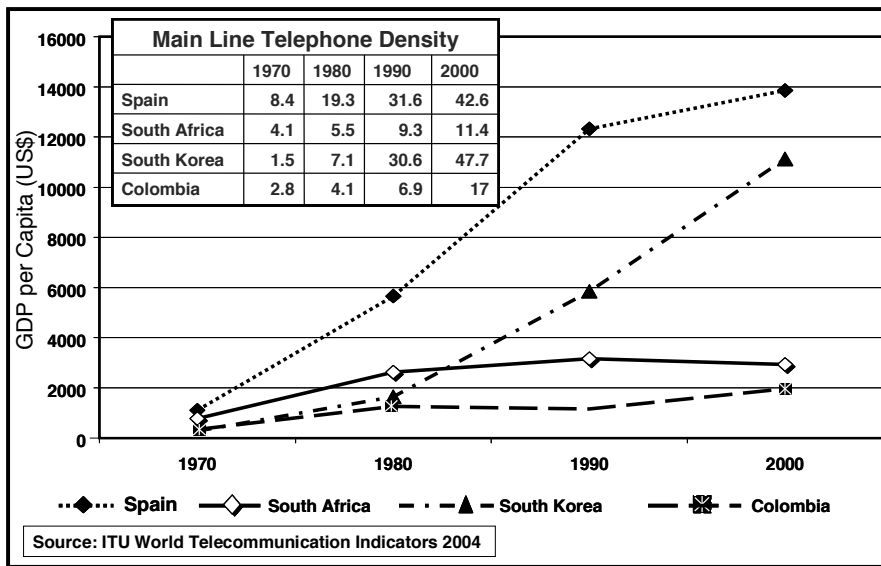


Figure 1: Thirty-Year Economic and ICT Growth: Five Similar Countries Compared [20].

The benign economic growth in South Africa over the period is mirrored by the limited growth in telephone density. During the apartheid era (pre-1994) the telecommunications infrastructure was developed to support the White-dominated "first economy". Little effort was expended on developing infrastructure for the majority of the population. In the immediate post-apartheid period after 1994,

efforts were made at increasing telephone density amongst the disadvantaged, but this effort could not be sustained. Many “second economy” consumers that were provided with telephone services were unable to afford it, and lines were disconnected [8]. Mobile phone services introduced in 1994 [34] became effective substitutes for fixed line access, but their affordability remains a matter of great concern [8, 30].

Commercial Internet services were launched in South Africa in 1994 [2]. There was rapid growth from 1994 to 2000, but this was short-lived. The Internet was only affordable and accessible to those operating in the developed “first economy”. Growth therefore stagnated as levels of saturation were reached in the “first economy” [2]. To date the number of Internet users per capita remains below 10%, due to the high cost and inaccessibility of Internet services to the majority of the population [2].

Affordability of ICTs is essential for human development [19]. Table 1 below compares typical South African broadband prices to Japan [15, 17]. Broadband tariffs are falling as illustrated in Table 1, but these decreases are not deep or fast enough to realise the full benefits of the full range of ICTs services as enablers of human development. In fact, the Table demonstrates the paradoxical situation that the most developed countries (e.g., Japan) often have the cheapest ICT services. In developing countries such as South Africa with much greater needs for the human development support services that ICTs offer, prices are much higher. Mobile services have partially bridged the information divide, but their knowledge delivery capacity cannot be compared with high speed fixed broadband infrastructure. Furthermore, sophisticated, leading edge data and multimedia mobile services are pervasive in the “first economy”, whilst in the “second economy”, simple voice and possibly SMS services are the norm [2].

Bandwidth	South Africa			Japan		
	Bandwidth limit	Price per Month (US\$)		Bandwidth Limit	Price per month (US\$)	
Price Change	-	Feb. 2006	Apr. 2008	-	2003	2004
192kb/s	3GB	87.54	49.14	Nil	0.25	0.11
512kb/s	10GB	207	171.71	Nil	0.70	0.31
1Mb/s	10GB	238	193.71	Nil	1.38	0.61
Data Source & Notes	http://www.interprise.co.za Access dates as per price data			Prices based on 47Mb/s http://www.itu.int/ubiquitous UNS Japan Case Study		

Table 1: Broadband Price Comparisons between South Africa and Japan [15, 17].

