

ICT AS AN ENGINE OF ECONOMIC GROWTH IN THE CONGO

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Literature Review

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Abstract

The Democratic Republic of Congo (DRC) is currently a poor giant in the heart of Africa. Although it is richly endowed with natural resources and vast mineral deposits, this country of 2,345,410 square kilometers is one of the poorest countries in the world. This is partly due to the fact that DRC continues to rely heavily on the exploitation of its mineral resources, disregarding all other resources. DRC has yet to fully exploit the great potential of ICT as an engine of economic growth and social development. By adopting a coherent ICT plan, the Democratic Republic of Congo can overcome several development challenges it confronts. In fact, it has the potential of becoming an ICT powerhouse in Africa in the same way India has become in Asia. The purpose of this paper is to make a case for the adoption of ICT for economic growth and social development in DRC. This literature review explores how ICT can play a major part in generating and sustaining economic growth and social development in DRC, and includes annotated references for further information on resources used to research this topic.

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Introduction

There is growing recognition that Information and Communication Technologies can be a catalyst for social and economic development. Over the years, studies have ascertained the enormous potential that Information and Communication Technologies have to bring widespread social, political and economic benefits to developing countries. They can create a new human society, facilitate the rise of human capabilities to new heights, generate economic growth, and reduce poverty (Torero and Braun, 2006).

Indeed, there is substantial empirical evidence that some sectors of some developing countries are harnessing the social and economic benefits that ICT offer. As Jun (2005) notes, experts have “long recognized the economic and social benefits of information and communication technologies (ICTs)” (p.904). Certain firms have dramatically improved their competitiveness by using ICT and some developing countries are increasing their export strengths in the ICT sector. There are governments in the developing world that provide some services to their citizens more efficiently using Information and Communication Technology. Yahya (1993) holds the same view. He contends that “information technology has a great potential for the economic development of third world countries.” (p.349)

Despite an abundant body of literature that attests that cost-effective utilization of ICTs can spur economic growth and social development, many African countries are still dragging their feet and ignoring the benefits that ICTs can provide.

The Democratic Republic of Congo, formerly known as Zaire, is one of the African countries that is not embracing ICTs. This country is one of the richest countries in the world in terms of natural resources and untapped mineral wealth. Paradoxically, it is one of the poorest countries in the world in terms of per capita gross national product, standards of living, and infant mortality rate. Although DRC is richly endowed with natural resources and vast mineral deposits, this country is not harnessing the benefits of ICTs. Several causal factors account for this state of affairs: excessive reliance on minerals, political instability, mismanagement of resources, lack of leadership and vision, to name but a few. Ayittey (1998) observes that “Zaire should be a prosperous country; it is blessed with vast mineral deposits and rich agricultural lands in the fertile Congo basin. But arrant misrule and plunder have reduced it to tatters.” (p.47)

Only recently has DRC begun to seriously consider developing a National Information and Communication Infrastructure (NICI) plan. In 2004, DRC teamed up with the United Nations Economic Commission for Africa (UNECA) to develop the plan. So far, this plan has achieved insignificant results in terms of e-government and national backbone infrastructure. UNECA acknowledges the failure of this project. “Due to political situation, the process was stalled for several months, however with the new government swearing in around December 2006, it is expected that the NICI process will restart early 2007,” UNECA (2009) notes. Evidently, the consequences of the slow implementation of the NICI plan can be felt throughout the entire country.

It is my belief that a well-designed and properly implemented ICT Plan can help DRC overcome several development challenges it confronts today. I hypothesize that a country’s successful investment in ICT or in technological innovations is contingent on the leadership of its citizens. As noted earlier, ICTs can play a major role in spurring social and economic

development in DRC. This paper examines a conceptual and strategic framework for the adoption and implementation of ICT in DRC. It reviews literature regarding the link between Information and Communication Technologies and development in developing countries.

Definition

Information and Communication Technologies have been defined in various ways. Unwin (2009) views ICT as an umbrella term which covers any communication device or application encompassing: radio, television, cellular phones, computer and network hardware and software, satellite systems and so on as well as the various services and applications associated with them such as videoconferencing and distance learning (p. 77).

Torero and Braun (2006) offer a much broader definition of ICT which encompasses equipment and services. For them, ICT “includes the computing industry (hardware, software, networks, the Internet, and related services); electronic data processing and display (such as photocopiers, cash registers, calculators, and scanners, as well as a myriad of less well-known machines specifically tailored to production and manufacturing); telecommunications and related services (such as fixed and cellular telephones, facsimile machines, instant messaging, teleconferencing, and so on.); and audiovisual equipment and services (including television, radio, video, DVDs, digital cameras, compact discs, MP3 players, and so on” (p. 3).

