THE MEASURES TAKEN FOR IMPLEMENTATION OF THE UNESCO RECOMMANDATION CONCERNING THE PROMOTION AND USE OF MULTILINGUISM AND UNIVERSAL ACCES TO CYBERSPACE

RWANDA REPORT
(DECEMBER 2010)

Source: "*The Rwanda 2010 ICT Status Baseline Survey Draft***"**

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LIST OF ACRONYMS

ICT	Information and Communication Technology
ITU	International Telecommunication Union
MTN	Millennium Telephone Network
NGO	Non government Organization
NICI	National Information Communication Infrastructure
NISR	National Institute of Statistics in Rwanda
NSO	National Statistical Office
GoR	Government of Rwanda
EDPRS	Economic Development and Poverty Reduction Strategy
RDB/IT	Rwanda Development Board/Information Technology
RURA	Rwanda Utilities Regulator Agency
SCAN-ICT	Scan ICT indicators Project
MDGs	Millennium Development Goals
TV	Television
UAF	Universal Access Fund
EMIS	Educational Management System
UNECA	United Nations Economic Commission for Africa
UNESCO	United Nations Educational, Scientific and Cultural Organization
MINEDUC	Ministry of Education
9YBE	Nine Years Basic Education
TTCs	Teacher Training Colleges
CoE	College of Education
KIE	KIGALI INSTITUTE OF EDUCATION
NUR	National University of Rwanda
ULK	Université Libre de Kigali
WSIS	World Summit in Information Society

INTRODUCTION

Rwanda is small landlocked country with neither tangible mineral resources nor rich agricultural potential to help the acceleration of its development, but it can make use of Rwandese work's capacity combine to new technologies and improve the efficiency at which its available resources are used, thereby achieving rapid growth. ICTs promote growth and development through attracting national and foreign direct investment, international tourism and global business. Domestic operators become more productive and efficient by using ICTs. Finally, incomes of the poor are generally known to grow faster in telecommunications-intensive economies.

In its Vision 2020 statement, the Government of Rwanda (GoR) envisions a transformation from a largely agriculture-based economy to a knowledge and information based economy, in an effort to reach middle income status by 2020. This intention has been operationalized through the National Information and Communication Infrastructure (**NICI)** Plans.

Rwanda's Economic Development and Poverty Reduction Strategy (EDPRS) states the objective of the ICT Sub-sector as

> *"To promote investment in, and the growth of the Information and Communications Technology industry, efforts will be made to widen access to ICT among the population, and to promote ICT for e-Governance, education and capacity-building, and for use by the private sector. To this end, the number of telecentres will be increased substantially (stated elsewhere as 300 by 2012) and the cost of connecting to a telecommunications network will halve by 2011.*

The Government has recently established the Rwanda Development Board with five economic clusters, namely ICT, Tourism, Trade & Manufacturing, Services, and Agriculture. The ICT pillar is known as RDB/ICT and takes over the mandate and functions of the previous entity known as the Rwanda Information Technology Authority—RITA. The RDB/ICT is entrusted with the implementation of the NICI plan, monitoring and evaluating the implementation of ICT programmes across Ministries, Departments and Agencies, increasing awareness and providing advisory and support services to ICT programmes. The Government has emphasized its intention to use investment in ICT as the key driver for this transition and as a vehicle for improving the delivery of public and private services, particularly in the rural areas. The NICI-2010 plan comprises ten sub-plans (i.e. education, infrastructure, human capacity building, economic development, social development,

infrastructure, development, rural and community access, private sector development, policy and regulation and national security, law and order).

The country has gone through major economic reforms including telecommunications reforms that aimed at increasing the competitiveness of the telecommunications industry and attracting foreign investment. Amongst those reforms, was the establishment of an independent regulatory body known as the Rwanda Utilities Regulatory Agency (RURA). The main mission of RURA is to promote fair competition, improve quality of services, and create an enabling environment to attract investors with the intention of improving the provision of services to citizens in accordance to the Universal Access obligations set by the International Telecommunication Union.

Meanwhile in order to address those gaps, a number of programs and projects are underway within the National Electricity Company (Reco Rwasco) to increase the affordability and accessibility to rural households. Those programs and projects also focus on increasing network access around and outside the country over fiber optic technologies, increasing the efficiency of government service provision through a variety of programs, and establishing applications in support of good governance and poverty alleviation, with a special attention to the development and transformation of the rural communities through the adoption and usage of ICT.

I. ICT Infrastructure Development

Selected Telecommunication Indicators:

Indicator	**2006**	**2007**	**2008**	**2009**	**2010 3rd Quarter**
Main line telephones (Fixed)	18,651	23,208	16,852	33,451	24,037
Main lines per 100 inhabitants	0.21	0.25	0.18	0.34	0.24
Mobile cellular subscribers	332,762	635,137	1,322,637	2,429,252	3,615,573
Internet subscribers	3,165	5,578	8,483	147,548	530,081
Broadband subscribers		2,543	4,241	8,388	
No. of Internet Service Providers (ISPs)		9	10	12	
International internet bandwidth (mbps)		156	267	351	686

(Source: NISR, RURA Presentation November 2010)

The telecommunications network has expanded over the years under government initiatives and private sector promotion. The telecommunication industry has shifted quickly since 2005 from the government control to private sector with the privatization of RWANDATEL and the arrival of three GSM operators namely MTN Rwanda, Rwandatel and TIGO. Through RURA, the Government of Rwanda has promoting and monitors the liberalization of the telecommunication sector for adequate competitiveness in order to provide quality services at affordable costs.

MTN RWANDA Serving since 1998, MTN Rwanda continues to expand its network, offer new and innovative packages and services, and keep up with the latest trends in communications while maintaining affordability. The company is currently involved in major infrastructure network investments such updating its GSM network, expanding fiber optic backbone around Kigali city and majors cities of the country. MTN also has installed hot spots in the city for easy access to internet (GPRS and 3G services)

RWANDATEL provides fixed lines connections, ADSL internet connections, mobile telephone services in 3G technology and internet broadband connectivity to its users.

TIGO is a Multi National Telecommunications Company with Mobile Telecommunications Operations in 13 countries; 3 in Central America, 3 in South America and 7 in Africa. The company is now in second position in terms of mobile subscribers.

NEW ARTEL provides Internet services particularly provision of high bandwidth capacity to various public institutions as well as low income organizations around the country.

Repartition of mobile phones subscribers by providers

Operators	Mobile Subscribers January 2010	% of the market	Mobile Subscribers September 2010	% of the market
MTN Rwanda	1,886,023	75.5	2,394,364	66.2
Rwandatel	487,250	19.5	535,710	14.8
Tigo	123,897	5.0	685,393	19.0
Total subscribers	2,497,170	100	3,615,467	100

Source: RURA (September 2010)

The table Tab 1 shows the status of Active Mobile Subscribers on HLRs (Home Location Register database) in the country as of end of September 2010. With a quarterly average increasing growth of 113%, the number of mobile phone subscribers will reach 4 million around December 2010 (see table below)

Tab 2: Mobile phones subscribers' growth rate

Jan-2010	Mar-2010	Jun-2010	Sep-2010	Dec-200
2,497,170	2,722,236	**3,172,759**	3,615,467	**4,096,324**
growth rate	109%	117%	114%	on an average 113%

2. ICT Policy Highlights in 2010

<table>
<tr><th>Telecoms services</th><th>Policy</th></tr>
<tr><td>Fixed lines</td><td>

Rwandatel has been the major telecom operator in Rwanda providing voice telephony, fixed lines and Internet services.
MTN Rwanda has also been licensed to offer the fixed line services as well and is currently offering Internet and data services using fiber optic, GPRS, Wi Max and Wi Fi technologies

