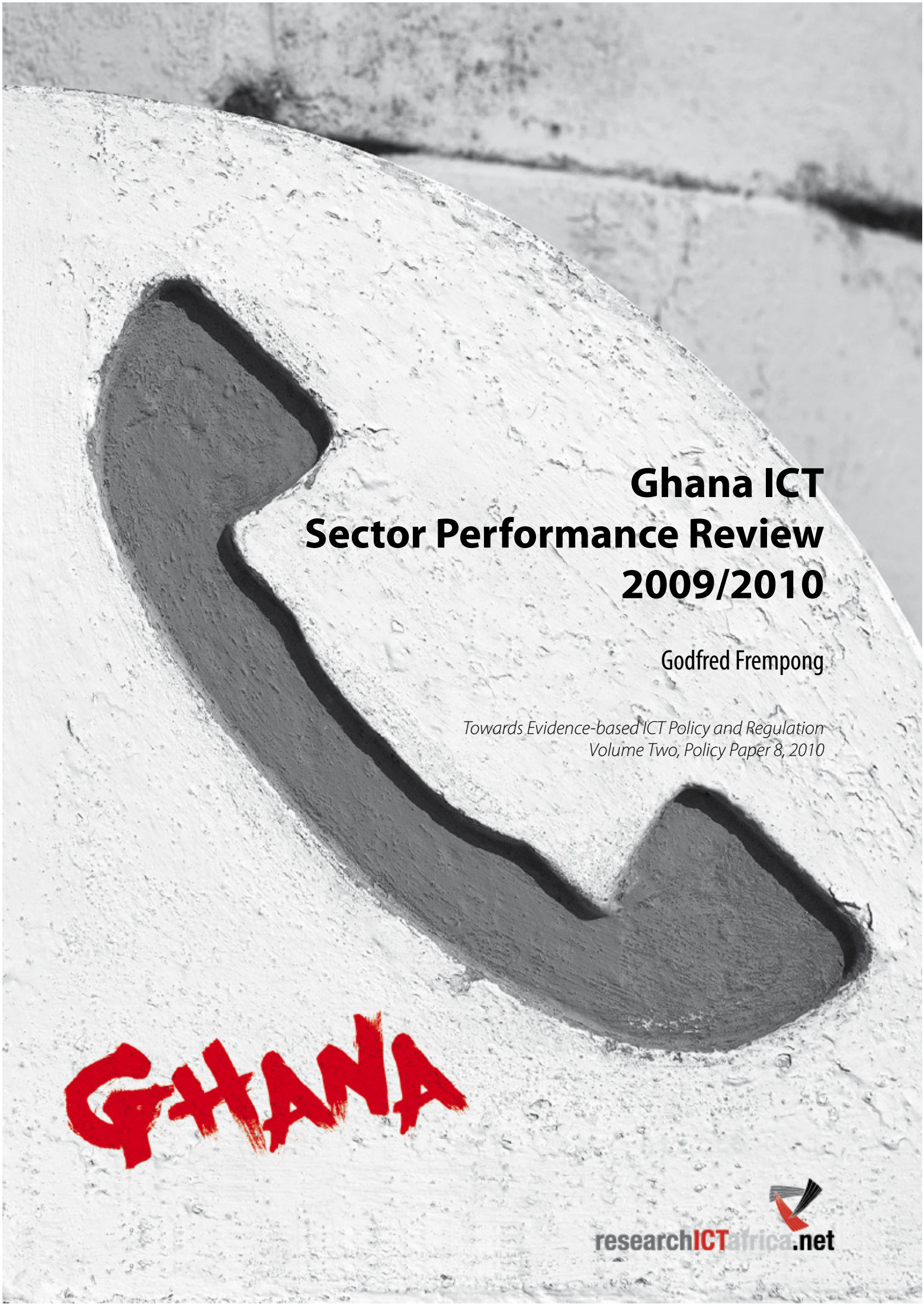

Ghana ICT Sector Performance Review 2009/2010

Godfred Frempong

Towards Evidence-based ICT Policy and Regulation
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Research ICT Africa

Research ICT Africa fills a strategic gap in the development of a sustainable information society and network knowledge economy by building the ICT policy and regulatory research capacity needed to inform effective ICT governance in Africa. The network was launched with seed funding from the IDRC and seeks to extend its activities through national, regional and continental partnerships. The establishment of the Research ICT Africa (RIA) network emanates from the growing demand for data and analysis necessary for the appropriate and visionary policy required to catapult the continent into the information age. Through network development RIA seeks to build an African knowledge base in support of ICT policy and regulatory design processes, and to monitor and review policy and regulatory developments on the continent. The research arising from a public interest agenda is made available in the public domain, and individuals and entities from the public and private sector and civil society are encouraged to use it for teaching, further research or to enable them to participate more effectively in national, regional and global ICT policy formulation and governance. This research is made possible by the significant funding received from the International Development Research Centre (IDRC) Ottawa, Canada. The network members express their gratitude to the IDRC for its support.

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Executive Summary

Strong regulatory framework is a requirement for attracting investment.

Information and communication technologies (ICTs) markets are being revolutionised by the rapid adoption of Internet-based services, wireless technologies and by the convergence of previously distinct ICTs such as broadcasting, computing and communication. These services emanating from the ICT market have the potential to contribute to rapid socio-economic development.

The ICT sector performance review (SPR) conducted by the network, and findings of the previous reviews, have been instructive and have contributed to the sector's development. The SPR have also supported academic and policy research in ICT in Ghana.

The legal regime has seen some rigorous developments. New laws have been passed to support the implementation of the two ICT policies and improve the regulation of the sector. The laws include:

- National Communication Authority Act, 2008, Act 769
- National Information Technology Agency Act, 2008, Act 771
- Electronic Transactions Act, 2008, Act 772
- Electronic Communications Act, 2008, Act 775

The regulatory environment of the ICT sector has also seen some remarkable improvements as evidenced by the 2009 telecom regulatory environment (TRE) assessment results and analysis, in comparison to the one conducted in 2006. The interconnection regime in Ghana was positive and the country was among the few countries which had a positive score interconnection. The establishment of a cost-based interconnection tariff and the increase in the number of companies with significant market power from one to two have reduced the tensions in the market. However, regulating completion and quality of service require urgent attention to bolster the development of a sound regulatory situation in the country.

The ICT market exhibited a lot of dynamism, which has resulted in an explosion in the development and deployment of many ICT services, and the country earned a positive score in TRE assessment of market entry conditions. The competitive pressures in the mobile market have created a dynamic market with considerable consumer welfare gains. Significantly, mobile telephone tariffs have progressively declined since 2004 and Ghana was among the countries with the lowest mobile tariff. However, tariff regulation in the TRE was negative which signifies that much still needs to be done to bring the tariff levels down further. In addition, Internet tariffs remained high due to the high cost of leased facilities, among others, and this has contributed to the low uptake of Internet services in the country.

The study reviewed the existence of weak e-skill capability in Ghana and in Africa as a whole. It was only South Africa which had an e-skill index above 1. The rest of the selected countries, including Ghana, had e-skill indices below 1. This is an indication of the handicap that African countries, especially Ghana, face in effectively exploiting ICT opportunities to enhance their socio-economic activities.

The recommendations made were:

- Regulatory Issues
- The NCA should build on its experience to improve its capacity, visibility and credibility as well as regulatory skills to bolster the effective development of the ICT sector.
- The regulator should intervene in the Internet market to engender dynamism to promote growth of the industry.
- The co-location and the telecom facility-sharing regulatory requirement as contained in the NTP should be implemented and enforced by the regulator and not left to the whims and caprices of the operators.
- Though market forces are to shape the development of the Internet industry, it is necessary for a national policy to provide a conducive environment for the industry.
- Government as a matter of agency should provide a succinct and elaborate policy with incentive schemes to revamp the fixed-line telephone market.
- Need to build e-skills in the country through a more structured and rigorous programme whose impact on the national landscape should be visible.
- Need to develop a vibrant ICT market that can provide employment or absolve the generated capability.