Within the framework of this paper, I will adopt the definition offered by Torero and Braun (2006). It is more inclusive and more representative of ICT. It includes equipment and services.

Country Profile

The Democratic Republic of Congo is the third largest country in Africa. With its 2,345,410 square km, about the size of the U.S. east of the Mississippi, this country lies in central Africa and borders nine countries namely Angola (2,511 km of which 225 km is the boundary of Angola's Cabinda Province), Burundi (233 km), Central African Republic (1,577 km), Republic of the Congo (2,410 km), Rwanda (217 km), Sudan (628 km), Tanzania (459 km), Uganda (765 km), and Zambia (1,930 km). The whole country is drained by a long river, known as the Congo River. Second in the world after the Amazon with respect to hydroelectric potential, the Congo River is the second longest river in Africa after The Nile and the fifth longest in the world. (Nzongola-Ntalaja 2002, p. 28)

The country has vast mineral resources. Nzongola-Ntalaja (2002) describes the mineral wealth of the Democratic Republic of Congo as follows:

“The Congo has a wide array of minerals including copper, cobalt, tin, zinc, gold, diamonds, iron ore, silver, cadmium, uranium, europium, niobium (or columbite), tantalum and thorium. Some of these minerals are of great strategic value. Uranium, for example, has been used to manufacture nuclear weapons, while rare metals such as niobium and tantalum are greatly needed for space aeronautics in the twenty-first century. According to experts, Africa contains 15 per cent of the world's niobium reserves and 80 per cent of its tantalum deposits. Of these African reserves, the Congo alone has 60 per cent of niobium and 80 per cent of tantalum.” (p. 28)

A Belgian geologist René Jules Cornet once described the Katanga province of the Democratic Republic of Congo where he conducted some prospecting work in 1892 as a “veritable geological scandal”. The country has since been known as a geological scandal. Georges Nzongola-Ntalaja (2002) points out that “the real scandal, however, is that in 110 years of mineral extraction, the wealth of the country has not been used to the benefit of the great majority of its people. Since the days of King Leopold, it has gone to serve the interests of the country’s rulers and those of their political and business partners in the international community.” (p. 28)

The Democratic Republic of Congo had a tumultuous past. From 1885 to 1908, it was a personal property of King Leopold of Belgium. He transferred the ownership of the Congo to his country, Belgium due to political and social pressures. On June 30, 1960, this country gained its independence from the Kingdom of Belgium. During its 49 years of independence, DRC has only had four presidents: Joseph Kasa Vubu (from 1960 to 1965), Joseph Mobutu (from 1965 to 1997), Laurent Kabila (from 1997 to 2001), and Joseph Kabila (from 2001 to present).

Since 1996, DRC has been embroiled in a war that once drew in seven African countries (Rwanda, Uganda, Burundi, Namibia, Angola, Zimbabwe, and Chad). A January 2008 International Rescue Committee survey found that 5,400,000 people have died from war-related causes in Congo since 1998 – the world’s deadliest documented conflict since WW II (International Rescue Committee, 2007). Congolese women and girls in particular still bear the brunt of this crisis.

It is in this context of political instability that the government of Congo contemplated launching a National Information and Communication Infrastructures (NICI) project with the support of UNECA. As could be expected, the project ultimately yielded insignificant results.