</td></tr>
<tr><td>Mobile Services</td><td>

MTN-Rwanda is the main private cell phone company established in 1998 and has reached 2.200,000 subscribers this year (2010)
Rwandatel has launched its GSM services since 2008 and has reached so far 536.710 subscribers
Tigo , the last born mobile phone provider (2009) has reached recently 686.393 subscribers (September 2010)
Mobile telephones as on September 2010 (source: RURA)

<table>
<tr><th>Operators</th><th>Mobile Subscribers January 2010</th><th>% of the market</th><th>Mobile Subscribers September 2010</th><th>% of the market</th></tr>
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</table>
Source: RURA, September 2010
</td></tr>
<tr><td>Internet service Providers</td><td>

MTN, Rwandatel and Tigo are the major internet service providers using mainly the GPRS and 3G technologies. Some other players are in business as ISPA & ALTECH. The 3G and 3.5G operators have increased quickly the number of internet users by reducing the connectivity cost and by offering easy service. Considering the number of internet users connecting thru the mobile phone, the internet user rate has increased exponentially reaching 530.000 users in 2010.
New Artel is a new company providing Internet services mainly to government and districts around the country.

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<tr><td>Cyber cafes and Community Centers</td><td>

In 2008, close to 300 Cybercafés were estimated to be operational in the Country with 65% in the Capital Kigali. RURA has defined guidelines for operating cybercafés but due to the affordability cost of computers, mobile phones and easy connectivity to internet (hot spots, 3G modems), the number

</td></tr>
</table>

	of cybercafés has decreased till 131 registered at RURA as most of potential internet users are using their own equipment. ⊕ Community Centers are being deployed in remote areas and very supported by both Gov. and International Organizations. RDB/IT (former RITA) has setting up telecenters in each District with two mobile ICT buses. ⊕ Some community organizations as AVEGA (Rwamagana), Coffee Exporters (Maraba) have implementing cybercafés for their community and people around.
Call Centre services	⊕ MTN-Rwanda, Rwandatel and Reco-Rwasco have their call centers for their own customers. In addition, Business Communication Service (BCS) has a call centre business which is used to service Tuvugane and its taxi business as internal clients
VSAT	⊕ 40 Broadband VSATs are operational in Rwanda. The major owners are International Organizations, ISP's and Higher Educational Institutions. As the fiber optic is spreading quickly around the country (2000 kms), the use of VSAT for public institutions (as Universities and other public services) will be limited very soon.
VOIP	⊕ The current licenses allow MTN, Rwandatel and Tigo to use and offer VoIP services as their licenses are all-encompassing. However the legalization of VoIP by the regulator is still at the preliminary ideas stage

3. ICT current status in 2010

The number of mobile phone subscribers was 3.615,467 in September 2010 all providers included while the coverage of Internet services has expanded to all major towns thru GPRS and 3G technologies provided by the operators. The total number of local websites increased rapidly from 2000. More than 38.9% of the public sectors (ministries, agencies, provinces and districts) have presence on the web comparing to 34.5% for the private sector. Most of majors' government institutions (ministries, agencies, provinces & districts) have websites with relevant information that is useful to the general public but few public institutions are offering services online.

Some public services are offering online services as:

- Immigration/Emigration Directorate General: applications can be submitted through the Internet for visa,
- Rwanda Revenue Authority for tax declaration;
- National Electoral Commission for inquiries on electoral list;
- Ombudsman Office: for annual declaration;

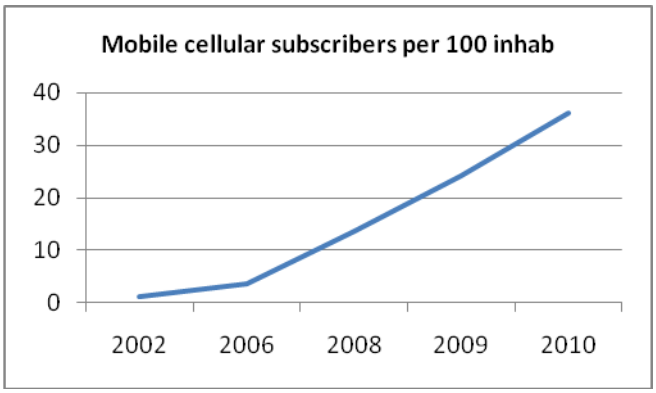
Private sector is also offering online services:

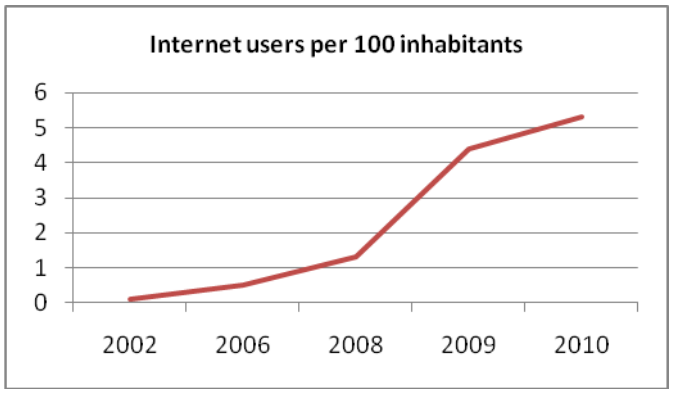
- All commercial banks are offering services online as SMS banking, Mobile banking & web based online services;
- Some few companies are also selling services online (ticketing, airtime, cash power, booking air tickets, hotel reservations, etc.)

The progress in the development of ICT infrastructures in the country is quite impressive. The Government of Rwanda under RDB/IT supervision has now invested much in ICT infrastructures such as the National Optic Fibre Backbone, the Kigali Metropolitan Network and the National Data Centre (NDC) and all these are on the right track.

Broadband Internet connections are becoming more and more affordable thru ADSL (RWANDATEL) and 3G technology (MTN, TIGO, RWANDATEL). There are some few internet service providers as ISPA, ALTEC who are offering services to private sector. The waiting time for connection and uploading/downloading documents is reasonable, even during peak hours. The national average number of people per fixed telephone line is stacked at 0.3 per 100 inhabitants comparing to the mobile phone density expected to reach 40 per 100 inhabitants before December 2010.

Mobile phones subscribers & internet users per 100 inhabitants





Internet users key statistics for East Africa (2010)

INTERNET USERS AND POPULATION STATISTICS FOR EAST AFRICA REGION					
countries EAC	Population in 2010	Internet users 2000	Internet Users 2010	Penetration (% population	User growth
Kenya	37,643,772	200,000	3,995,500	10.00%	1898%
Uganda	31,394,761	40,000	3,200,000	9.60%	7900%
Tanzania	39,379,321	115,000	676,000	1.60%	488%
Rwanda	**10,392,617**	**5,000**	**530,000**	**5.30%**	**8900%**
Burundi	9,271,330	3,000	65,000	0.70%	2067%
Source: RURA, internetworldstats.com, ITU, Nielsen Online, US Bureau of census					

The internet user growth rate of Rwanda with 5.3% is under the African average rate (10.9) but it is one of the highest internet user growth's rate with 8900% (from 2008 to 2010). For comparison, the continent growth rate is 2450% and the world average rate equals 444%.

UNIVERSAL ACCESS CONCEPT

Universal access as a concept in telecommunication is the creation of an enabling environment for people to have equal opportunity and access to telecommunication services and products. Universal service on the other hand is normally phrased as a requirement of the telecommunications service provider to meet criteria in the following three areas: Availability, Accessibility and Affordability (ITU 1998).

The Government of Rwanda decides to promote and implement the concept of Universal Access through the UA Presidential Order 05/01 of 13/03/2004, which established the UAF (Universal Access Fund) with the objective of accelerating the use of ICT in the Country. It is funded through the contribution of 2% of the turnover of the licence operators in the country.