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Introduction

Proliferation of institutions may result in conflicts which may affect the sector's development.

Information and communication technologies (ICTs) markets are being revolutionised by the rapid adoption of Internet-based services, wireless technologies and by the convergence of previously distinct ICTs such as broadcasting, computing and communication. These services emanating from the ICT market have the potential to contribute to rapid socio-economic development. This can be possible if among other factors, the market is responsive, dynamic and operating in an effective and efficient regulatory regime.

Building of a strong regulatory framework is very important for the development of the ICT market because a good regulatory framework provides security and stimulus to attract foreign investment. It is equally important, therefore, that the sector should be periodically reviewed and assessed to see how it has performed, identify problems and provide recommendations to address the identified problems.

In addition, the existence of a strong ICT network infrastructure and application which are easily accessible, affordable and highly exploited can accelerate socio-economic development. Mastrini and Aguerre (2009) argue for the need for policies that create a conducive environment for stability, predictability and fair competition at all levels, and that they should be developed and implemented in a manner that enables universal service and other obligations to be achieved.

Ensuring the development of proactive policies and the development of responsive regulatory regimes to facilitate the development of a dynamic ICT market requires constant analytical review of how the sector has performed in order to provide recommendations that could potentially accelerate its development.

The provision of this analytical review to support Ghana's ICT sector development underlies this study conducted under the aegis of Research ICT Africa. This is the third ICT sector performance review (SPR) conducted by the network, and findings of the previous reviews have been instructive and have contributed to the sector's development in terms of providing inputs for general policy discussions in the country. The reviews have also supported academic and policy research in ICT in Ghana.

The 2009 SPR report is organised in eight sections. The first part serves as the introduction to the study and is followed by the institutional, policy and regulatory frameworks for the ICT sector in the country. The third section focuses on network and infrastructure and the fourth concentrates on the pricing mechanisms of the various segments of the market. The development of ICT skills is discussed in the sixth section and is followed by e-applications and services in the country. The last two sections look at the policy issues emerging from the study, conclusions and recommendations.

Institutional, Policy and Regulatory Frameworks

Efficient institutional, policy and regulatory frameworks provide a foundation for attracting investments.

Efficient institutional, policy and regulatory frameworks are necessary for the holistic development of the ICT industry. In the modern ICT industry, conducive institutional, policy and regulatory frameworks provide a foundation for attracting investments, and focus is turned to these frameworks in the ICT sector in Ghana. General political stability, rule of law and respect for human rights also underlie the attraction of direct foreign investment into the sector. These factors will provide security of investment and reduce arbitrariness in political decisions on the sector.

Policy Framework

In Ghana, two policies are driving ICT developments – ICT for Accelerated Development (ICT4AD) Policy and National Telecom Policy (NTP). The ICT4AD Policy has the overall objective of supporting an ICT-led socio-economic development process aimed at transforming Ghana into a middle-income, information-rich, and knowledge-based society (Ghana Government, 2003). On the other hand, the goal of the NTP is to establish market structures that will be most beneficial to Ghana's citizens and businesses, and to set in motion the procedures and incentives that will boost the market's development (Ministry of Communication, 2004). It is also to support the realisation of the vision of the national ICT4AD policy.

Efforts have been made to implement some of the strategies enunciated in these two policy documents. For example, further liberalisation of the telecom market has taken place with the licensing of a sixth mobile telephone operator, with the intended effect of driving down prices.

Also, licences for broadband wireless technology have begun to be issued. Further, the Ghana Information, Communication and Technological Directorate (GICTED) has been established under the Ministry of Communication as the national implementation and coordination body of ICT projects linked to the ICT4AD policy. The Directorate is one of the key institutions implementing the e-Ghana project funded by the World Bank. The e-Ghana Project aims at supporting concrete initiatives to implement the Government ICT-led development strategy. The project has three components, namely:

Ghana registered some improvements with regard to market entry and interconnections.

- Capacity-building and operational support to the Ministry of Communications for the overall coordination, implementation, financial management, procurement and monitoring of Project activities;
- Support to Local ICT Businesses and IT-Enabled Services in Ghana;
- e-Government Applications and Government Communications Development of IT architecture and interoperability standards for government applications and networks.

For the ICT4AD policy, action-plans to implement the strategies of each of the 14 pillars are being developed, albeit at a very slow pace. The process needs to be accelerated to enable the country to keep pace with the rapid technological and environmental changes associated with the sector. This is a crucial issue and requires strong political commitment and promptitude to establish such institutions.

Though GICTED forms part of the strategies of the national ICT4D, proliferation of these institutions might result in institutional wars, as evidenced in the earlier relationship between the National Communications Authority and the National Media Commission. There was a controversy over the NCA mandate to allocate frequency spectrum to the electronic media, which falls under the National Media Commission.

The proliferation of institutions may result in turf wars.

In the case of the NTP, some visible efforts have been made; for example, the further opening of the ICT market to grant more operators licences to operate. However, regulation, despite some improvements, remains a daunting task for the NCA. Poor quality of service and the inability of the regulator to enforce all the tenets of the licensing obligations of the ICT service operators affect the effective development of the sector. These affect the ICT readiness/ICT development index of the country, critical components of the information society evolution framework. For example, Ghana's ICT development index in 2007 was 1.63 and ranked 114 in the world. Despite the competitive effects of a liberalised market, as will be discussed later, a certain segment of the market (Internet) has not been competitive and this has affected the development of the sector.

Legal and Regulatory Environment

The legal and regulatory regime has seen some rigorous developments. New laws have been passed to support the implementation of the two ICT policies and improve the regulation of the sector. The laws include:

- National Communication Authority Act, 2008, Act 769[1]
- National Information Technology Agency Act, 2008, Act 771
- Electronic Transactions Act, 2008, Act 772
- Electronic Communications Act, 2008, Act 775

These laws were passed and gazetted in December 2008 but the implementation of these laws has not advanced much.

Generally, these laws provide the full complement of Acts required to give a comprehensive legal framework for ICT sector in the country. They also provide the legal basis for some of the strategies of the ICT4AD and the NTP. The National Communications Act (NCA) Act 2008, Act 769 expands the mandate of the NCA and tries to resolve the controversy between the National Media Commission (NMC) and the NCA over the right to licence and allocate frequency for the electronic media (radio and broadcasting). The NCA Act 769 granted the NCA the authority to issue, allocate and manage frequency spectrum in the country. However, it made provision for the NMC to serve on the board of the NCA. In that sense, the NMC has some role to play in the operations of the NCA.

1 See Appendix 1 for detailed review of the laws and areas of applicability, especially the National Communication Authority Act and the National Information Technology Agency Act.

There is no convergence in the legal and regulatory frameworks of the sector. The merger of the NCA and the NMC to form a single regulatory authority will be difficult since the establishment of the NMC is one of the provisions in the 1992 constitution. It is worth stating that technological development appears to be making these separate regulatory institutions anachronistic. The question is, with the development of multi-media services, such as Internet broadcasting (both TV and radio) and video increasingly becoming available, who regulates these services? It is also becoming necessary to separate the dual functions of the NMC i.e. protection of the media from political infractions and the control and development of content. The MNC can concentrate on the first function, while content development is added to the NCA to ensure efficient regulation and development of content in Ghana. This is a challenge that requires strong political will to change so as to make Ghana fit into the emerging trends in ICT regulation.