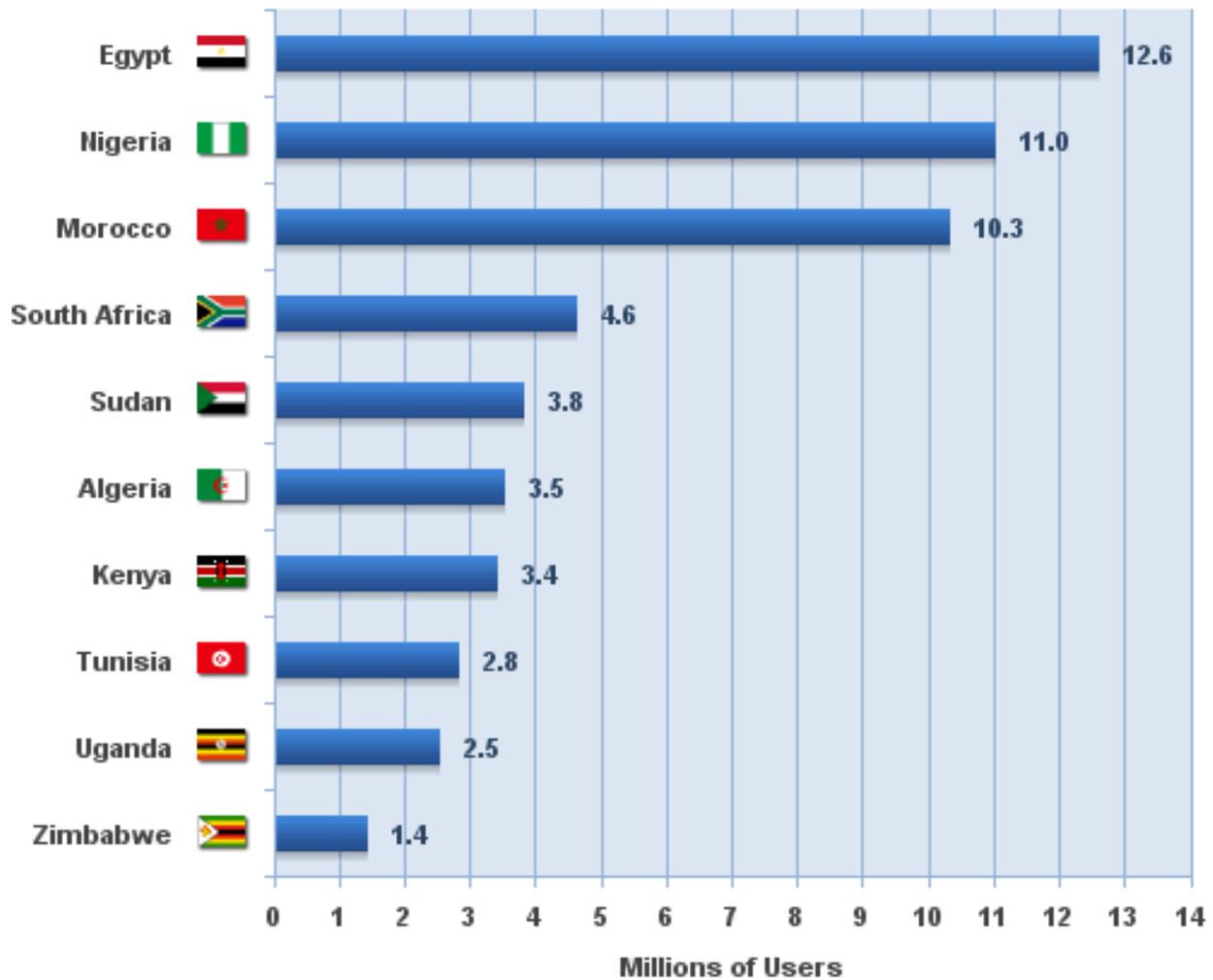
Current State of ICT in D.R. Congo and in Africa

The general state of ICTs in Sub-Sahara Africa and in D.R. Congo in particular is deplorable. Many African countries lack basic ICT infrastructures. Unwin (2009) cites an ITU (2006a) report which states that “Africa averaged 1.74 personal computers (PCs) per 100 inhabitants in 2004, compared with 50.84 in Oceania”. The report goes on to argue that the special divisions within Africa itself are also very significant, with countries such as Burundi, the Democratic Republic of Congo, Ethiopia and Niger all having less than 1 internet user per 100 people in 2006, compared with 2.7 in Ghana, 7.9 in Kenya, 12.7 in Tunisia and 24.1 user in Mauritius (Unwin, 2009, p. 26).

According to another report by International Telecommunication Union (2007) entitled “Telecommunication/ICT markets and Trends in Africa 2007”, only 0.02% per 100 inhabitants of Congo’s 59,320,000 citizens had main fixed telephone lines in 2006. D.R. Congo had 4,415,000 mobile phone subscribers and 180,000 internet users, that is; 0.30% per 100 inhabitants (p. 25). In 2006, the whole continent of Africa had an estimated number of 44 million Internet users or 3.8 percent of the world’s 1.1. billion Internet users (ITU, 2007, p. 2).

Figure 1: Africa Top 10 Internet Countries.