The Regulatory Board manages this UAF. The UAF provides partial finance for the extension of universal access and the spread and take-up of information and communications technologies (ICT) in designated areas of the country. It complements and integrates with the overall NICI policy framework for Rwanda. As per its background, private sector companies (e.g. telecom, Internet, information and other service providers) were invited to tender their proposals and participate in the rural communications development process.

ICT indicators in Households

Table 4: **ICT** households indicators (Radio and TV sets)

indicators	EDS 1992	Pop 2002	Scan 2006	RURA 2009	RDB/IT 2010
Radio sets per 100 inhabitants (urban)	52		61.4	71.6	95*
Radio sets per 100 inhabitants (rural)	30.5		39.8	45.8	74.3*
Television sets per 100 Inhabitants (urban)		0.9		5.7	6.9
Television sets per 100 Inhabitants (rural)		0.01		0.8	0.9
** all devices owned by household such as mobile phones with radios included*					
Source: from desk research					

No institutions really register the number of computers, TV sets and radios. However, according to Rwanda Population and Housing Census 2002, 61.4% of urban households have Radio and in 2010 the penetration rate is 95% in urban area. It was close to 40% in rural area in 2006 and now it reaches 74%. The distribution of TV sets is concentrated in the major city which is Kigali with 7% of households who declared having a TV where relatively more people can afford the cost and electricity is available.

ICT households indicators related to telephone accessibility, computer and internet

Households ICT Indicators	Pop Census 2002	Scan 2006	RURA 2009	RDB/IT 2010
Proportion of households with a fixed line telephone	0.2	0.2	0.3	0.3
Proportion of households with a mobile cellular telephone		11.4	28.4	29.5
Proportion of households with a computer		0.2	1.6	2.3
Proportion of individuals who used a computer (from any location) in the last 3 months				3.9
Proportion of households with Internet access at home			1.1	1.8

The proportion of Households with access to telephone has increased regularly from 2002 to 2010 moving from 11.4% in 2006 to close to 30% in 2010. The proportion of HH with computer also increased from 0.3% to 2.3% in 2010. The continuous decrease of mobile phone devices and computers costs have allowed Households to have access to these electronic tools.

ICT in Education

Introduction

ICT in education policy, along with detailed implementation strategies, are defined in each of the quinquennial NICI plans for action by the Ministry of Education. The sub-plan for education in NICI Plan sets out a number of policy action items and associated planned actions that include time frames, budget estimates, and expected benefits. The planned actions, with leadership assigned to the Ministry of Education (sometimes in collaboration with other agencies), are listed below. Some of these are new, while others relate to planned actions in NICI-2005 that have been updated and revised. Others have been rolled forward from the NICI-2005 plan into the NICI-2010 plan because implementation is continuing.

- ✓ Train primary and secondary teachers on ICT in education
- ✓ Establish a national library network
- ✓ Develop new e-learning content
- ✓ Implement an educational management system (EMIS)
- ✓ *Survey educational software appropriate for Rwanda and translate to Kinyarwanda*
- ✓ *Convert existing computer-based training and e-learning content to Kinyarwanda*
- ✓ Develop programmes to promote the acquisition of computer equipment by Educational institutions
- ✓ Develop a comprehensive policy on computer education in schools
- ✓ Develop a national School Net to provide access to the Internet for schools, facilitate sharing of learning resources, facilitate electronic distance education

within the school system, and link Rwandan schools with schools internationally
- ✓ Develop a national computer curriculum for primary and secondary schools and coordinate its implementation
- ✓ Train a critical mass of computer literate teachers

In signing up to the Millennium Development Goals (MDG), the Government of Rwanda committed to creating 'Universal Education for All' and Pillar One of Rwanda's Vision 2020 document emphasizes the importance of quality education. All aspects of Government have put a renewed focus on education since 2003, when the Ministry of Education (MINEDUC) devised a national curriculum policy for primary and secondary education, to be implemented in a nine-year plan, and stated that primary education should be free and mandatory for all children.

Nine years of basic education for all program

In 2003, President Kagame made universal basic education (primary and secondary) a major priority. 2009 saw the introduction of Rwanda's radical Nine Year Basic Education Programme (9YBE), which offers six years of primary and three years of secondary education to all Rwandan children free of charge. Before the programme was implemented, many Rwandan youngsters were unable to access education, hampering their chances for a good start in life. As well as promoting universal primary education, the programme hopes to reduce the numbers of pupils having to repeat years, and the numbers of those who drop out. Rwanda is close to reaching universal education; today primary school enrolment stands at 97 per cent for boys and 98 per cent for girls – some of the highest enrolment rates in the region according to UNESCO.

This programme gained momentum following a recent schools construction campaign which saw thousands of new classrooms built across the country. Nearly all of the new classrooms were built voluntarily by parents, students, security forces, and government officials. The number of secondary degree schools shifted from 635 to 1350 from 2008 to 2010.

Teacher's training & development program

With the recent introduction of the 9YBE and higher student enrolment, teachers' demand has increased. Many existing teachers need additional training (professional and upgrading) in order to meet the new standards imposed by the government. The Ministry of Education has developed a Teacher Development and Management (TDM) Policy, which sets out to enhance the image and the status of the teacher as a qualified dedicated expert, and a vital engine of nation building and development. As a result, the Kigali Institute of Education (KIE) was established to produce more teachers for upper secondary level, two Colleges of Education (CoE) were created to produce teachers for lower secondary and eleven Teacher Training Colleges (TTCs) were also established to produce primary school teachers. 600 teachers have also graduated from a distance learning programme introduced by the government

Tertiary Education

In addition to making impressive strides in universal basic education, the Government of Rwanda has also made tremendous progress in increasing access to universities. Back in 1994, Rwanda had just one university; the National University of Rwanda (NUR) in Huye which was founded in 1963. In the 30 years after it opened, NUR had produced approximately 1,800 graduates. There are now in 2010, 29 accredited high learning institutions, seventeen are public and twelve are private, which boast a combined population of 65,000 students and 2412 academic staff.

Accessibility to electricity, telephone (fixed or mobile) and internet

Accessibility to electricity, telephone and internet by primary schools

ICT Indicators			Scan ICT 2006	MINEDUC	RDB/IT 2010
EP1	% of school with access to electricity (grid, generators & solar)			11.3	12.8
EP2	% of school with access to telephone (fixed or mobile) in primary schools				88*
EP3	% of school using computers in primary schools			4.2	8.2
EP4	% of school with access to internet in primary schools			1.5	5.4
EP5	% of school with website to internet in primary schools			0.3	1.6

**The access to telephone was considered during this survey as the headmaster phone provided by district (education) as official contact address.*

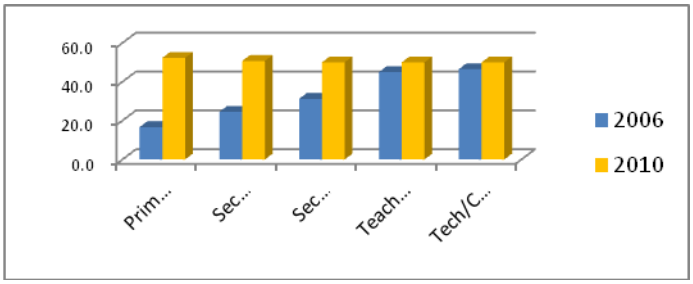
Thirteen percent of primary schools have access to electricity in 2010; eighty eight percent have declared having access to telephone but huge proportions of these schools use the headmasters' mobile phones as the official telephone of primary schools. Fixed lines telephones are very few as this technology was replaced by the wireless technology. MINEDUC considers only officials fixed or mobile phones owned by the primary or secondary schools.