The relationship between the NCA and the Ministry of Communication has been clearly defined and the Ministry's role is that of administrative oversight over the activities of the NCA. The role of the Minister of Communication as the 'Court of Appeal' found in the old NCA Act has been removed. This should reduce the political interference in the activities of the NCA. The NCA Act mandates it to establish dispute resolution committees and also calls for the establishment of an electronic communications tribunal.

An ad hoc electronic communications tribunal has the mandate to review decisions and orders of the NCA and the Dispute Resolution Committee.

The electronic communications tribunal is to be chaired by a retired supreme judge or a lawyer with 15 years experience, with the mandate to review decisions and orders of the NCA and the Dispute Resolution Committee. The tribunal is to be convened on an ad hoc basis with a registrar and other staff appointed by the Public Services Commission (PSC)[2], but its budget will be derived from the revenue of the NCA. Further, the members of the Tribunal are also to be appointed by the PSC.

All the Acts are more or less two years old and therefore the structures to ensure their implementation are yet to be developed. However, the implementation of these Acts, especially the Tribunal, will impact positively on the regulation and development of the ICT sector, as well as improve the efficiency of dispute resolution.

Regulatory Framework

The NTP laid a strong emphasis on further liberalisation of the ICT market through a licensing regime that supports widespread market entry. The policy stated that licensing and authorisation activities of the NCA should be conducted in a transparent, non-discriminatory, open and simple manner. The import of this is to make the sector in Ghana responsive to technological developments and attract investors. Key ICT regulatory issues such as licensing, facility sharing, number portability and interconnection are discussed in this section.

Licensing

The Electronic Communication Act mandates every company providing public communication services to obtain licences from the NCA. However, technological development is radically changing the licensing of communication services and introducing new dimensions into the sector in terms of the scope and what should be licenced. This is a daunting task since regulation has always lagged behind developments in the market, but a more proactive licensing regime may make an impact in terms of reducing the gap in the pace of technological development.

Service Neutral Licences

The licensing regime of the country is working towards service neutrality[3], especially among the telephone companies operating in the country. The argument in support of service-neutral licences is that advances in technology are gradually dismantling the notion that different services must be obtained from different licenced providers (Ndukwe, 2005).

[2] The PSC has the mandate to appoint high-level personnel for the civil service and some public institutions in the country. Appointments by the Commission follow rigorous processes and therefore prevent the hand-picking of people to fill public positions.

[3] Service neutrality refers to the non-discriminatory and equitable licensing and regulation of different services and technologies.

The licences of the telephone companies allow them to provide services which are related to their core activities, and they only need to inform the regulator about their intention.

A typical example of service neutrality is the provision of data services by the mobile telephone companies in the country. These operators are utilising opportunities provided by GSM and CDMA technologies to provide data services, though most of them do not have licences for data services. The grant of 3G licences to all mobile telephone companies is going to expand the provision of data services by these companies through mobile modems and handsets.

Though this has the positive effect of increasing the country's Internet penetration, it may negatively affect the businesses of the Internet service providers (ISPs) in the country. The mobile telephone companies will compete with the ISPs for customers, especially the non-corporate subscribers who may be attracted by the low initial cost in using the data service facilities provided by the mobile telephone companies. For example, a broadband mobile modem is being sold by MTN, Vodafone and Zain for between GH¢95–Gh¢101 (US$66–US$71[4]). We can compare this to an iBurst Ghana USB modem, which normally costs Gh¢250 (US$175)[5] and a Skyburst modem from Internet Ghana which is US$350. One advantage the mobile telephone companies have is their wide coverage which will enable people to access the Internet anywhere their signals are available.

One of the outmoded policy bottlenecks that remains is the issue of voice over Internet protocol. While the use of VOIP is impossible to distinguish from data and therefore difficult to monitor, the stand of the NCA is that companies whose licences do not allow them to offer voice services should obtain a licence before they can deploy or use VOIP. However, the NCA has given authorisation to some companies, mostly mining concerns, for the use VOIP for their private communication networks. Such private networks cannot terminate traffic into the public networks however. Also, other IP-based communications such as Yahoo Instant Messenger and Skype services are allowed in the country for private communications.

One of the outmoded policy bottlenecks that remains is the issue of voice over Internet protocol.

Reflecting the structural conflict of interest in a sector where the State is responsible for the overall policy of the sector and safeguarding the welfare of consumers, but is also a major shareholder of the incumbent, the main argument against the commercialisation of VOIP is the loss of revenue to the dominant network operator – Vodafone Ghana – of which the government is a shareholder. However, for consumers, it is a lost opportunity to enjoy the cheaper rates for international communications being enjoyed by citizens in other countries all over the world.

Technological Neutral Licensing

The policy requires the NCA to apply technology-neutral standards to allow licenced operators to deploy any combination of technologies to encourage economically efficient and innovative market development (Ministry of Communication, 2004). Technology neutral licensing[6] is one of the pillars for achieving a convergent licensing regime in the country.

The intent is to allow licence holders to adopt appropriate and cost-effective technologies to deploy services in the country. Consequently, ICT operators in the country have adopted different technologies to deploy their services. For example, the Internet service providers have adopted combinations of technologies, such as wireless and ADSL, to provide Internet services. Further, the two national network operators have deployed both copper (cables) and fixed wireless technologies to provide telephone services.

On a related note, all the mobile operators have introduced fixed wireless telephone systems in the country. The leading company, however, is Kasapa, which is aggressively marketing its fixed wireless service, dubbed 'Kasapa Homework.' With the Kasapa Homework fixed wireless service, a user pays slightly higher call charges than Vodafone Ghana and Zain charge for the fixed-line network. One disadvantage of the Kasapa Homework telephone is that one cannot move the telephone from one location to the other. The telephone is usually locked in within the cell site where it is registered and one has to re-register it in the new location. MTN Ghana is operating payphones in the University of Ghana campus based on its mobile telephone platform.

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[4] Average exchange rate of ¢1.43 to US$1 was used for the conversion in May 2010.

[5] iBurst Ghana, under a promotional sale, is selling the USB modem at Gh¢139 about US$97.

[6] Technology neutral licence allows a licencee to choose any type of technology and equipment to be used to provide communication services (see http://www.ictregulationtoolkit.org/en/PracticeNote.aspx?id=3128 data retrieved on 22nd June, 2009).

Interconnection

Interconnection of the telecom system allows users of specific network to interact with others on different networks, thus ensuring seamless communication. However, it has been the bane of the telecom industry, and has created a lot of controversies and disagreements among interconnecting parties.

Consequently all telecom regulations have provisions compelling all operators in the industry to interconnect. The Electronic Communication Act, 2008, Act 775 mandates all licenced public telecom operators to interconnect. Currently, two companies, namely Vodafone and MTN Ghana, with significant market power (SMP), are to provide the infrastructure for physical interconnection.

There has been improvement in the interconnection regime of the country, occasioned by a number of factors. First, the existence of two companies with SMP has improved physical interconnection in the industry and this has reduced industrial controversy in the interconnection capacity, especially between those companies. Secondly, the NCA has formed an Interconnection Technical Committee with the objective of resolving all technical problems associated with interconnection at the committee level before it becomes explosive. Finally, a consultant has provided a model for the determination of interconnection rates which has been accepted by all operators. The interconnection model is based on long-run incremental cost. These have contributed to an improved interconnection regime and industrial (ICT sector) harmony prevailing in the country[7].

Like most other countries, fixed-line telephones registered negative CAGR between 2003 and 2008.

Facility Sharing

Facility sharing has become a very important regulatory issue in the country due to the public uproar over the unplanned nature of mast construction in the country. The NTP supports facility sharing as a measure to bolster fair competition, minimise cost and public inconvenience, and protect the environment. The policy stipulates that as far as possible, access to public rights-of-way, towers, telephone poles, underground conduits, international cable landing stations, and other physical support structures should be shared among operators (Ministry of Communication, 2004). The NCA was to play a key role in the negotiations of terms and conditions, including cost allocation, for such shared facilities.