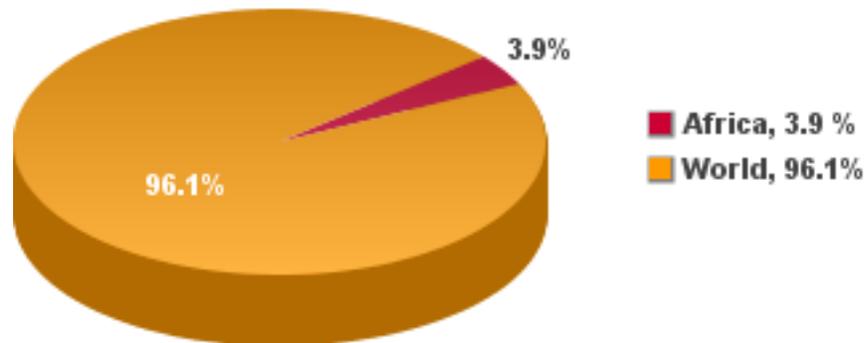
Africa Top 10 Internet Countries June 2009



Source: Internet World Stats - www.internetworldstats.com - June 2009
Copyright © 2009, Miniwatts Marketing Group

Figure 2: Internet Users in Africa

Internet Users in Africa June 2009



Source: Internet World Stats - www.internetworldstats.com
 65,903,900 estimated Internet users in Africa for 2009 2Q
 Copyright © 2009, Miniwatts Marketing Group

Table 2: Internet Use Statistics for D.R. Congo

Country	Population (2009 Est.)	Internet Users Dec/2000	Internet Users Latest Data (as of Jun/09)	Penetration (% Population)	User Growth (2000-2009)	% Users in Africa
D.R. Congo	68,692,542	500	290,000	0.4%	57,900.00%	0.4%

Data Source: Internet World Stats

It is worth noting that the numbers of ICT users have grown up quite significantly since this report was published in many parts of Africa, especially for cellular telephone use.

Two years ago, I saw first hand the lack of ICT infrastructures in DRC during my month-long stay in the country. Université Pédagogique Nationale, the main teachers college in the country, had a new program of study about Distance Learning. There was a large banner in front of the A-Building that read “The new Distance Learning program is co-sponsored by the government and UNESCO”. I was interested to see how course offerings were organized. As I watched and listened, a professor gave his lecture without any computer-based aids. I later spoke with a few students in the program; they admitted that there was no lab yet. They used regular Internet cybercafés around the capital city for their research.

Most government services are still paper-based in D.R. Congo. Accountants still travel around the country with bags of cash to pay government employees including national army soldiers. The government agency, which oversees government construction projects, still uses almost exclusively drawing papers and brushes to design projects. Record keeping is a challenge in virtually every sector.

Ultimately, the lack of ICT capabilities undermines the country’s ability to compete with other countries and to ensure the vital participation of Congolese citizens in today’s global economic markets. The demise of educational, social, political and economic institutions is partly attributable to this absence of a well-thought-out, strategic ICT plan in the Democratic Republic of Congo. If anything, the alarmingly low rate of success in standardized national tests (known as examens d’état) is an indication that the education system could greatly benefit from the diffusion of knowledge and information that ICT makes possible.

ICT for Economic Growth

Scholarly literature abounds to support the link between ICT and social and economic development (Torero and Braun, 2006; Unwin, 2009, Kuppusamy and Santhapparaj, 2005).

According to the 2001 OECD report, the ICT manufacturing sectors in such countries as Finland, Ireland, and Korea saw a strong labor productivity growth of 4 percent in the late 1990s.

(Kuppusamy and Santhapparathy, 2005, p. 148)

It is a proven fact today that Information and Communication Technology (ICT) plays a major part in generating and sustaining economic and social development. Yahya (1993) argues that “information technology has a great potential for the economic development of third world countries” (p.349). The 2002 OECD report on Science and Technology shows how ICTs played a role in helping the economies of OECD member countries in the 1990s. “Despite the economic slowdown in the OECD region, it is clear that ICTs played an essential role in driving economic growth in the 1990s.” (OECD, 2002, p.29)

ITU (2007) notes that “Nowadays, it is broadly understood that access to ICT can contribute tremendously to economic development” (p. 2). The United Nations report entitled “The Global Information Society: a Statistical View” (2008) states that there is “global recognition of the importance of ICT for social and economic development, especially in developing countries” (p.7). The report also notes that “Currently, reliable statistical indicators for collecting and compiling data on the impact of ICT in Africa are scarce because most African nations lack basic information on key ICT and related economic and social indicators.” (p.17)

Sadly, many African countries including the Democratic Republic of Congo (DRC) are not harnessing the benefits of ICT. Opoku-Mensah (2008) observes that “there is abundant

evidence that Africa is the only region yet to fully exploit the great potential of science and technology as an engine of growth and development” (¶ 2).