Accessibility to electricity, telephone and internet by secondary schools

	ICT Indicators in secondary schools		Scan ICT 2006	MINEDUC 2007	RDB/IT 2010
ES1	% of school with access to electricity (all sources included) in secondary schools		68.2	74	82.2
ES2	% of school with telephone (fixed or mobile) in secondary schools		62.4	56	92.4
ES3	% of school using computers in secondary schools		69.1	45(a)	88.9(b)
ES4	% of schools with access to internet in secondary schools		28.2	33	32.2(c)
ES5	% of school with website to internet in secondary schools		2.1	-	3.6

*(a)In 2007 survey, MINEDUC had considered secondary schools who provided access to staff * students to the computer lab.*
(b) During this survey (2010), we have considered secondary schools who use computers only (staff & students access not necessary)
(c) The number of secondary schools doubled in 2010 due to 9YBE program which incorporated more 650 primary schools in the second degree.
The table related to accessibility of secondary schools to electricity, telephone and Internet shows a continous improvement of ICT in the secondary schools based on the multiple projects implemented in the Education Sector.

Evolution of proportion of literate teachers in primary & secondary schools since 2006

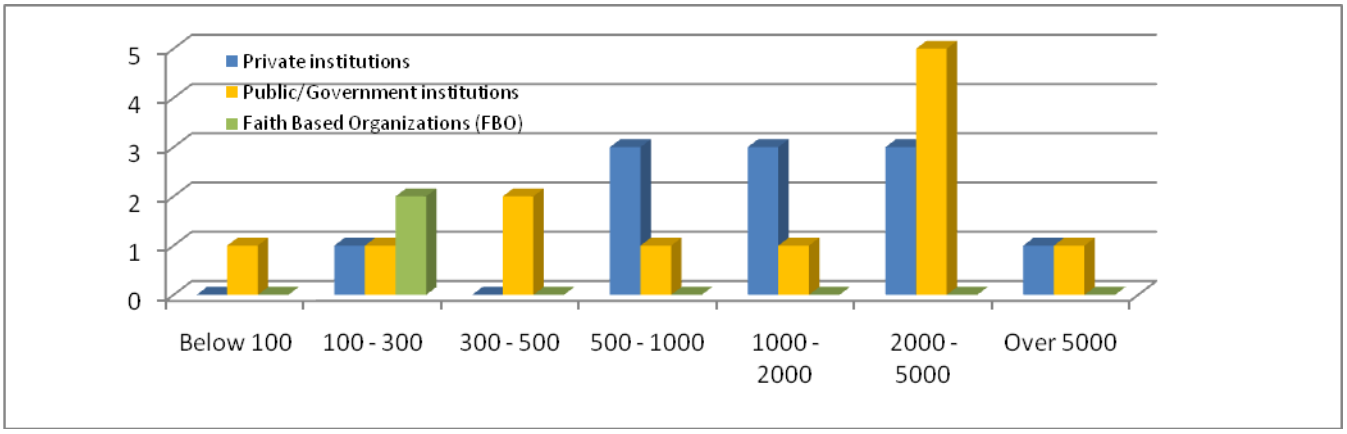


The rate of ICT literate teachers in primary and secondary degree has increased significantly respectively from 17% to 52% in primary schools and from 25% to 51% in secondary schools. In the technical and vocational schools, the rate moved from 31% to 50%.

The teaching college's ICT literate rate moved slowly during that period from 47% to 50%

High Learning Institutions by number of students and category

Repartition of high learning institutions by size and institutional category

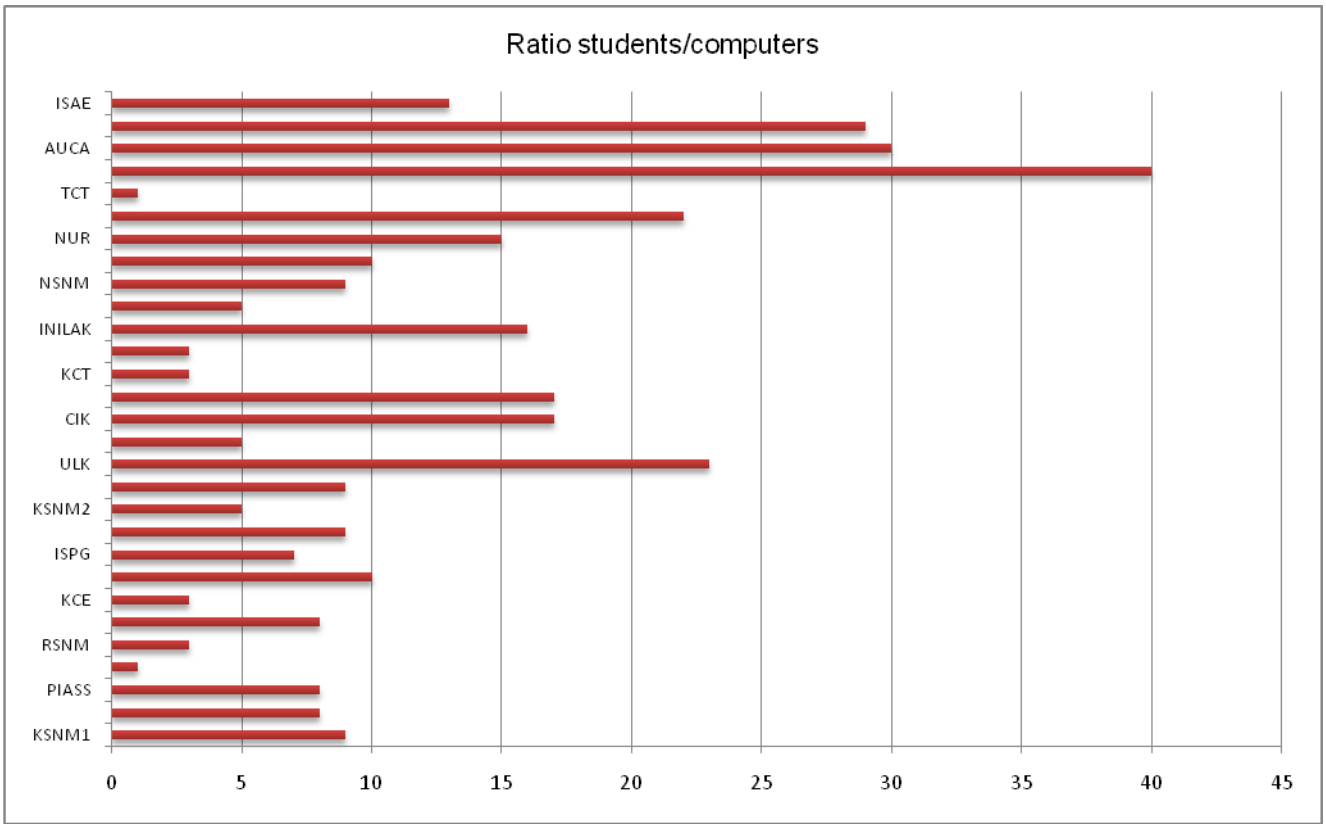


Source: NHEC Survey (2010)

The figure above shows the repartition of high learning institution by number of students. Two institutions (one public, NUR & one private, ULK) have more than 10.000 students enrolled in 2010. In the mid sized HLI (500 to 2000), we have more private HLI than public ones and the opposite in the range of HLI (2.000 to 5.000 students).