To some extent, there is facility sharing in the telecom industry in the country. For example, there is a facility sharing agreement between MTN and Tigo to enable the latter use of MTN's infrastructure between Accra – Takoradi and Accra – Kumasi. There are similar agreements between Kasapa and Vodafone and Vodafone and Tigo. However, facility sharing is not a widespread phenomenon and this has led to the proliferation of masts. Glo Mobile has to completely build a complete infrastructure for its service, though it could have used the excess capacity on the fibre network or masts of MTN. This has affected the commencement of operations by Glo Mobile.

Mobile Number Portability

A number of countries have introduced mobile number portability (MNP) into their telecom sector. In Europe, most countries have introduced MNP into their telecom sector, because of its advantages, which include:

- The potential to eliminate one of the barriers to true competition, i.e. the inability of end users to switch networks while retaining the same telephone number;
- An increase in subscriber choice with the likelihood of improving customer service;
- MNP will facilitate competition in saturated markets;
- Reducing the subscriber's cost of switching networks, because there is no need to circulate new number;
- More effective use of numbering resources;
- Motivation of service providers to provide high quality service, deploy advance services and provide more choice to end users (Peprah, 2010).

The Electronic Communications Act 2008, Act 775, Section 6(1) (o), states that: "a network operator or service provider shall provide number portability when required to do so by the Authority."

[7] See Table 13 for the resultant price determination.

Furthermore, it is a licence condition for operators to implement number portability when a decision is made by the NCA in consultation with the operators of the industry.

The introduction of MNP is receiving serious attention by the regulator in the country and a series of activities have been planned in 2010, especially the stakeholders' forum to discuss the modalities for introducing MNP into the market.[8]

Telecommunications Regulatory Environment

Generally, there has been some improvement in the telecom regulatory environment in the country. This is evidenced in the outcome of the Telecom Regulation Environment (TRE)[9] survey conducted as part of the sector performance review, which shows some improvements in the overall regulatory environment in the country as compared to the TRE results in 2006 (see Figure 1).

Ghana should not neglect developing the fixed-line telephone market segment.

Ghana scored positive marks in two indicators – interconnection and market entry. With the exception of tariff regulation, all the other indicators registered some improvements in the 2009 TRE. Comparatively, it is Mozambique and Tanzania which had positive assessments from the TRE. However, it is only South Africa and Ethiopia whose ranking further deteriorated in 2009 (Figure 2).

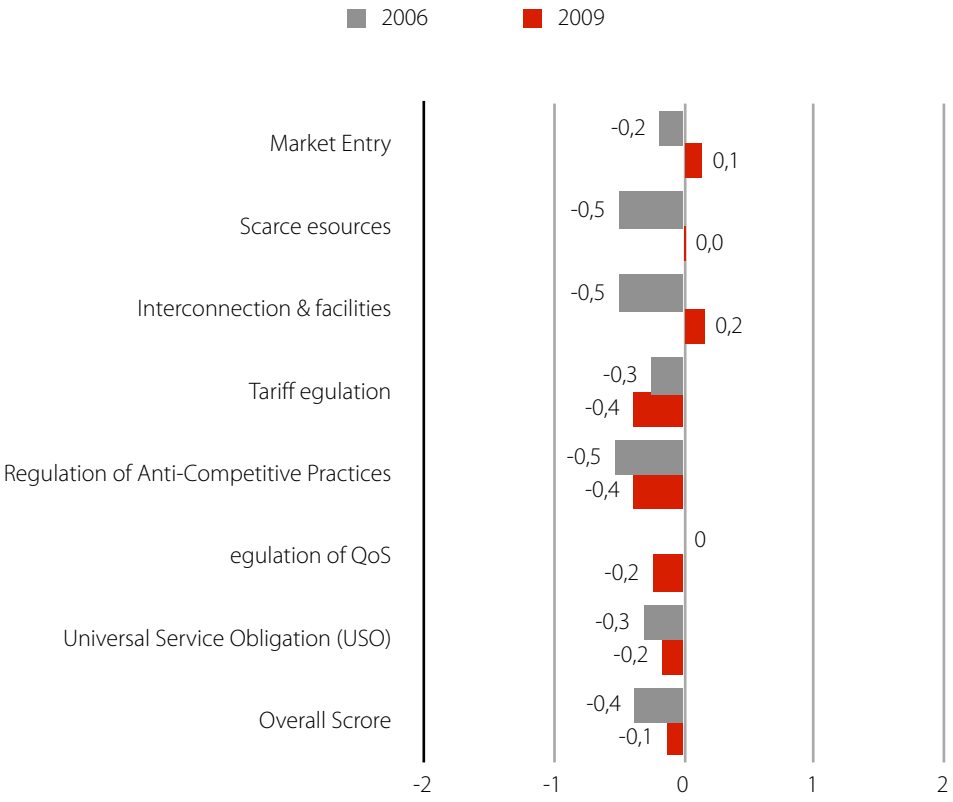

Figure 1: Comparison between 2006 and 2009 TRE in Ghana

[8] South Africa is the only country in Africa that has fully implemented MNP in its market. Consequently, the experience of South Africa should guide the NCA on the introduction of MNP in the country. Countries considering introducing MNP include Nigeria and Egypt.

[9] The TRE is a diagnostic tool to assess the performance of the laws affecting the telecom sector and the various government entities responsible for their implementation.

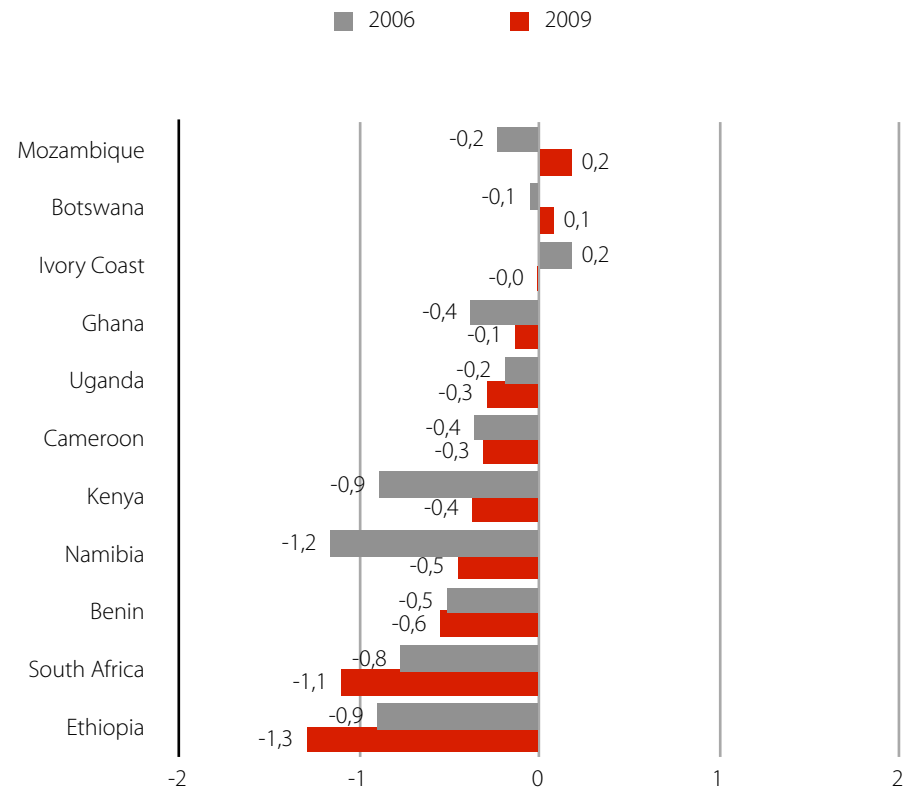

Figure 2: Comparison between 2006 and 2009 TRE among Selected Countries

Market Structure

The development of the ICT market in the country is underpinned by the NTP. The objective of the policy in relation to the ICT market is to promote a broader opening of all market segments to private and competitive market forces (Ministry of Communication, 2004). The policy emphasised the development of an ICT industry based on the principles of open markets and fair competition. This is to provide level grounds for all operators in the market, as well as to ensure that consumers benefit from the competitive market. Also, the new NCA Act mandates the NCA to ensure competition among all communication networks in the country. In effect, the policy and legal frameworks support the development of a competitive ICT market in the country.