Africa is still far behind in terms of technological innovations in the area of ICT. ITU (2007) addresses the issue. Although Africa has a share of around 14 per cent of the world’s population, it accounted for little over two percent of the world’s Gross Domestic Product, its report says (p. 1). While South Africa alone accounted for a GDP of 240 billion USD, 25 percent of Africa’s total GDP out of 54 African economies, the Democratic Republic of Congo only had a GDP of 9.85 billion in 2007.

The adoption of ICT can, indeed, help this country curb corruption, promote literacy and learning, develop new revenue streams, compete globally, and increase its GDP exponentially. ICT may very well empower the citizens of D.R. Congo while reducing poverty.

ICT in Education

Education is in dire need of revamping in the Democratic Republic of Congo. In most elementary schools, secondary schools, and colleges across the country, education is not supported by ICT systems, except in very few private and public institutions. Where ICT exists, it is marred with several challenges ranging from lack of stable electricity supply, lack of adequate educational facilities, unavailability of qualified educators, problem of retention of qualified educators, especially in rural areas, lack of security for educational facilities and equipment, and so forth.

Yet, there is hard evidence that ICT can play a major role in education. Wagner et al (2005) notes that “ICTs *are* currently being used widely to aid education in many developing countries, and it appears that there is increasing demand for their use in education by policymakers and parents in developing countries. Teacher corps ravaged by AIDS, inadequate

number of schools, lack of equal educational opportunities for girls, desperate poverty – ICTs can play a role in helping to combat all of these significant challenges” (p. vii).

The Democratic Republic of Congo can reclaim its leadership position in Sub-Saharan Africa by investing responsibly in ICT. Revitalizing the education sector through the adoption of ICT is indeed a viable option. It is distressing that different governments of DRC have been spending less money throughout the years on education. From 1969 to 1975, the national government spent on average 20.5% on its national budget on education. According to Bambanota (2006), expenditures went down drastically after 1975. In 1993, only 0.2% was spent on education; and only 0.1% in 2000 (p. 5). This is hardly enough to improve basic educational infrastructures in the country, let alone adopt new technologies.

Table 1: National Education Budget from 1969 to 2000.

Year	1969	1972	1974	1975	1993	1995	1996	1997	1998	1999	2000
%	21.9	22.6	15.5	21.9	0.2	0.2	0.9	0.8	0.2	0.4	0.1

Data Source: Bambanota (2006)

As can be noted, it is hard for the government to implement a national ICT plan for education with this kind of budgets. It is even harder for educational institutions to fulfill their traditional obligations. Investing in ICT requires considerable capital, vision, and political will on the part of government officials. But is the government serious about improving the education system in DRC?

It is widely accepted that adequate education can reduce poverty, advance technology, improve health care, ensure sustainable development and empower women. But “research suggests that simply putting computers into schools is not enough to impact student learning.

That said, specific applications of ICT *can* positively impact student knowledge, skills and attitudes, as well as teaching practices, school innovation, and community services.”

(Wagner et al, 2005, p.1)

The education system as a whole in DRC has not undergone enough reforms to part from the system set up by colonial rulers. Yet, as the 127 World Bank Report (2008) points out those old education systems in many African countries were not developed to empower Africans:

“In Africa, however, the development of a secondary education system was based on the structures and practices of their colonial rulers with one very important distinction. These system were not designed to meet the developing economies of the people and context to which where transported. They were instead designed to produce the kind of labor power needed to support and expand colonial rule. Nevertheless the systems have become entrenched and any reform effort will struggle with how to adapt as well as change these systems” (p. 11).

In other words, primary, secondary and higher education systems in DRC are not well aligned with 21st century needs and purposes. There is urgent need for educational reforms in DRC. The meager results of 12th graders’ achievement on national exams and the lack of preparation of these youngsters to meet college challenges bear testimony on the urgency of reforms.

I am very much in agreement with Unwin (2009) when he says that “ICT is certainly not a panacea for education, but it is a powerful tool that when implemented appropriately can catalyse and accelerate education reform and development” (p. 207).

Conclusion

The Democratic Republic of Congo has several development challenges. New information and communication technologies with a revamped education system can play a central role in supporting the country as it confronts those challenges.