The analysis has revealed that ICT growth and development in South Africa has generally been unequal. Telecommunications services, with the exception of

basic mobile telephony, are largely available to those that can afford it in the developed “first economy”, with ICTs in general having little impact on human development in the “second economy”. Efforts have been made to reach underserved communities through, for example, multipurpose community centres with mixed results [2]. In the next section, a review of ICT definitions and meanings are presented before ICT policy in South Africa is examined.

3. Review of ICT definitions and meanings

The rapid growth of ICTs, and the commercial interests associated with them, led to fragmentation in the ICT industry and a proliferation of technical terms and acronyms. This proliferation of terms has tended to confuse and misdirect ICT policy makers and ICT users alike. Fragmentation has spawned a new divide between the “Bellheads” who built, own and defend the traditional telecommunications public switched telephone network (PSTN) infrastructures, and the “Netheads” who build, operate, and defend the Internet [32]. Policy makers have been misled by these superficial divisions, protecting “Bellheads” from competition and allowing competition by many “Netheads” while restricting their range of services to protect the “Bellheads” [6]. In this section, well-known ICT definitions are re-examined with the specific objective of supporting this chapter’s proposal for a fundamental review of national ICT policies in South Africa, by returning to the original meanings of terms, and focusing attention on the human development potential of ICTs.

Before embarking on a review of selected components of ICTs, it is useful to review the prevailing definitions of the ICT acronym itself. The following definitions provide a good starting point:

Wikipedia [37]: “an umbrella term that includes all technologies for the communication of information”.

Richard Heeks [13]: “‘electronic means of capturing, processing, storing, and communicating information’ ICTs are based on digital information held as 1s and 0s, and comprise computer hardware, software and networks”.

The United Nations Development Programme (UNDP) [35]: “information-handling tools — a varied set of goods, applications and services that are used to produce, store, process, distribute and exchange information. They include the ‘old’ tools such as of radio, television and telephone, as well as the ‘new’ ICTs of computers, satellite and wireless technology and the internet”.

Even within this limited range of definitions, significant differences in actual or perceived meanings are apparent. The Wikipedia [37] definition stresses the communications aspect of ICTs, Heeks [13] emphasises the digital IT aspects, and the UNDP [35] prefers a broader meaning encompassing both communications and information processing. The UNDP definition has a potentially misleading bias: the classification of selected methods of providing ICTs as “old” or “new” tools. Returning all definitions of ICT components to their original meanings will help policymakers and consumers of ICT services to focus on the services

themselves, and not the manner in which they are delivered, or the technologies they use.

The definition of technology as used in the ICT acronym also needs to be reviewed and simplified for policy-making purposes. Wikipedia [37] defines technology as “a broad concept that deals with a species' usage and knowledge of tools and crafts, and how it affects a species' ability to control and adapt to its environment”. Using such a definition for technology, the very ancient “African talking drum” could be described as an ICT. It was used to transmit information which affected the user community’s ability to control and adapt to their environment [24]. Reverting to this simple meaning of the term “technology” should assist policy makers in refocusing attention on the benefits to be derived from the use of technology, and not on the technology itself.

The base line definitions in the following reviews were taken from the standard Oxford Dictionary.

3.1 *Telecommunications*

Telecommunications: *Derived from the Greek words “Tele” meaning “far, at a distance”, and “Communications”, the act of imparting or transmitting information.* The definition is agnostic to the technology used to move information from one place to another, and to the content and form of the information. The term applies equally to voice, numerical data or graphic images. Reverting to the term telecommunications to describe any form of electronic communications would simplify policy formulation and regulation of the industry, and would improve user understanding and therefore assimilation and use. It would also be consistent with the desire for convergence of the ICT industry, and with the emerging concept and definition of Next Generation Networks (NGNs) [16, 18].