Government has reduced its direct involvement in the market.

The developments in the market demonstrate the effects of open-market policy in the country. The telecom market in Ghana has six mobile telephone operators and two national fixed-network operators. The mobile telephone operators are MTN Ghana, Tigo Ghana Limited, Vodafone Ghana, Kasapa Telecom and Zain[10]. The sixth operator, Glo Mobile, is yet to commence business, but is currently involved in building its physical infrastructure. With the exception of MTN and Glo, the operators are subsidiaries of multinational mobile telephone companies.

Furthermore, the government has reduced its direct involvement in the market. It sold 75% interest in the then Westel to Celtel International, a subsidiary of Zain (formerly named the MTC Group) for US$120m in 2007. Westel was initially licensed as a second national network operator as part of the duopoly introduced under the Accelerated Development Plan for Telecommunication (ADP) of 1994. The objective of ADP was to liberalise and revamp the sector through the participation of the private sector to meet the changing needs of Ghanaians as well as ensuring effective integration into the global context (Atubra and Frempong, 1999). Also, the government sold its majority (70%) stake in Ghana Telecom to Vodafone for US$900m in 2008. Additionally, the telecom international gateway has been liberalised and four companies, namely Vodafone Ghana Limited, Milicom Ghana Limited, MTN Ghana and Zain have been granted licences to provide international gateway services.

[10] Zain, in the early part of 2010 sold its subsidiaries to Bharti Aritel of India.

Universal Access

The objective of the universal access (UA) policy is to make telecom services[11] available in all regions and communities by the year 2010 and also expand the coverage to at least 25% of the population, which should include at least 10% penetration in rural areas. At the end of 2008, telephone penetration was 52.4% indicating part-achievement of the UA objective. However, since the term telecom was broadly defined to include data and related services, it is obvious that access to those services is not close to the target. Further, the bulk of the telephone subscribers are in the three major cities of Ghana, namely Accra, Kumasi and Takoradi. Therefore, it cannot be said that telephones have been deployed to all communities in the country.

Terrestrial national fibre backbone is necessary for increased data and multimedia services.

Table 1: Trends in Revenue and Expenditure of GIFEC 2005–2008 (Source: GIFEC 2009)

	Collected	Disbursed	Share Disbursed
2005	1 800 000	100 000	5,6%
2006	2 100 000	136 000	6,5%
2007	7 300 000	600 000	8,2%
2008	7 100 000	1 400 000	19,7%

The Electronic Communications Act, 2008, Act 775 provided a legal basis for universal access obligations in the country. The Act established the Ghana Investment Fund for Electronic Communication (GIFEC)[12] as an independent body to manage the country's universal access fund. The object of the Fund is to provide financial resources for the establishment of universal service and access for all communities, and facilitate the provision of basic telephony, Internet services, multimedia services, broadband and broadcasting services to these communities. The policy mandates telecommunication operators to contribute 1% of their net revenue to the Fund.

The management of the Fund consists of all telecom operators with representatives from the Ministry of Communication and National Communications Authority. The GIFEC has a secretariat with an administrator responsible for the administrative machinery of the Fund.

Table 2: Summary of Regional distribution of CICs in Ghana (Source: ITU, 2009)

Region	Number
Ashanti	14
Brong-Ahafo	12
Central	13
Eastern	14
Greater Accra	6
Northern	10
Upper East	13
Upper West	12
Volta	13
Western	13
Total	120

Figure 3 provides a summary of the revenue and expenditures of the Fund between 2005 and 2008. The revenue accruing to the Fund increased from 2005 and peaked in 2007, but dropped in 2008. The drop in revenue for 2008 was due to the non-payment of contributions by the then Westel and Ghana Telecom Company. This was the period when the government was in the process of selling its shares in the two companies, and the companies withheld their contributions until the process was completed.

One interesting phenomenon is that the mobile telephone companies are outpacing the GIFEC in the extension and expansion of mobile communication services to the rural and underserved areas. Competition in the mobile telephone market is driving the service operators to expand their services across the country. In most cases, the mobile telephone operators enter earmarked communities before GIFEC and this is affecting its work. Between 2005 and 2008 GIFEC's revenues stood at GH ¢18,300,000 (US$17.62m) out of which GH¢2,236,000 (US$2.03m) representing 12.2% had been spent over the period. Like most other universal access funds, the huge unspent revenue in its accounts epitomises the ineffectiveness of the Fund to implement its projects.

[11] The term telecom is broadly defined to include basic traditional telephone services, and broadband information and communication services that include voice, data services, access to the Internet, local relevant content and government.

[12] GIFEC was, formerly called the Ghana Investment Fund for Telecommunication.

GIFEC has been funding the construction of shared facilities for the mobile telephone operators and the establishment and management of community information centres (CIC) as mechanisms to increase access to ICT services in the rural and underserved areas of the country. Data from GIFEC indicates that it has completed 39 Common Telecom Facilities in 2008 which enabled mobile telephone operators to extend their services to 273 communities. It has also operationalised 120 CICs. Table 1 illustrates the regional distributions of the CIC.

Pricing is a key component for improved ICT access and increased usage.

The CICs are equipped with television sets, videos, computers with Internet facilities, photocopiers, fax machines, as well as other communication gadgets. Most of these CICs face operational challenges such as ownership, management, patronage and lack of business plans.

GIFEC has now expanded its scope of activities in line with its extended mandate under the Electronic Communications Act. Some of its funding activities are: Rural payphones in conjunction with MTN, Rural Business Centres, School Connectivity, Support to Ghana Library Board and Support to Prisons among others, but as indicated, implementation has been slow.

The slowness in working towards achieving universal service/access is epitomised by the negative score Ghana registered in the TRE on universal service obligation (see Figure 4). In Figure 4 Botswana regulatory or agency with universal service/access obligations had the best rating, while the Universal Service Agency of South Africa had the lowest. Ghana can improve its rating if GIFEC can adopt proactive mechanisms to facilitate the implementation of its universal access projects and also improve its visibility.

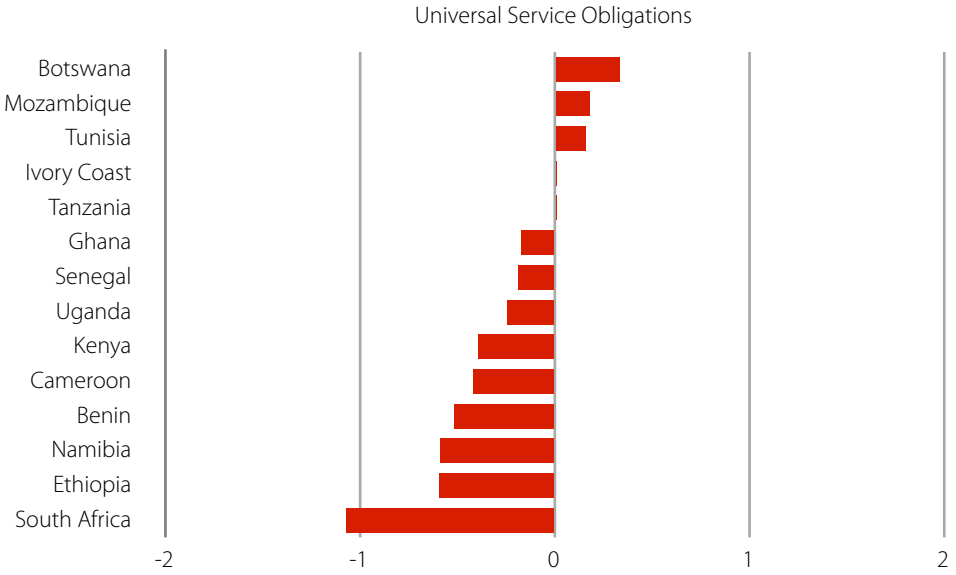

Figure 4: Universal Service Obligations(Source: RIA TRE 2009)

Telecom, Internet and Broadcasting Market Analysis

This section analyses the market situation for telecom, Internet and broadcasting.