This literature review has demonstrated that cost-effective use of information and communication technologies can significantly impact the social and economic landscape of a country. Ignoring the real value of ICT in spurring social and economic development will only continue to prolong poverty, illiteracy, and underdevelopment in the Democratic Republic of Congo. Overreliance on basic exploitation of minerals can cause long-term damage to the country. ICT can play a key role in education. The introduction of ICT in education requires active involvement of the government. As Wagner et al (2005) noted, “Coordinating the introduction of computers with national policies and programs related to changes in curriculum, pedagogy, assessment, and teacher training is more likely to result in greater learning and other outcomes.” (p. 2)

Studies reported in this literature review reveal that the introduction of ICT in a developing country like DRC can yield a variety of strategic social and economic benefits. The study points out the fact that ICT can significantly affect the global competitive advantage of the government while enabling the people of that country to improve the quality of their lives.

References

- Ayittey, G.B.N. (1998). *Africa in chaos*. New York: St. Martin's Press, Scholarly and Reference Division.
- Bambanota, G. M. (2006). *L'école congolaise de demain: quelles chances et quels défis? L'école Démocratique*. Retrieved September 15, 2009 from <http://www.skolo.org/spip.php?article355&lang=fr>
- Jun, T. (2005). Information and communication technologies for enterprises growth and development. ICEC 2005: 904-906. Retrieved August 08, 2009.
- International Rescue Committee. 2009. *IRC Annual Report 2008*. Retrieved September 15, 2009 from <http://www.theirc.org/special-reports/special-report-congo>
- International Telecommunication Union (ITU). 2007. *Telecommunication/ict markets and trends in africa 2007*. ITU. Geneva: Switzerland. Retrieved September 10, 2009 from http://www.itu.int/ITU-D/ict/statistics/material/af_report07.pdf
- Internet World Stats. Usage and Population Statistics. 2009. Internet usage statistics for Africa. <http://www.internetworldstats.com/stats1.htm>. Retrieved September 15, 2009.
- Kuppusamy M. and Santhapparathy, S. A., 2005. Investment in information and communication technologies (ict) and its payoff in Malaysia. *Perspectives on Global Development and Technology*, 4(2), 147-167. Koninklijke Brill NV, Leiden. Retrieved September 10, 2009.
- Nzongola-Ntalaja, G. (2002). *The Congo from Leopold to Kabila: A People's History*. Zed Books Ltd. London: UK.

OECD. (2002). Science, technology and industry outlook.

The Organization for Economic Cooperation and Development (OECD). Paris, France.

Retrieved September 15, 2009 from Google Books.

OECD. (2009). Guide To Measuring The Information Society, 2009.

The Organization for Economic Cooperation and Development (OECD). Paris, France.

Retrieved August 07, 2009 from http://new.unctad.org/templates/Page____749.aspx

Opoku-Mensah, A. (2008). The role of science and technology in the knowledge economy: the

role of the African private sector support for investment in ICT R & D. *UN Economic Commission for Africa (UNECA)*. Retrieved July 31, 2009 from

<http://www.uneca.org/istd/resources/istd-resource-2008120002-en.asp>

The Global Information Society: a Statistical View. (2008). *Global event on measuring the Information Society*. Organized by Partnership on measuring ICT for development.

Palais des Nations, Geneva. May 27-29, 2008. Retrieved from August 1, 2009 from

http://www.unctad.org/en/docs/LCW190_en.pdf

Torero, M. & Braun, J.V. (2006). Information and communication technologies for development and poverty reduction: The potential of telecommunications. International Food Policy Research Institute. Washington, DC.

UNECA. 2007. National information and communication infrastructure (nici) policies and plans (e-strategies). United Nations Economic Commission for Africa (UNECA). Retrieved

July 31, 2009 from <http://www.uneca.org/aisi/nici/drc/drc.htm>.

Unwin, T. (ed.). (2009). ICT4D. Information and communication technology for development.

Cambridge: Cambridge University Press.

Wagner, D.A., Day, B., James, T., Kozma, R.B., Miller, J. & Unwin, T. (2005). Monitoring and Evaluation of ICT in Education Projects. A Handbook for Developing Countries.

Washington DC: *Information for Development Program (InfoDev)*. Retrieved August 1, 2009 from

http://www.infodev.org/files/2942_file_M_E_ICT_Education_draft_WSIS_optimized.pdf

World Bank Report No 127. (2008). Governance, Management, and Accountability in Secondary

Education in Sub-Saharan Africa. *Africa Human Development Series*. The International

Bank for Reconstruction and Development / The World Bank. Washington, D.C.

Yahya A.H. (1993). On the Problems of Information Technology Management in Developing

Nations; *Proceedings of The Conference of the ACM Special Interest Group on*

Computer Personnel Research ACM SIGCPR 93; St. Louis, Missouri, U.S.A. April 1--

3, 1993. The ACM Digital Library. Retrieved July 30, 2009.