3.2 *Telegraphy*

Telegraphy: *Tele – Gk. far, at/from a distance: Graphē – Gk. writing.* The first digital electronic telecommunication, the “*Telegraph*” required a graphic input/output interface to enable satisfactory communications. Personal computers mobile telephones, broadband wireless and fibre optical cables have replaced the original Morse code telegraphic system and its wired infrastructure, but the principles remain unchanged. The Internet-based email “telegraph” has become a critical component of the knowledge society. The complexity of its current policy and regulatory control provisions has prevented this first ICT from benefiting the majority of South Africa’s citizens.

3.3 *Telephony*

Telephony: *Tele – Gk. Far, at/from a distance: Phōnē – Gk. voice.* The success of telephony was immense soon after its invention. It led to a cacophony of illogical ICT policies such as the United Kingdom’s Telecommunications Policy

of 1888 [21], which protected the British Post Office's monopoly for 75 years by legislating that a telephone was a "telegraph", and that a telephone call was a "telegram". The ICT industry has introduced a variety of acronyms and jargon to describe small variations in the manner in which telephony is delivered. We now have "old" telephony or Public Switched Telephone Networks (PSTN) [35]. Voice over Internet Protocol (VoIP), Value Added Networks (VANs) which are little more than private telephone networks, global Skype telephone services, and a wide variety of telephone systems differentiated only by the fact that they use radio (wireless) as the main transport platform. This cacophony of terms and jargon continues to increase as new ICT technologies present slightly differentiated applications and delivery opportunities. The commercial interests of the ICT industry are such that great pressure is exerted on policymakers and regulators to differentiate similar services for short term commercial gain. This chapter proposes that the best defence against such pressure is to rationalise and simplify all ICT definitions. By defining and classifying just one product, telecommunications, and obliging the ICT industry to compete on how best to deliver the richest and most cost-effective telecommunications to consumers, effective use and growth of information services would be promoted.

3.4 *Radio*

Radio: *The process of "wirelessly" delivering telecommunications through the air* (include Television here). The early use of the radio frequency spectrum to enable telecommunications was initially unencumbered by autocratic government policy and regulatory controls. Its value was nevertheless such that greed, stock fraud, and patent infringements encouraged close scrutiny by governments and their law enforcement agencies [5]. The control of the radio-frequency spectrum became highly politicised. These controls resulted in numerous classifications of telecommunications products delivered over radio transmission paths (e.g., radio, television, walkie-talkie, cell phone; wireless). South Africa's failure to provide high quality affordable broadband connections to the country's majority "second economy" citizens can be partly attributed to the complex system of classification and controls governing the use of the radio-frequency spectrum. Reducing the number of unique ICT classifications that govern spectrum allocation can help focus policy and regulatory systems on the human development potential of this resource.

3.5 *Data*

Data: (a) known facts or things used as a basis for inference or reckoning (b) quantities or characters operated on by a computer etc. The introduction of computers to process and transport data spawned a new data communications industry. The main feature that differentiated it from other forms of communications technology was the coding method used. Data in analogue form was modulated into a digital format and demodulated by the receiving terminal to

reproduce the data in its original analogue form. In the evolving NGNs [18], all forms of data will be transported in digital formats. In reality, they already are, but just routed or switched differently. This renders the term data communications obsolete, as it can be included under the broad rubric of telecommunications.

3.6 Information

Information: (a) *Something told, knowledge; (b) items of knowledge; (c) news.* Information is the core product of the ICT industry. For the purposes of policymaking and regulation there are only two information components of the ICT acronym: the unregulated information processing elements (IT) that enable information storage and processing, and the heavily regulated communications elements that transport processed or unprocessed information from one unregulated processing terminal to another. There seems little reason why the unregulated IT elements that encompass information processing functions should play any role in ICT policymaking or regulation, and yet they do. South Africa's current national ICT policy, the Electronic Communications Act of 2005 [10], has gone a long way to separating the IT sector from the communications sector, but still includes as its primary objective to "*promote and facilitate the convergence of telecommunications, broadcasting, information technologies and other services contemplated in this Act*" [10]. Simplifying this policy by focusing only on the transmission and receipt of information, i.e., telecommunications would be of great value. Such simplification would ease the regulatory process and promote the use of ICTs for human development. As technological advances enable more cost-effective delivery of any type of information in any mode, the retention of complexity in policies and regulatory controls is counterproductive. Telecommunications, the act of imparting or transmitting information over distance, would seem to be an adequate rationalization for control purposes.