Telephone Penetration

The telecom sector of Ghana is one of the most liberalised markets in Africa. As mentioned earlier, the market has two national fixed-network operators and five operating mobile telephone companies. The fixed-line telephone segment is almost a monopolistic market since Vodafone Ghana controls almost 98% of the market, while Zain, the second network provider, has only 2% market share.

Unlike the fixed-line telephone market, there is rigorous competition in the mobile telephone market and this has contributed to an improved penetration rate in the country.

Unlike the fixed-line telephone market, there is rigorous competition in the mobile telephone market and this has contributed to an improved penetration rate in the country. In 2008, the telephone penetration stood at 52.4%, of which mobile telephones contributed 99%. The analysis showed that the deployment of fixed-line telephones has been on the decline and between 2003 and 2008, it experienced a negative CAGR of 13.1, while that of mobile telephones was 70.8% (ITU, 2009a).

Figure 5 illustrates the market shares of the various mobile telephone operators in the country. MTN Ghana is still the market leader with a market share of 53%. It is followed by Tigo with 23%, Vodafone Mobile with 14%, and Kasapa with the lowest market share of 2%.

Zain Ghana has made significant in-roads into the mobile telephone market. The company only started operations in the last quarter of 2008, but now commands 8% of the market. The company has adopted rigorous marketing strategies, including pricing to acquire that market share, with the effect of driving down the prices of its competitors.

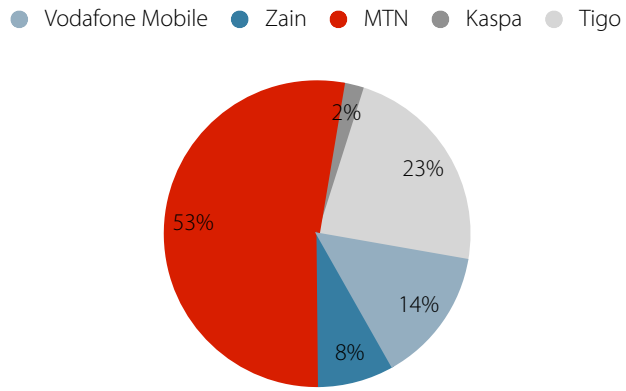

Figure 5: Mobile Telephone Market Segment Source: http://www.nca.org.gh/access-lines/169.html

At the end of 2009, Ghana had over 15 million mobile telephone subscribers. Table 3 gives the actual subscriber details of the operators. The total penetration rate may be misleading due to subscribers who hold multiple SIMs. A survey conducted by Research ICT Africa in 2007/2008 revealed that 11% of mobile phone owners had multiple SIMs.

Table 3: Subscriber Levels of Mobile Telephone Companies (Source: http://www.nca.org.gh/access-lines/169.html)

Operator	Subscription Level
Kasapa	262,259
Tigo	3,420,354
MTN	8,000,946
Vodafone Mobile	2,132,119
Zain	1,293,238
Total	15,108,916

Figure 6 shows the combined trend of mobile and fixed-line telephones penetration in the country. Generally, fixed-line telephone development and penetration has been declining since 2004, while mobile telephone penetration is accelerating very fast.

In the past, fixed lines were the main backbone for access and utilisation of Internet services, but the development in wireless technology is increasingly eroding the extent of its deployment. In addition, the increasingly popularity of mobile

The decline of fixed-line telephones raises a serious policy implication since fixed-line telephony still has a role to play in the ICT development of the country.

telephones has further contributed to its erosion. The decline of fixed-line telephones raises a serious policy implication since fixed-line telephony still has a role to play in the ICT development of the country. It is important that Ghana should not neglect that segment of the market so as to maintain its readiness to take on-board any technological breakthroughs that might emerge from the fixed-line telephone market.

Table 4: ICT Access in Ghana (source ITU)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
DSL Internet subscriptions						1,4	6,2	14,4	20,7	26,1
Public payphones	3,2	4,3	5,2	6,8		16,9	12,8	9,6	5,2	
Fixed telephone lines	212,5	244,6	275,0	291,0	313,3	321,5	356,4	376,5	143,9	267,4
Mobile cellular telephone subscriptions (post-paid + prepaid)	130,0	243,8	386,8	795,5	1 695	2 875	5 207	7 604	11 570	15 109

Productivity and Profitability

Due to the paucity of financial and other critical data, a rigorous analysis of productivity of the telecom companies in terms of employment, revenue per employee, and others cannot be accomplished. However, two companies provided some financial data which can yield to some financial analysis.

Table 5: MTN Ghana (Source: MTN, 2009)

	2007	2008
Net income after tax (in GH¢ m)	179.8	234.3
Network Investment (in GH¢ m)	196.3	271.5
Employees	1207	1387
Revenue per employee (in GH¢ m)	0.15	0.17

MTN Ghana provided financial data for two years; however, this does not sufficiently lend itself to trend analysis. It does however provide some indications of the profitability of the company. MTN's net income in 2007 was GH¢179.8m (US$185.3m) and increased to GH¢234.3m (US$193.0m) in 2008, representing an increase of 76.7%.

A similar trend was seen in terms of revenue per employee which increased from GH¢0.15m in 2006 to GH¢0.17 in 2008. In the case of Vodafone, its net income declined from 2005 to 2007. The net income fell from GH¢18.09m in 2005 to GH¢2.35 in 2006 and was registered as a loss of GH ¢15.87 in 2007. Similarly, its revenue per staff was negative in 2007, in spite of the rise in earnings in 2006. Interestingly, Vodafone's network investment for 2006 and 2007 was almost the same in spite of the decline in the revenue of the company.

Table 6: Vodafone (Source: Vodafone, 2009)

	2005	2006	2007
Net income after tax (in GH¢ m)	18.0958	2.352	-15.868
Network Investment (in GH¢ m)	266.1967	381.824	380.199
Employees	4180	3981	4162
Revenue per employee (in GH¢ m)	4.329	5.908	-3.812

Generally, there has been a decline in the average revenue per user (ARPU) of the mobile telephone companies. During the second quarter of 2008, MTN had the highest ARPU of $14. It was followed by Vodafone's One Touch ($9), Kasapa ($8) and Tigo ($7.5)[13] but the ARPU declined during the first quarter of 2009 for all the operators. This appears to be partly attributable to increased multiple subscriptions with the entry of Zain into the mobile market in the last quarter of the previous year.

[13] See http://consultantvalueadded.com/2008/11/08/ghana-telecom-market-review-november-2008/ data retrieved on 14th March, 2010.

Consequently, the subscribers had to spread the disposable income over their SIMs, thereby reducing the ARPU. The MTN ARPU dropped from $14 (in 2008) to $8 per month. Tigo had $5.30; Kasapa, $4.70; while Zain made $3.00[14]. On average, the national ARPU for the first quarter of 2009 was $5.3. Zain's earnings in Ghana were the lowest among its subsidiaries across Africa and Middle East. Zain's highest ARPU was in Kuwait with US$55, followed by Bahrain (US$26) and Gabon (US $25[15]).