High Learning Institution ratio student/computer

Repartition of high learning institutions by ratio of students/computers



High Learning Institutions and IT literate teachers

All teachers in Universities and High Learning Institutions are IT literate with 100 %

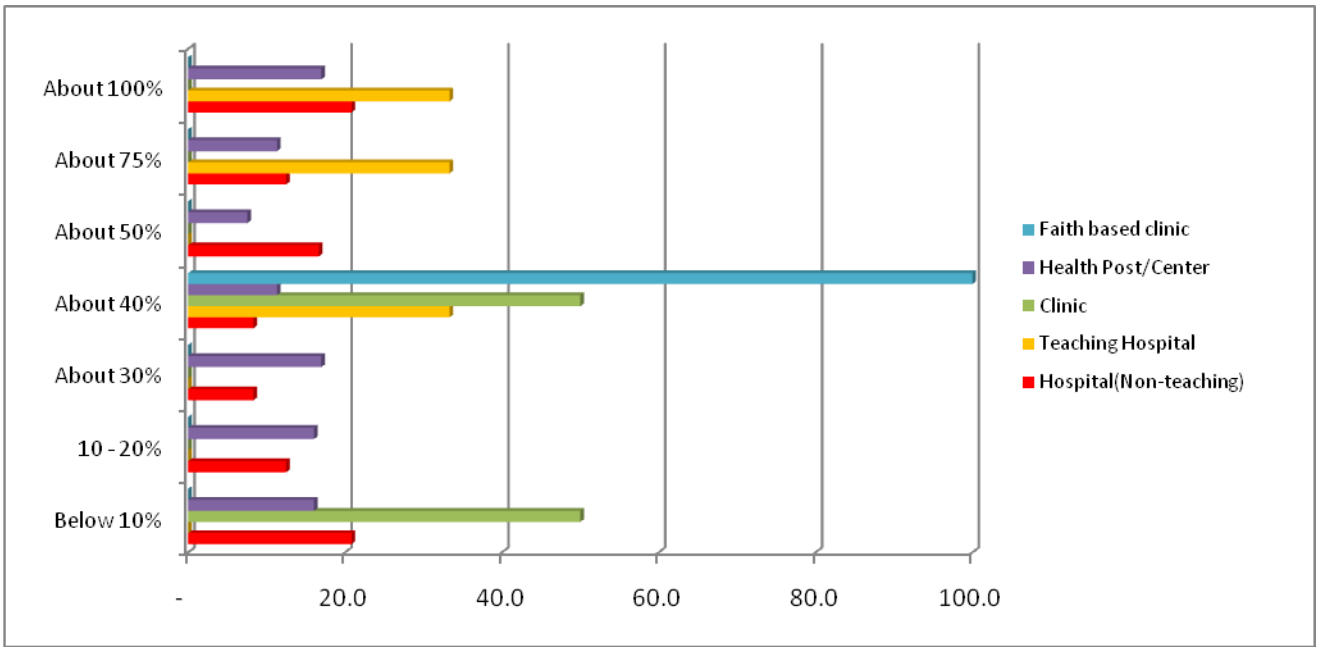
ICT in Health Sector

Health institutions and use of computers

Hundred percent (100%) of health institutions have declared using computers to support their activities and operations daily except Health Centers who declared 98%.

Proportion of health institutions staff who use of computers

Proportion of health institutions' staff who use computers in their activities and by institutional category



It appears that hospitals in general use computers in higher proportion (50% to 100%) than health centers and clinics. The percentage of health institutions staff using computers was 10% in 2006 versus to an average of 30% for hospitals (teaching and non-teaching).

Accessibility to electricity, telephone, computers & Internet

Percentage of health centers with access to electricity, telephone and Internet

Core indicators on ICT In Health				Scan ICT 2006	RDB/IT 2010
Health Centers & Clinics					
HC1	% of Health Centers with access to electricity (all sources included)			45.6	68.6
HC2	% of health centers with telephone (fixed or mobile)			65.4	92.2
HC3	% of health centers using computers			64.5	80.2
HC4	% of health centers with access to internet			0	10.2
HC5	% of health centers with website			0	2.4
HC6	% of health center staff using computers			17.7	30.6

The table related to ICT in Health centers and clinics shows a great improvement since 2006 in accessibility to electricity (69%), in accessibility to telephone with 92.2% (included health center's staff phones), in using computers with 80% for administrative purposes and database management. The proportion of health center's staff using computers regularly has increased from 18% in 2006 to 31% in 2010.

Percentage of hospitals with access to electricity, telephone and Internet

Hospitals				Scan ICT 2006	RDB/IT 2010
HOP1	% of hospitals with access to electricity (all sources included)			72.6	96.2
HOP2	% of hospitals with telephone (fixed or mobile)			88.2	100

HOP3	% of hospitals using computers			88.8	92.4
HOP4	% of hospitals with access to internet			15.3	36.4
HOP5	% of hospitals with website			11.8	20.1
HOP6	% of hospitals staff using computer			20.4	33.2

The proportion of hospitals with access to electricity energy (provided by the national grid company, generators or solar panels) has increased from 73% to 92% in 2010. All hospitals have claimed having access by phone. Some olds institutions have fixed and mobile lines. The access rate to internet also has increased substantially from 15% to 36%. One staff on three have claimed using computers regularly in the hospitals for administrative activities, database & research activities. Some few said that they use computer for telemedicine.

ICT in Private Sector versus Public Administration

Introduction

In 2003 On the Frontier (private consultancy company) conducted a survey to measure the ICT usage intensity within the public and private sectors institutions. It appeared that

- Nat. Government reports the highest levels of ICT Access, but 20% still have achieved the level of CT Only
- Local Government falls into the two lowest categories (94%), driven by lack of access to basic ICT infrastructure.
- Large Businesses are concentrated (83%) in the two lowest levels of ICT engagement.
- SMEs are the most evenly distributed across the spectrum, reflecting the varied conditions under which SMEs operate in Rwanda. However, 74% are classified as Non-ICT or CT-Only, indicating that they have not integrated PCs into their operations.

In 2006, during the scan ICT survey, it appeared that

- The public sector with 59% of staff using computers intensity (75% to 100%) was performing more than the private sector with 50%.
- Some components for the private sector (agriculture, craft, and mining) had the lowest ICT intensity usage rate with less than 10%.

Findings in RDB/IT 2010

Percentage of public institutions with access to electricity, telephone and Internet

Core indicators on ICT In Public Administration			**Scan ICT 2006**	**RDB/IT 2010**
PA1	% of public administration offices with access to electricity (all sources included)		62.4	78.6
PA2	% of public administration offices with access to telephone (fixed or mobile included staff's phones)		56.1	92.4*
PA3	% of public administration offices using computers (central level to sector level)		60.2	72.8
PA4	% of public administration offices staff using regularly computers (central level to sector level)		59.4	88.2
PA5	% of public administration offices with access to internet (using all connection means)		52.4	72.2
PA6	% of public administration offices with website		12.6	28.9

* *Access to telephone refers to official phone numbers when it exists and managing staff mobile phone numbers*

Since the 2006 (ScanICT survey), the public administration has benefited the large implementation of ICT infrastructure development in remote area. The mobile phone coverage was increased regularly by GSM providers as recommended by RURA. Accessibility and affordability to telephone, electricity and internet has allowed public administration to use ICT facilities in general.

Percentage of private sector businesses with access to electricity, telephone and Internet

Core indicators on ICT in Private Sector			Scan ICT 2006	RDB/IT 2010
PV1	% of private sector businesses with access to electricity (by source)		82.3	95.8
PV2	% of private sector businesses with access to telephone (fixed or mobile)		78.9	94.8*
PV3	% of private sector businesses using computers (LSE, SME)		78.4	81.3
PV4	% of private sector businesses staff using regularly computers (LSE, SME)		50.2	61.5
PV5	% of private sector businesses with access to internet (LSE, SME)		50.2	92.6
PV6	% of private sector businesses with website		14.1	34.5

* *Access to telephone refers to business fixed line number when it exists or managing staff mobile phone numbers*

The private sector businesses mostly based in the capital Kigali has a high access rate to electricity due to their activities (manufacturing, trade and commerce, services,). Some of them still using generators as backup source due to the shortage of electricity. RECO RWASCO has improved the quality of service in the last 3 years but the cost in still high comparing to the neighboring countries.