3.7 Computers

Computers (and "Computer networks" aka the Internet): (a) *Calculating machines (b) Electronic machines used to process information.* The Internet, often defined as a network of computers, may use complex arithmetic processes to enable telecommunications, but its main input/output product is information transported from one place to another. The Internet is clearly a telecommunications network that uses computers as key components. It is most certainly not a computer network that uses telecommunications networks to compute. This potential to confuse and fragment the ICT industry was recognised early in the life of the Internet [12]. As early as 1963, the architects of the Internet anticipated the deep divisions and fragmentations that the overlapping computer and telecommunications industries could cause, and specifically described the nascent Internet as follows: "*The ARPA theme is that the promise offered by the computer as a communication medium between people, dwarfs into relative insignificance the historical beginnings of the computer as an arithmetic engine.*"

And “*It is not proper to think of networks as connecting computers. Rather, they connect people using computers to mediate. The great success of the Internet is not technical, but in human impact*” [12].

This profound statement was to a large extent ignored, as the industry fragmented. The emerging NGN [16, 18] offers an opportunity to converge all thinking, reverting to the single term telecommunications to describe all modes of transporting information, and fostering the selection of the most effective quality assured technologies available.

3.8 Summary of the discussion on ICT definitions

If all forms of moving information from one place to another could be allowed to revert to the original all-embracing term for the process - telecommunications, the policy and regulatory processes would be eased significantly. Technological advances enable full convergence of all fragmented forms of telecommunications. It is therefore possible for ICT policy focus to shift to the use of ICTs for human development. The guiding principles for policy reform could be reduced to:

Simplicity: The cumbersome licensing laws and control mechanisms add significantly to entry costs, impede effective competition, raise user prices, and effectively slow down national growth and local participation.

Focus on Information: National ICT policies should focus on the principal product of ICTs - the information needed for human, social and economic development, rather than technological complexity, commercial interests, or ownership issues.

Affordability and quality: New policies should encourage innovation at all levels. They should maximize the opportunities presented by new technologies to reduce infrastructure costs and access prices.

Ubiquity: National ICT policies should be continuously reviewed to ensure that access to all forms of telecommunication services will become available to all segments of the community. NGNs provide an invaluable opportunity to ensure ubiquity, effectiveness and ease of use of information products [16, 18].

Competition: National ICT policies should promote competition by lowering barriers to entry, and by monitoring the industry to ensure that dominant market power is not abused. Competition policy should focus equally on encouraging new competitive entrants, and on the competitive structures of the industry as a whole.

4. ICT policies in South Africa

It is not the purpose of this chapter to present a rigorous analysis or review of South Africa’s national ICT policy. Several studies have undertaken such analyses, and most have concluded that South Africa’s current national policy, represented by the Electronic Communications Act of 2005 (ECA) [10], is reasonably well constructed and intentioned [4]. It is effective implementation that remains elusive, however [4]. It has been observed that “*South Africa continues to*

descend down international scales of competitiveness and e-readiness in the telecommunications sector” [4]. This section discusses the major issues that impede effective implementation of the current policy.

4.1 Little focus on the utility of ICTs

The imperatives for rapid development of ICTs in South Africa are well known and desired by South Africa’s political and social leaders. The Electronic Communications Act began as the Convergence Bill, in line with recommendations of a sector analysis report published by the Yankee Group in 2003 [38]. The Yankee Group report emphasised the convergence of broadcasting and telecommunications, which became the dominant theme of the ECA. A high-level examination of the ECA indicates three dominant themes: licensing, broadcasting, and the structure and funding mechanism of the Universal Service and Access Agency of South Africa. The major focus of the act is control and enforcement, with little focus on the content or utility of ICTs.