Annotated Bibliography

This annotated bibliography contains references related to the research contained in the preparation of this paper.

Ayittey, G.B.N. (1998). *Africa in chaos*. New York: St. Martin's Press, Scholarly and Reference Division.

The book “*Africa in Chaos*” by George B.N. Ayittey, a distinguished economist and native of Ghana, explores social, economic and political plights that plague the continent of Africa. He analyzes the real causes of economic and social disasters of Africa. This book will help me discuss the challenges that many African countries including the Democratic Republic of Congo face.

Bambanota, G. M. (2006). *L'école congolaise de demain: quelles chances et quels défis? L'école Démocratique*. Retrieved September 15, 2009 from <http://www.skolo.org/spip.php?article355&lang=fr>

Professor Gratien Mokonzi Bambanota teaches at the school of education of Université de Kisangani in the Democratic Republic of Congo. He has published numerous articles and a few books on the challenges facing the education system in the Democratic Republic of Congo. This article provides information about government expenditures on education.

Jun, T. (2005). Information and communication technologies for enterprises growth and development. ICEC 2005: 904-906. Retrieved August 08, 2009.

The article studies the effects of Information and Communication Technologies on enterprises.

The author argues that success in today's economy rests on sound business practices and effective use and management of Information Technology (IT) resources. He recommends a framework for enterprises growth and development. The article is a useful reference which provides solid information about the possible linkages between economic growth and ICTs.

International Rescue Committee. 2009. *IRC Annual Report 2008*. Retrieved September 15, 2009

from <http://www.theirc.org/special-reports/special-report-congo>

The International Rescue Committee has been an important non government organization which has been offering humanitarian relief to war-torn areas for more than 75 years. The organization has earned international recognition and trust because of the quality of work it does. It addresses, among other things, the root causes of violence. It has been monitoring the war situation in the Congo since 1996. It is a useful resource.

International Telecommunication Union (ITU). 2007. *Telecommunication/ICT markets and*

trends in africa 2007. ITU. Geneva: Switzerland. Retrieved September 10, 2009 from

http://www.itu.int/ITU-D/ict/statistics/material/af_report07.pdf

This report provides an assessment of the current situation, trends, challenges, and opportunities of the telecommunication/ICT markets in Africa. It is a useful resource.

Internet World Stats. Usage and Population Statistics. 2009. *Internet usage statistics for Africa*.

<http://www.internetworldstats.com/stats1.htm>. Retrieved September 15, 2009.

Internet World Stats is an International website that features up-to-date world Internet Usage, Population Statistics and Internet Market Research Data, for over 233 individual countries and world regions. It is a useful resource for Internet usage around the world and in Africa.

Kuppusamy M. and Santhapparathy, S. A., 2005. Investment in information and communication technologies (ict) and its payoff in Malaysia. *Perspectives on Global Development and Technology*, 4(2), 147-167. Koninklijke Brill NV, Leiden. Retrieved September 10, 2009.

This article examines the impact of ICT on Malaysian economic growth over the period 1975-2002. The study revealed that ICT had contributed positively to Malaysia's economic growth over the study period. The authors also make some policy recommendations on how Malaysia can achieve better economic growth by leveraging of ICT. It is a great of information on the potential of ICT for economic growth.

Nzongola-Ntalaja, G. (2002). *The Congo from Leopold to Kabila: A People's History*. Zed Books Ltd. London: UK.

This book offers a unique perspective on the situation in the Democratic Republic of Congo and in the Great Lakes region of Africa. It provides insights into the violent and tragic political history of the vast territory of the Congo from the 1870s to the present day. The author is a leading scholar on the history of Africa and teaches African Studies at the University of North Carolina at Chapel Hill. He taught at Howard University in the past. This is a useful resource for information about the Democratic Republic of Congo.

OECD. (2002). Science, technology and industry outlook.

The Organization for Economic Cooperation and Development (OECD). Paris, France.

Retrieved September 15, 2009 from Google Books.

This report provides an overview of trends, prospects and policy directions in science, technology and industry across the OECD area. It gives an outlook on different levels of development of OECD countries and some non-OECD countries. It is a solid resource.

OECD. (2009). Guide To Measuring The Information Society, 2009.

The Organization for Economic Cooperation and Development (OECD). Paris, France.