Percentage of private sector businesses with access to electricity, telephone and Internet

Use of computers	Manufacturing	Services	Agriculture	Mining	Trade & commerce	Total
No	20.0%	26.2%	53.8%	7.7%	0.0%	18.8%
Yes	**80%**	**73.8%**	**46.2%**	**92.3%**	**100%**	**81.3%**
Total	100%	100%	100%	100%	100%	100%

Source: 2010 ICT Status

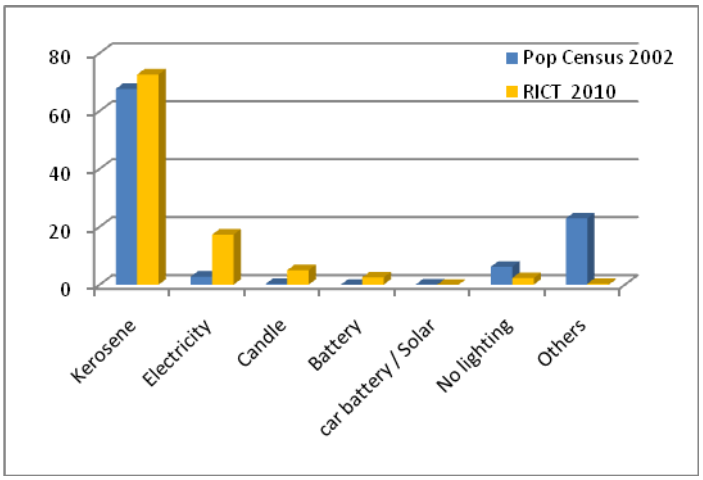
The table above shows that in private sector, the use of computers for supporting activities and operations is actually 81% while it was 50% in 2006 (ScanICT survey) and 10% in 2003 (OTF ICT Survey). In this category, the trade and commerce sector is toping with 100%, followed by Mining (92%), Manufacturing (80%) and Services with 74%. The Agriculture sector comes in last position with 46% corresponding to a medium usage.

ICT in Households & Individuals

The survey on ICT usage in households and Individuals has provided data on the equipment and usage of modern information and communication technologies owned by households, especially radios, TV sets, access to newspapers, computers and Internet. Statistical information was collected on the constraints that prevent people from using new information and communication technologies.

Repartition of HH by the source of energy used for lighting in 2002 & 2010

Repartition of households by energy source of lighting		
comparative surveys		
lighting energy source	Pop Census 2002	RDB/IT 2010
Kerosene	67.6	72.6
Electricity	2.8	17.3
Candle	0.3	5
Battery	0	2.5
car battery / Solar	0.1	0
No lighting	6.2	2.3
Others	22.9	0.3
Total	100	100



Compared with population census 2002, the proportion of households using kerosene as main energy source for lighting has increased by 5 percent (from 67.6 percent to 72.6 percent). The electricity energy as source for lighting had increased significantly from 2.8% to 17.3%. This indicator (electricity access rate) seems to be high comparing to the official national average electricity rate which is 6.8% but a lot of improvement is done actually by the Government of Rwanda to increase this indicator to 30% by 2012. Others energy sources for lighting (as candle, battery and solar system) have increased with an average of 3%. The proportion of households with no lighting had decreased from 6.2% to 2.3% during the same period.

Repartition of HH by accessibility to electricity, telephone, computers and Internet

ICT Indicators related to HH and Individuals	EDS 1992	Pop & H 2002	Scan ICT 2006	RI/DHS 2007-08	RURA 2009	RDB/IT 2010
Proportion of households with access to electricity	2.2	2.8	3.2	5	10.4	11.8
Proportion of households with a radio	46	50.2	54.1	58	58.7	74.3
Proportion of households with a TV			0.9	3	4.3	4.9
Proportion of households with a fixed line telephone			0.2		0,3	0.3
Proportion of households with a mobile cellular telephone			11.4		28.4	29.5
Proportion of households with a computer			0.2		1.6	2.3
Proportion of individuals who used a computer (from any location) in the last 3 months						3.9
Proportion of households with Internet access at home			0.5		1.1	1.8
Internet activities undertaken by individuals in the last 3 months						4.4
SMS messaging undertaken by HH in the last 3 months						17.9
Proportion of households with access to newspapers in the last 3 months						5.1

Source: *RI/DHS: Rwanda Interim Demographic & Health Survey (NISR, Macro 2007-08)*
EDS 1992: Enquête Démographie & Sante (Macro) Scan ICT 2006 : (RITA/UNR/NISR, UNECA 2006)

Repartition of HH with declared that ICT services have improved the quality of their life

Four households on five have declared that ICT services have improved the quality of their live by increasing HH incomes for those who are involved in business and in general increased the capacity of communication.

Proportion of households who declared that ICT services have improved their quality of life					
Provinces	% of HH	Toping districts	% of HH	lowest districts	%
MVK	91.3	Kicukiro	97.5	Nyarugenge	81.3
Northern Province	86.3	Rulindo	90.0	Gakenke	82.5
Southern Province	63.3	Ruhango	76.0	Gisagara	35.0
Western Province	82.7	Ngororero	97.5	Rutsiro	67.5
Eastern Province	80.5	Nyagatare	90.0	Bugesera	71.3
National	**80.8**				

ICT Industry & contribution to national GDP

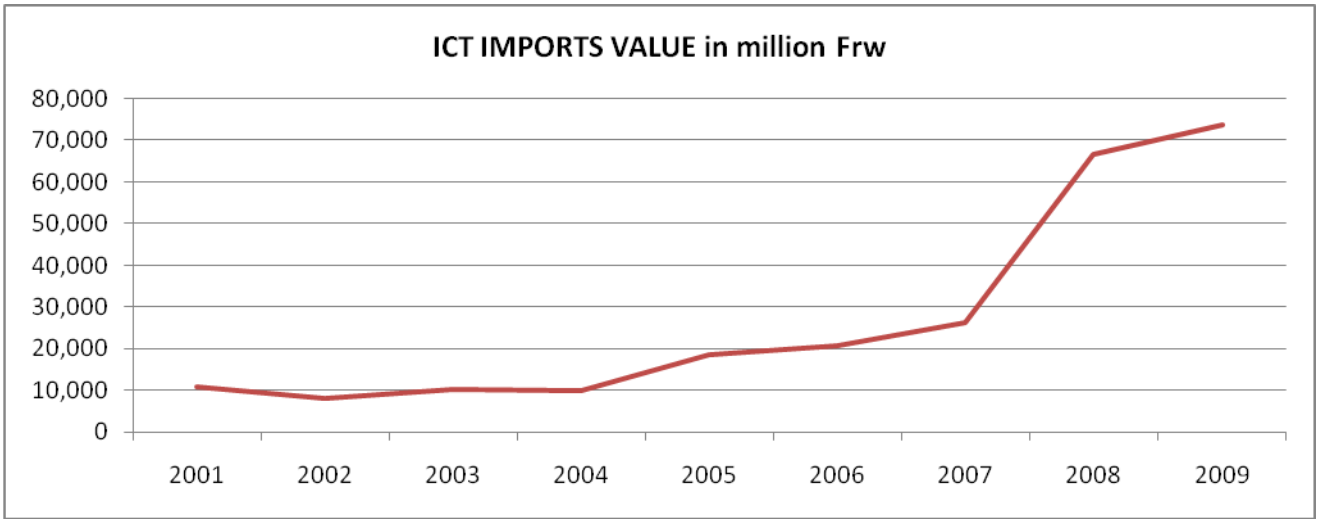
ICT can be considered as an important tool used in all different sectors to increase performance and therefore contribute to socio and economic growth.