4.2 Licensing delays

Implementation of the ICT licensing changes resulting from the ECA has been extremely costly, time consuming, and frustrating for existing and new ICT businesses. ICASA, the state ICT regulator, has limited capacity to convert all existing ICT licenses to the new competitive arrangements in the short term demanded, and has consequently delayed the licensing of new entrants. This has delayed the growth of the critical South African ICT industry, especially its expansion to effectively service the needs of South Africa’s majority “second economy” citizens.

4.3 Slow implementation of policy

Evidence of the slow implementation of policy reform is the process of local loop unbundling (LLU). Releasing the relatively large number of fully depreciated copper cable for competitive use by SMEs, especially in the under-serviced low income urban areas would go a long way towards introducing broadband services in these areas. The Department of Communications has studied this possibility extensively, and set a target of 2011 for completion of LLU [11]. Even the South African President’s expression of exasperation over this delay has had little effect on the lengthy LLU liberalization process [26]. Meanwhile, South Africa’s broadband prices remain high in comparison to the developed world [15, 17], and out of reach to the communities that need them most for development.

4.4 Ownership of ICT businesses

An important feature of national ICT policy is the concept of ownership of ICT business entities. Although this aspect is not covered specifically in the ECA, a

separate legal provision stipulates the levels of Black South African ownership and management control of ICT business entities [3]. The Department of Trade and Industry (DTI) has been tasked with warehousing all Black Economic Empowerment (BEE) Charters [3]. The BEE charters are clearly aimed at reversing the historical exclusion of Black South Africans from economic activity. The fine balance of redressing historical injustices while developing a modern high technology ICT driven knowledge society can, and has in some instances resulted in conflicts and contradictions. Lengthy delays in the introduction of effective competition in the ICT sector have slowed economic development [8]. The controversy surrounding recent proposals to amend the ECA to license Infraco, the proposed state-owned national and international broadband provider [25], and efforts to prevent private sector international fibre optic cables from landing in South Africa, created controversy and embarrassment for the government [1, 22, 33].

5. Discussion and implications

Despite a well-formulated and well-intentioned ICT policy environment in South Africa, several problems persist. The analysis above has identified the lack of focus on the utility of ICTs, licensing delays, slow implementation of policy, and a fixation on ownership of ICT businesses as problematic. These issues may be the reason why ICTs seem to be having little effect on human development in South Africa's "second economy". A human-development-based ICT policy would make the key elements and components of human development explicit in the policy framework. Licensing delays and slow implementation of policy are at odds with the urgency required to address the socio-economic deprivation in poor communities. A focus on ownership structures, while necessary to address racial inequalities, also diverts attention away from speedy delivery of services to the poor. In addition, government has tended to adopt a techno-centric approach to implementation of services in under-served areas with generally disappointing results [28]. By ignoring critical human development components and community participative issues in ICT for Development (ICT4D), many initiatives have failed [8, 28]. Simplifying South Africa's ICT policy and regulatory systems through simplification and rationalization of the underlying definitions of the ICT industry, focussing on the human development utility of ICTs, and promoting unfettered competition in a horizontally structured NGN industry would be an elegant starting point for this development.

6. Conclusion and recommendations

South Africa is faced with immense socio-economic problems emanating from the many divides created by apartheid. ICTs present a means of addressing some of these problems. Simpler human development-focused ICT policies and

regulatory systems are a prerequisite for the introduction of affordable ubiquitous modern ICT products and services to all South Africans.

This chapter has very briefly summarised the human development challenges faced by the South African nation as a whole. A sample of key statistics reveals that South Africa's ICT growth is lagging behind equivalent emerging economies. If South Africa is to join the global knowledge society, the country will need highly effective ICTs that are accessible, affordable, and used by the majority of South Africans. Creating such an ICT environment demands simple yet effective human development-based ICT policies and regulatory systems that can be implemented quickly and transparently. Such simplicity will encourage ICT service providers and consumers to participate more in the process of development. A human development focus will ensure ICTs have a positive impact on standard of living, life expectancy and improved education especially in the marginalized "second economy".