Competition in the mobile telephone market segment is contributing to the fall in ARPUs. Most of the operators have reduced their tariffs to target the lower income earners so as to increase their market share. However, these reduced tariffs are related to on-net calls and this is to increase intra-network communications. The effect of this situation is the rise of multiple SIM card usage, a phenomenon which is negatively affecting ARPUs. For example, a multiple SIM card user whose income is largely fixed has to spread what might have been spent on one company among others, and this definitely affects a user's ARPU for each company to which he/she is a subscriber. Consequently, the increasing rates of multiple SIM use are part of the contributory factors for the decline of ARPU in Ghana.

Mobile competitors have reduced tariffs for on-net calls which has resulted in the rise of multiple SIM card usage, a phenomenon which is negatively affecting ARPUs which as assessed per SIM card, not user.

This argument is confirmed by Obiodu (2009) when he argued that multiple SIM card owners distort market performance and that it therefore should not be used as the main determinant of profitability. Consequently, a more rigorous way should be found to measure market performance in the light of multiple SIM holders which is a symptom of users not satisfied with inter-network call charges, poor quality of service, and limited service coverage, among other factors.

Broadband Internet

Ghana was among the first countries in Africa to introduce the Internet into its ICT market. However, the market has not experienced the dynamism that would lead to massive deployment of Internet services in the country.

Table 7: Summary of Service Providers as December 31, 2009 (Source: NCA, 2010a)

CATEGORY		NO. AUTHORISED	NO. OPERATIONAL
Internet Data Service Providers		176	30
VSAT Data Operators		201	60
Direct to Home Satellite Services (DTH)		23	0
Public/Corporate Data Operators		112	30
FM Stations		219	164
TV Stations	FREE ON AIR	49	9
	PAY-PER-VIEW		5

As at December 2009, the regulator had licenced 176 Internet service providers (ISPs), but only 30 were operational. Similarly, 176 Data VSAT operators have been granted licences, but only 60 are in operation. In case of Public/Corporate Data Operators, 103 companies were issued with licences, but only 25 had commenced business. Though the large numbers of unutilised licences epitomizes regulatory laxity, it also illustrates how liberal the market is in the country.

Some of the main ISPs are Vodafone Broadband4u, Teledata ICT, UCom, African Online, Internet Ghana and Zipnet. It is difficult to determine the size of the Internet market due to the unwillingness of the ISPs to share data on their subscriptions. The available data indicates that Vodafone Broadband4U is the market leader with almost 23,800 subscribers in 2009. Teledata ICT had 2,000 subscribers and Ucom had 635.[16] However, estimation by Southwood (2010) put Internet subscribers below one million.

[14] http://www.ghanaweb.com/GhanaHomePage/NewsArchive/artikel.php?ID=167845 data retrieved on 14th March, 2010.

[15] www.zain.com/download/able/reports/Q32009ZainPresentation.pdfsource Data retrieved on 14th March, 2010.

[16] Most of the ISPs refused to share their subscription data with the research team and this makes it extremely difficult to determine the exact Internet market in the country.

A survey conducted by Research ICT Africa (RIA) in 2007/2008 on Household and Individual ICT usage revealed low penetration of Internet at the residential/household level. The survey showed that only 0.3% of the households in Ghana had Internet connections at home. This is far below countries such as South Africa (4.8%), Namibia (3.3%), Kenya (2.2%) and Cameroon (1.18%), which typifies the lack of rigorous competition in the Internet market segment as witnessed in the mobile telephone market.

Another survey, conducted under the auspices of AudienceScapes, revealed that the level of residential Internet penetration was 4% (Bowen, 2010). However, the level looks too high, as the difference between the outcomes of the two surveys is quite distinct[17]. Though poor telecom infrastructure negatively affects Internet access for many in Ghana, another major challenge appears to be lack of knowledge about the service. The AudienceScapes revealed that over half of the respondents who did not use the Internet indicated their lack of knowledge about the service (Bowen, 2010).

Besides the ISPs, all the mobile telephone companies are providing data services, largely through GPRS/ CDMA/EDGE systems. However, two companies (Zain and MTN Ghana) are now operating 3.5G systems and providing broadband Internet services through mobile modems. There is no data to determine the extent of usage of the 3Gmobile platforms for data services, but it is possible that with the 3.5G infrastructure, mobile Internet may rescue the falling voice ARPUs and may increase data revenues (Southwood, 2009). Southwood argues further that cheaper bandwidth may boost mobile Internet usage to increase residential penetration of Internet services.

Broadcasting

Some FM stations have adopted Internet broadcasting with the aim of targeting Ghanaians in the diaspora to enable them access to live broadcasting and to follow developments in the country.

The 1992 Constitution of Ghana laid the foundation for the liberalisation of the airwaves to support political and socio-economic development. Section 162(3) states unequivocally that there should be no hindrance to the establishment of the press or media by the private sector (Ghana Government, 1992). This provision in the constitution and technological changes in the sector have led to media pluralism in the country. The NCA has issued licences to many companies to provide radio, Frequency Modulation (FM) and TV broadcasting in the country. As at December 2009, 219 companies were licensed to provide FM broadcasting, of which 164 are operational. Most of these FM stations are commercial and largely concentrated in the regional capitals, especially Accra and Kumasi. There are a few community FM stations which should in principle address local issues and provide programmes/platforms that support community development.

Innovatively, some of the FM stations have adopted Internet broadcasting with the aim of targeting Ghanaians in the diaspora to enable them access to live broadcasting and to follow developments in the country.

Again, most of the FM stations in urban areas (notably Accra and Kumasi) have established affiliations with FM stations in the districts to relay some of their programmes, mainly major news broadcast, sports and other live programmes of national importance. This arrangement enables FM stations in the cities to broadcast national and international news to the deprived districts and communities in the country.

One regulatory issue which remains a challenge to the NCA is how to curb the abuse of licence limitations (approved power ratings) required by FM stations. Most of the FM stations exceed the approved power ratings and broadcast to unauthorised areas. The novelty of the FM frequency spectrum is the ability to allocate the frequency range to multiple users operating in different locations. For example, the 107.1 frequency band, which has been allocated to Oman FM in Accra, can also be allocated to a different FM station operating in Koforidua, which is about 84 kilometres from Accra. However, this is not possible since most of the FM stations broadcast beyond their permitted areas. The current situation does not lend itself to efficient utilisation and management of the frequency spectrum in the country. However, the NCA has adopted a licensing regime where FM frequency fees are linked to the distance covered. For example, an urban FM licence covering a distance of 100km attracts an initial authorisation fee of US$20,000 and an annual spectrum fee of US$1,500, while a similar licence for urban FM, but with 25km coverage attracts the initial authorisation fee of US$5,000 and annual spectrum fees of US$400. Most of the urban FM stations operate in the 100km coverage area and pay the accompanying fees. It makes economic sense to operate in a bigger coverage area, which might increase the companies' chances of increasing

[17] The upcoming national population and housing census will provide exact data on the penetration of Internet in the country. ICT questions form part of the data to be captured during the census.

revenues through advertisements and sponsorship of programmes. Consequently, this policy is more of an ad hoc measure than an attempt to effectively manage this important resource.

In the case of television broadcasting, nine companies are broadcasting free on air and five pay-per-view TV broadcasting companies are operating. In the case of direct to home satellite services (DTH), 23 companies have been given authorisation to operate, but none has commenced business.