Its level of importance can be estimated through the import trend value over the years. More import increase, High ICT contribution impacts are in the social and economic growth. The following table shows the situation on ICT import from 2001 to 2009.

Evolution of ICT imported goods

	2001	2002	2003	2004	2005	2006	2007	2008	2009
ICT IMPORTS VALUE*	10,807	8,102	10,350	10,069	18,609	20,728	26,302	66,648	73,711
% change (calculation based on year 2001	100%	75%	96%	93%	172%	192%	243%	617%	682%
Yearly increase based on previous year value		-25.03 %	27.75 %	-2.71%	84.81 %	11.38 %	26.89 %	153.39 %	10.60 %
*** in million Frw**									

Source: RRA/Customs

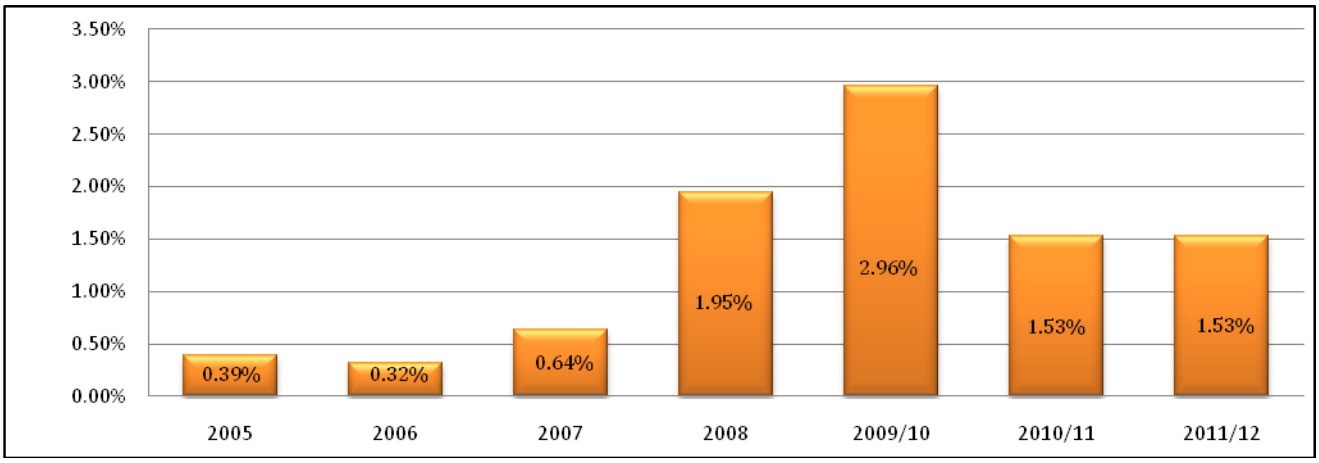


By considering the year 2001 as a base year, the value import from 2002 to 2004 decrease respectively by 25%, 4% and 7%. From 2005 to 2009 the level of imports of ICT equipments keeps going up compare to the level of imports in 2001. The value of imports in 2005 increased by 72% compare to the value on ICT imports in 2001.

The level of ICT imports in 2008 was a little high more than 6.5 times of the import value of 2001 and the year 2009 ICT imports value was about 7 times high than the imports value in 2001. Since 2004 up to 2009, the variation in imports value was positive which means the imports value in 2005 was high than value observed in 2004.

The value of imports in 2008 increased by 153.4% compare to the previous year mostly due to the telecoms sector with the inputs of mobile phones providers and the deployment of the fiber optic network. The ICT intervention in different sectors is reflected by the changes in imports volume and value.

ICT Expenditure, 2005-2012



Source : MINECOFIN 2009

Table 23: ICT Goods imports versus total of importations (2001-09)

YEAR	ICT IMPORTS VALUE	% CHANGE BASED ON YEAR 2001	% INCREASE BASED ON PREVIOUS YEAR	TOTAL IMPORTS VALUE	% ICT IMPOTS COMPARE TO TOTAL IMPORTS
2001	10,807,704,015	100%	-	123,284,661,655	8.77%
2002	8,102,244,607	75%	-25.03%	120,345,100,763	6.73%
2003	10,350,576,476	96%	27.75%	140,978,164,563	7.34%
2004	10,069,800,815	93%	-2.71%	178,149,498,791	5.65%
2005	18,609,782,152	172%	84.81%	228,117,116,324	8.16%
2006	20,728,269,670	192%	11.38%	271,589,916,642	7.63%
2007	26,302,957,112	243%	26.89%	372,221,222,129	7.07%
2008	66,648,149,817	617%	153.39%	571,137,267,666	11.67%
2009	73,711,028,961	682%	10.60%	631,195,789,971	11.68%

Law and Regulation in the ICT

POLICY AND REGULATORY ENVIRONMENT

Background

As in many other sectors, the time line for ICT sector development in Rwanda in general and telecommunications in particular can be divided into two major periods: the periods before and after 1994. The first period is characterized by a centralized and government based telecommunication sector, where the Ministry of Telecommunication plays both the role of service provider as well as the regulator until 1993 when a government based company known as *Rwandatel* was established with a semi autonomous status.

After the genocide in 1994, the main challenges in telecommunications development were to rehabilitate the telecommunications infrastructure that was damaged during the 1994 war and rebuild the government owned company from scratch as many of its employees were either killed or exiled. Rwandatel was the only telecom player on the ground until 1998 when MTN Rwandacell entered the market with Rwandatel as one of the main shareholders as well as the host of the main switches and related equipment. The following table summarizes the milestones that occurred during the period from 1994 to date as well as some projections for 2010 based on interviews made with policy makers as well as the managers of major telecoms companies.

Major milestones in the ICT Sector Development in Rwanda (2010)

	1994 - 1997	1998 – 2000	2001 - 2005	2006 - 2010
Law			**Law N 39/2001 of 13/09/2001 creating the Rwanda Utilities Regulatory Agency (RURA)** Law N 44/2001 of 30/11/2001 Establishing Telecommunications Laws: The law grants the Republic the authority to regulate telecommunications and set up a regulatory board to carry out that function * Law N 32/2002 of 02/10/2002 Creating the Rwanda Information and Technology Authority (RITA) PRESIDENTIAL ORDER N° 05/01 0F 15/03/2004 DETERMINING THE FUNCTION OF THE UNIVERSAL ACCESS FUND AND PUBLIC OPERATOR'S CONTRIBUTIONS	1. Review of the Telecommunications Law of 2001 by the Ministry of Infrastructure in 2006 **RDB/IT creation (2008)** The Government of Rwanda set up the RDB-IT, as a high powered Think-Tank with the mission to lead the process of creating the Rwanda information society and developing the economy in line with the aspirations of the Vision for Rwanda. RDB-IT is responsible for advising the Government on all matters relating to how best Rwanda can formulate, develop and implement its ICT policies, strategies and plans to speed up the process of transforming Rwanda into an information-rich, knowledge-based society and economy. Regulations made by RURA (current situation): • Re-delegation of the country code top level domain (.rw) • Develop guidelines for E-Waste Management in Rwanda • Develop guidelines for E-Health in general and for Telemedicine in particular • Develop guidelines for Information Security in Rwanda • Develop guidelines for E-Banking facilities in Rwanda • Develop guidelines to Protect Children in Cyber Space • Develop guidelines for the operation of Video Lending Libraries and Video Trade Entities • Develop guidelines for Hardware Installation, Software Development and implementation, Database Services and Data Processing Services • Develop guidelines for Postal Services • Establishing policy framework for migration to IPv6