The following recommendations are offered as additional activities that can lead to early policy and regulatory changes to support improved human development through improved use of ICTs.

Recognition: Begin high level dialogue using all available forums to create or reinforce awareness of the link between ICTs and human development. South African government organs, ICT industry representatives, and civil society should be included in these discussions.

Research: Initiate research programmes aimed specifically at ICT policy reforms. Action research projects, for example, will allow for monitoring of the intervention process and enable the identification of any policy or regulatory barriers that impede successful achievement of the research objectives. These will provide potent arguments for the required reforms.

Advocacy: Opportunities to create awareness and influence key role players in the human development process should be utilized.

Development: The introduction of a national NGN Forum should be encouraged, focused on developing consensus on the nature and form of the concept. The desired NGN Forum could be a new stand alone initiative, or a special focus group within existing forums, societies or associations. The forum or focus groups should preferably comprise multi-disciplinary groups to analyse and initiate action programs along the lines of the many highly influential NGN forums that exist in virtually all regions of the world except Africa.

Systematic implementation of the above proposals should result in a change in South Africa's ICT environment, and consequently South Africa's overall development and entry into the global knowledge society.

References

- [1] Barron, C. (2007). SA undersea broadband cables are in a tangle, Business Times, 16th Sep, <http://mybroadband.co.za/news/Telecoms/1328.html>, Accessed 30 November 2007.

- [2] Brown, I., Collins, T., Maleka, B., Morrison, D., Muganda, N., & Speight, H. (2007). Global diffusion of the Internet XI: Internet diffusion and its determinants in South Africa: The first decade of democracy (1994-2004) and beyond. *Communications of the Association for Information Systems*, 19, 142-182.
- [3] DTI: Department of Trade and Industry (2004). ICT empowerment charter working group, <http://www.thedti.gov.za/bee/beecharter.htm>, Accessed 24 April 2008.
- [4] Esselaar, S., Gillwald A., & Stork C. (2006). South African telecommunications sector performance review 2006. LINK Centre Public Policy Research Paper No 8, Witwatersrand University, South Africa.
- [5] Fayant, F. (1907). Fools and their money, *Success Magazine*, 9-11, 49-52 Available at: <http://earlyradiohistory.us/1907fool.htm>, Accessed 30 November 2007.
- [6] Frieden, R. (2002). Revenge of the Bellheads: How the Netheads lost control of the Internet, *Telecommunications Policy*, 26 (7-8), 425 – 444.
- [7] Gilholly, D (2005). Innovation and investment: Information and communication technologies and the Millennium Development Goals. United Nations Information and Communications Technologies Task Force.
- [8] Gillwald, A. & S. Esselaar (2004). South African ICT sector performance review. LINK Centre Public Policy Research Paper No 7, Witwatersrand University, South Africa.
- [9] Government of the Republic of South Africa (1998). Employment Equity Act No. 55, Government Gazette, 19 October, 1998.
- [10] Government of the Republic of South Africa (2006). Act No. 36 of 2005: Electronic Communications Act 2005. The Government Gazette Volume 490 number 28743 dated 18th April 2006.
- [11] Government of the Republic of South Africa (2008). Notice to invite public participation in the Local Loop Unbundling process, <http://www.info.gov.za/speeches/2008/08022908451001.htm>, Accessed 01 May, 2008.
- [12] Hauben, M. (n.d.) History of ARPANET, <http://www.dei.isep.ipp.pt/~acc/docs/arpa.html>, Accessed 30 November 2007.
- [13] Heeks, R. (1999). Information and communications technologies, poverty and development. Institute for Development Policy and Management, University of Manchester.
- [14] IAEA: International Association of Educational Achievement (2007). PIRLS 2006 international report, Boston: TIMSS & PIRLS International Study Centre, Lynch School of Education, Boston College.
- [15] Interprise (2008). ADSL Pricing.
- [16] ITU: International Telecommunication Union (2004). ITU-T recommendation Y.2001 (12/2004) - General overview of NGN.
- [17] ITU: International Telecommunications Union (2005). Ubiquitous network societies: The case of Japan. ITU, <http://www.itu.int/ubiquitous>. Accessed 01 May 2008.
- [18] ITU: International Telecommunication Union (2007). Trends in telecommunications reform: The road to Next Generation Networks (NGN). ITU.
- [19] ITU: International Telecommunication Union (2007). World information society report 2007: Beyond WSIS. ITU and United Nations Conference on Trade and Development (UNCTAD).
- [20] ITU: International Telecommunications Union (2008). World telecommunications/ICT indicators database, <http://www.itu.int/ITU-D/ict/publications/world/world.html>, Accessed 01 May 2008.