Retrieved August 07, 2009 from http://new.unctad.org/templates/Page____749.aspx

This report was initially published in 2005. It suggests a number of statistical standards for measuring various aspects of Information and Communication Technology (ICT) in OECD member countries. This report will be very useful for my final paper because it describes the ICT indicators used for measuring ICT for development, for measuring the impacts of an ICT sector, and for measuring e-business in countries across the globe.

Opoku-Mensah, A. (2008). The role of science and technology in the knowledge economy: the

role of the African private sector support for investment in ICT R & D. *UN Economic*

Commission for Africa (UNECA). Retrieved July 31, 2009 from

<http://www.uneca.org/istd/resources/istd-resource-2008120002-en.asp>

This article was published by the United Nations Economic Commission for Africa. It explores the role of science and ICT in the knowledge economy. It points out some of the challenges (including brain drain) that hinder the development of Africa.

The Global Information Society: a Statistical View. (2008). *Global event on measuring the Information Society*. Organized by Partnership on measuring ICT for development. Palais des Nations, Geneva. May 27-29, 2008. Retrieved from August 1, 2009 from http://www.unctad.org/en/docs/LCW190_en.pdf

This report was put together by representatives from developing countries. It reviewed standards (ICT indicators) for collecting statistics on information and communication technologies (ICTs) to spur social and economic development. It also provides a summary of the current status of ICT measurement worldwide. This resource will show where some African countries including the Democratic Republic of Congo stand with regards to ICT implementation.

Torero, M. & Braun, J.V. (2006). Information and communication technologies for development and poverty reduction: The potential of telecommunications. International Food Policy Research Institute. Washington, DC.

The book is particularly enlightening. It highlights the link between ICT growth and economic growth within a context of poverty and suggests a conceptual model. It assesses the potential for ICTs to promote economic growth that benefits the poor. This is a good reference resource for studying the potential benefits of ICTs in developing countries.

UNECA. 2007. National information and communication infrastructure (nici) policies and plans (e-strategies). United Nations Economic Commission for Africa (UNECA). Retrieved July 31, 2009 from <http://www.uneca.org/aisi/nici/drc/drc.htm>.

The United Nations Economic Commission for Africa (UNECA) describes the National Information and Communication Infrastructure (NICI) project it undertook in the Congo with the participation of government officials. This resource briefly outlines the goals of the project and the challenges it faced.

Unwin, T. (ed.). (2009). ICT4D. Information and communication technology for development. Cambridge: Cambridge University Press.

ICT4D provides an authoritative and accessible account of the use of Information and Communication Technologies (ICTs) in contemporary development practice. It combines theory with practical guidance - including both a conceptual framework for understanding the rapid development of ICT4D. It highlights the role of ICTs for economic development, especially in developing countries. It explores both the successes and the challenges facing such initiatives. It is a very important reference.

Wagner, D.A., Day, B., James, T., Kozma, R.B., Miller, J. & Unwin, T. (2005). Monitoring and Evaluation of ICT in Education Projects. A Handbook for Developing Countries. Washington DC: *Information for Development Program (InfoDev)*. Retrieved August 1, 2009 from http://www.infodev.org/files/2942_file_M_E_ICT_Education_draft_WSIS_optimized.pdf

This handbook provides policymakers in developing countries with monitoring and evaluation strategies for a successful implementation of Information and Communication Technology For

ICT as an Engine of Economic Growth in the Congo 27
Education (ICT4E) initiatives. This is a great resource for issues related to the introduction of
ICTs in educational settings in developing countries.

World Bank Report No 127. (2008). Governance, Management, and Accountability in Secondary
Education in Sub-Saharan Africa. *Africa Human Development Series*. The International
Bank for Reconstruction and Development / The World Bank. Washington, D.C.

The report suggests a framework for revamping the education systems in Sub-Saharan Africa in
order to help SSA countries meet development challenges in the knowledge-driven economy. It
chastises the systems that were largely developed in the developed world in the 19th and early
20th centuries, and transported to Africa. Those systems are not well aligned with 21st century
needs and purposes.

Yahya A.H. (1993). On the Problems of Information Technology Management in Developing
Nations; *Proceedings of The Conference of the ACM Special Interest Group on
Computer Personnel Research ACM SIGCPR 93*; St. Louis, Missouri, U.S.A. April 1--
3, 1993. The ACM Digital Library. Retrieved July 30, 2009.

“On the Problems of Information Technology Management in Developing Nations”
discusses the challenges that many developing countries face as they try to manage Information
Technology resources. It also demonstrates how information technology has a great potential for
the economic development of third world countries. This article can be a valuable tool for
examining generic computerization challenges that developing countries face.