	1994 - 1997	1998 – 2000	2001 - 2005	2006 - 2010
Policy	* No stated policy as such. Rwandatel as the only telecom operator. Tried to recover the telecom Infrastructure and replace damaged equipment	ICT 2020 Vision NICI Plan I as the policy instrument	Review of the NICI Plan I Drafting of NICI PLAN II Poverty Reduction Strategic Program (PRSP) * EDPRS (Economic Development and Poverty Reduction Strategy) (Drafting)	2006; Implementation of the NICI PLAN II Final version of the EDPRS approved 2010: Evaluation of the NICI PLAN II
Regulation	The Ministry of Transport and Communications and Rwandatel take up the role of regulation	The Ministry of Transport and Communications and Rwandatel take up the role of regulator.	* Establishment of the Rwanda Utility Regulatory Agency (RURA) (Multi-sector regulation)	
Market Structure	Monopoly	Entrance of a mobile operator Rwandatel runs an ISP • Public monopoly on fixed • Private lines. Monopoly on mobile service.	• Entrance of three ISPs (Terracom, ISPA, Artel) • Establishment of Artel communications as a Telephony over VSAT Provider • MTN got fixed and Internet licenses • Rwandatel privatized and owned by Terracom	.**Rwandatel** taken back to Gov. and privatization through a public call for tender to LAP Green, a Libyan consortium . New National Backbone and Carriers to come on board: . **Artel** to become New Artel and a full ISP . **Electrogaz** (power company) to establish a utility to manage the fiber backbone . **MTN** provides an Internet service provider and data carrier using its fiber backbone as well as Wi Max technology . **ALTECH** provide Internet services through Wireless . **Tigo** mobile phone service provider as last born started its services in 2009 (GSM, internet 3.5G,)
Number of Players	One player: Rwandatel	Two major players: Rwandatel and MTN Rwandacell	Four major players: Rwandatel, Terracom, MTN Rwandacell and Artel (Terracom and Rwandatel merge to form one company)	New entrances: **ISP:** New ARTEL and ALTECH **Radios broadcasters**: 24 private in 2010 **Pay TV** = 2 GSM Operators: 3
Services	Fixed telephony	* Fixed, Mobile and Internet	* Fixed, Mobile and Internet	**New services:** 3.5 G broadband internet offered by GSM

				operators. -Hot Spots internet access in Kigali City by MTN - Fiber optic national network implementation (2000kms)
Average Subscribers	14,000	-Fixed: 19,000 -Mobile:42,000 -Internet: 1,200	-Fixed: 21,687 -Mobile: 304,000 -Internet: 6,814	Subscribers 2010 • Fixed: 32,000 • Mobile: 3. 600,000 • Internet: 450,000

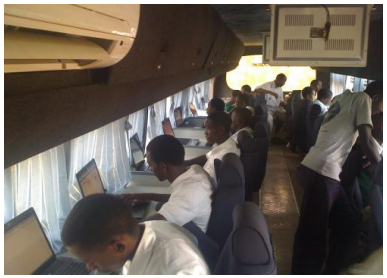
Source: Desk Research (2010)

RDB/IT Project

1. **Community Telecenters**: To date, RDB-IT has setup 30 telecenters in five provinces. The initial 12 telecenters were equipped with 15 computers, while the new multipurpose community telecenters are huge and equipped with 42 computers. These telecentres provide a variety of ICT services to the community at an affordable cost in relation to their income generation and these services will help the government to acquire the best mechanisms of decentralization as the community will have an online access to the Government's social, political and economic services. The services offered include various trainings in IT and internet connectivity; photocopying, printing and scanning and space for the community workshops and trainings on developmental studies.

2. **One Laptop per Child Project** has been initiated to introduce computers into Rwandan primary schools. This project will make computer education an integral part of the educational system at the school level and this will prepare Rwandan school children for university and college level education in computer-related programs thus improving the human resource development capacity of the Rwandans to meet the changing demands of the economy.

3. **Kinyarwanda Talkster:** Using ICT made simple. Innovation, Research and Development (IRD), to make ICT tools easily usable by people with sight disabilities. The blind and old people with sight disabilities will be able to use ICT tools with ease.



4. **The ICT Bus Project** – Rwanda already has two buses, which act as mobile Telecentres to help bridge the digital divide in the areas where there is no electricity.

5. **The e-Rwanda Project** aims at using ICT to simplify Government procedures, bringing transparency, accountability, allowing greater public access to information and making credible timely information available to all citizens, as well as providing all services in an efficient and cost-effective manner on an online basis.

6. **The Karisimbi Project** has been set up with a plan to provide high quality in communication navigation surveillance, telecommunications, and FM radio and television coverage in the country. Mt. Karisimbi is a strategic point with a great potential to play a significant role in enhancing broadcasting capabilities. The Karisimbi project has two main projects, broadcasting and Communication Navigation Surveillance/ Air Traffic Controller project.

Partners

- ITU
- SMSI
- Swedish institutions-KTH and SPIDER.
- India Government
- INTEL
- Mindset Network (South Africa),
- Rwanda Development Gateway
- ICT firms (Microsoft, CISCO …)
- NGOs (eg. The Rwanda Education Commons - REC)
- OLPC…

CHALLENGES

The major constraints are primarily related to the high cost of setting up network infrastructure and its maintenance particularly in the current context of shortage of electricity that lead to the high price of access as well as usage especially for mobile and internet services. The NICI II Plan had ambitious programs and projects to support increase of ICT access and usage around the country. The main target was to allow the central and local governments to communicate through ICT means in order to enhance good governance as well as provide efficient services to the general population through internet based applications. The main public and private agents have faced by the mentioned challenges including; RDB/IT, RURA and ICT service providers and are still severely facing shortage of technical skills and expertise in order to fulfill their respective requirement towards the achievement of the NICI II Plan.

CONCLUSION

The ICT sector in Rwanda can be characterized by two major aspects:
a) Significant progress made both in policy and regulatory reforms to ensure that ICT becomes an engine for poverty alleviation as a whole and a catalyst for socio economic development across the various sectors of the economy in particular.
b) Important issues and challenges to increase access, penetration and usage of ICT across the various segments of the society and particularly in the rural areas.
The reforms adopted have seen a number of changes in the telecommunication market with the entrance of new players and introduction of new technologies and services to meet the market demand. The public and private investment in network infrastructure development has significantly taken up and expected to grow over the coming five years within the framework of the NICI III Plan.
Indicators show a continuous improvement by increasing accessibility and usage of ICTs in the country.

The issue of access to and affordability of ICT services will be addressed by the discussed development of network infrastructure across the country supported by private and public initiatives. This is an important milestone towards the realization of a wider access to ICT services for the general population. The cost of network access remains the main challenges to increase ICT usage and penetration comparing to neighbors countries members of East African Community. It is therefore paramount to put proper procedure for sharing of network infrastructure amongst the major telecommunication operators in place, in order to reduce the cost of access and hence encourage new service providers in an open and competitive environment.
Furthermore, improving ICT access for low income and remote areas, there is a need to increase participation of the community in the development and deployment of ICT in the country. The process will involve great awareness of the potential benefits of ICT as a cross cutting tool to support development in the various sectors of the society hence poverty eradication. The full participation of the community in the management and maintenance of ICT services can provide alternative for increasing ICT access and usage for low income and remote areas in general. This will require a number of regulatory reforms to allow small scale enterprises to get involved in the areas where major service providers are not present and will also require significant changes in the provision of licenses to facilitate access to network services on a cost based pricing.