- [21] Levy, B. & Spiller, P. (2002). The institutional foundations of regulatory commitment: A comparative analysis of telecommunications regulation, *Journal of Law, Economics, and Organization*, 10(2), 201-246.
- [22] Mochiko, T. (2007). State demands slice of Seacom pie, Business Report, 23rd Aug, <http://mybroadband.co.za/news/Telecoms/1068.html>, Accessed 30 November 2007.
- [23] OECD (2003). OECD glossary of statistical terms. <http://stats.oecd.org/glossary/detail.asp?ID=1265>, Accessed 01 May 2008.
- [24] Ong, W. (1977). African talking drums and oral noetics, *New Literary History*, 8(3), 411-429.
- [25] Polity.org.za (2007). Broadband Infracore Bill, <http://www.polity.org.za/>, Accessed 30 November 2007.
- [26] Presidency: Republic of South Africa (2007). President Mbeki meets the ICT Advisory Council, <http://www.thepresidency.gov.za/show.asp?type=pr&include=president/pr/2007/pr0824821.htm>, Accessed 30 November 2007.
- [27] Reynolds, T., Kelly, T. and Jin-Kyu, J. (2005). Ubiquitous network societies: The case of the Republic of Korea. ITU, Available at <http://www.itu.int/ubiquitous>. Accessed 30 November 2007.
- [28] Roode, D., Speight, H., Pollock, M., & Weber, R. (2004). It's not the digital divide – it's the socio-techno divide! *Proceedings of the 13th European Conference on Information Systems*, Turku, Finland, June 14-16, 2004.
- [29] SARPAN: South African Regional Poverty Network (2004). Readings on the second economy, <http://www.sarpn.org.za/documents/d0000830/index.php>, Accessed 19 December 2005.
- [30] Skuse, S., & Cousins, T. (2007). Managing distance: Rural poverty and the promise of communication in post-Apartheid South Africa. *Journal of Asian and African Studies*, 42(2), 185-207.
- [31] Stats SA: Department of Statistics, South Africa (2003). Census 2001, <http://www.statssa.gov.za/SpecialProjects/Census2001/Census2001.htm> Accessed 22 July 2003.
- [32] Steinberg, S. (1996). Netheads vs. Bellheads, *Wired*, 4.10, <http://www.wired.com/wired/archive/4.10/atm.html>, Accessed 30 November, 2007.
- [33] Stones, L. (2007). Undersea cable plan tangled in acrimony, *Business Day*, 5th Sep, <http://www.businessday.co.za/articles/article.aspx?ID=BD4A556150>, Accessed 30 November 2007.
- [34] Telkom (2006). Highlights of the telecommunications history of South Africa. Telkom, <http://www.telkom.co.za/>, Accessed 06 December 2006.
- [35] UNDP: United Nations Development Programme (2004). Regional human development report: Promoting ICT for human development in Asia 2004: Realising the Millennium Development Goals. UNDP.
- [36] UNDP: United Nations Development Programme (2004 to 2006). Human development reports 2004, 2005, 2006. UNDP, <http://hdr.undp.org/en/reports/>. Accessed 30 November 2007.
- [37] Wikipedia (2008). Wikipedia, <http://www.wikipedia.org/>, Accessed 01 May 2008.
- [38] Yankee Group (2003). South African communications, 2002-2008: Market review and analyses. The Yankee Group, 31 St. James Ave., Boston MA 02116.