One of the problems associated with TV broadcasting, especially those re-broadcasting from foreign countries, notably South Africa, is the issue of content. Most of these stations have little or no local content and the lack of local content means no jobs are being created for the local content developers in the country. This raises a regulatory issue that lies squarely in the ambit of the NMC which has the mandate, among others, to regulate local content development.

There is a directive from the International Telecommunication Union to all member countries to migrate to digital broadcasting by 2015. In view of this, the government has established a technical committee to facilitate the migration by 2012.

In the general market entry analysis, Ghana scored positive in the TRE survey (see Figure 1). Favourable market entry conditions hinge on transparency and efficiency in issuance of licences, and liberal policy and regulatory regimes, amongst other factors. The subsequent opening of the mobile telephone market, data service operators and the publication (NCA website) of the licence application procedures have contributed to the improved market entry conditions. However, efforts should be made by the NCA to improve regulation of anti-competitive practices. Ghana was rated negatively in the TRE survey on anti-competitive practices. This points to the absence of a level playing field for all the operators and should be improved to augment the favourable market entry conditions. Effectiveness in regulating anti-competitive practices is one of the stimuli in attracting and safeguarding investments, thus ensuring the effective growth of the sector.

Favourable market entry conditions hinge on transparency and efficiency in issuance of licences, and liberal policy and regulatory regimes, amongst other factors.

Network Development/Infrastructure

There is a paucity of financial data that would allow for effective discussion and assessment of developments in ICT infrastructure in the country. Though investment data was difficult to obtain, there is evidence that the ICT companies have been investing to expand and improve the quality of their services. For example, MTN Ghana invested 467,791,295.00 (US$482m) in 2007 and 2008, while Vodafone also invested 1028.2197m in its network between 2005 and 2007.

Table 8: Summary of investment by Communication Operators 2009 (Source: NCA 2010b)

Period	Amount (US$ m)
Second Quarter	2,373.880
Third Quarter	188.185
Fourth Quarter	581.634
Total	3,143.70

Table 8 gives some data, albeit limited, on the investment made by ICT companies during the second to fourth quarters of 2009. These investments were in network equipment, telecom equipment (mobile phones, VSAT, radios, accessories) and broadcasting equipment.

For the three quarters in 2009, a total amount of US$3,143.7m was invested in the sector, with the second quarter having the highest investment.

Infrastructure

Base stations play an important part in the mobile telephone infrastructure and without them the functionality of mobile telephones may be impaired[18]. As a network expands, it needs more base stations to improve reception and quality of service. Consequently, with the increasing expansion of mobile telephone networks and subscription in the country, all the operators have been investing in base stations to ensure improved connectivity.

As at the first quarter of 2009, MTN Ghana had the highest number of base stations (1,652), followed by Tigo with 699, Vodafone 378 and the least was Kasapa with 112 (see Table 9).

[18] The base station uses radio signals to connect mobile telephones to a company's network and this enables people to send and receive calls, texts, emails etc.

Table 9: Number of Base Stations[19]

Company	No. of Towers
MTN Ghana	1,652
Tigo	699
Zain	250
Vodafone	378
Kasapa	112
Total	3,091

The construction of base stations to improve mobile telephone communication has been dogged by complains from the public about the alleged effect of electromagnetic radiation from the towers on human health. This has led to the placement of a temporary ban on the construction of masts by the Ministry of Environment, Science and Technology. The public outcry on mast construction has raised regulatory issues of co-location or facilities-sharing in the country and this need to be addressed adequately to ensure expansion of the service as well as improving quality in areas where the service is already available.

International and Domestic Backbone Services

The planned proliferation of submarine marine cables will create a competitive infrastructure market, which should lead to a reduction in the cost of international bandwidth with knock on benefits for leased facilities and Internet services.

To improve voice and data communication in Ghana, the national terrestrial fibre backbone is being constructed with a loan from the Chinese government. The fibre backbone took over the fibre ring of the Volta River Authority and a National Fibre Backbone Company was formed to manage the infrastructure. However, the company formed part of the Ghana Telecom package sold to Vodafone in 2008. The first phase of the project has been completed, which included the upgrade of the Voltacom fibre ring and extension of the fibre from 800km to 4,000 km to connect 23 sites nationwide.

Since the takeover of the fibre network, Vodafone has invested over US$30million to improve and expand the network. For example, Vodafone has extended the fibre backbone from Tamale to Bolgatanga in the north and constructed a new link from Kumasi to Techiman (which is to serve as a back-up to the original link which passed through Sunyani to Tamale). It is also constructing a link from Sunyani to Wenchi which might be extended to Wa in the Upper West Region.

In the case of international submarine fibre cables, Ghana and other countries in the West African sub-region will soon be inundated with many fibre networks. For many years West Africa had access to one undersea cable, SAT-3, which connects the sub-region to the international community. But recently three new private submarine cables, Glo One, Main One and West Africa Cable System (WACS) have been granted landing rights by the NCA. Glo One and Main One have already landed in Accra. The planned proliferation of submarine marine cables will create a competitive infrastructure market, which should lead to a reduction in the cost of international bandwidth. Invariably, this will affect the cost of leased facilities for Internet services.

Broadband Wireless

A number of companies are deploying broadband wireless technologies including Wimax and wifi wireless systems as the last mile in the provision of Internet services in the country. The companies have been deploying Wimax and wifi wireless for wide area or specific geographic location (for example, university campuses). Almost all the ISPs have integrated wireless technology in their service delivery.

In addition, the NCA has started the process to grant broadband wireless access (BWA) networks and services within the frequency spectrum range of 2500MHz–2690 MHz band. The BWA licence holders do not require a separate ISP licence to provide data services.

Pricing

Pricing is an important component of the ICT access and usage. An unattractive pricing mechanism will affect the capability and the enthusiasm of operators to increase investment to improve the deployment and expansion of the ICT services. On the other hand, if the pricing is too high, it may deter consumers from effective use of the service. Consequently, there is the need to achieve synergy between the social good and economic interests of the ICT companies. In this section, we discuss the various pricing levels of some of the ICT services in the country.

Fixed-line Telephones

Table 10 provides information on the prevailing tariffs for fixed-line networks in the country. Vodafone charges are cheaper than Zain. Vodafone charges a GH¢0.06 for both on-net and off-net calls on its fixed-line network, while Zain charges GH¢0.12. However, in the case of termination of calls on mobile telephone networks, Zain's rate is lower than Vodafone Ghana. Vodafone charges approximately GH¢0.14 per minute, while Zain charges GH¢0.17 per minute. With regards to international calls, Vodafone call charges are lower for countries such as the USA, Canada, South Africa, Germany, China and the United Arab Emirates.

Table 10: Tariffs of Fixed Telephony Operators (Prepaid in Ghana Cedis) 2009[19]

	Vodafone	Zain	Industry Average
On-Net (Within Network)	0.06	0.12	0.09
Off-Net (Other Local Networks –Fixed Line)	0.06	0.12	0.09
Mobile Networks	0.1368	0.12	0.1284
UK	0.2366	0.17	0.2033
USA	0.1158	0.17	0.1429
Canada	0.1158	0.17	0.1429
Italy	0.349	0.36	0.3545
Nigeria	0.2292	0.17	0.1996
South Africa	0.3056	0.36	0.3328
Germany	0.272	0.36	0.316
China	0.1134	0.17	0.1417
UAE	0.2625	0.36	0.3113

Mobile Telephones

Three mobile companies, namely MTN, Zain and Vodafone have adopted a uniform tariff for both on-net and off-net peak calls. MTN charges GH¢ 0.14 per minute for peak on-net calls and the same for off-net calls. In the case of Vodafone, it is GH¢ 0.144 per minute for both on-net and off-net. Trying to increase their market share, Zain has undercut their price marginally by GH¢ 0.12 per minute (See Table 11).

There appears to be a correlation between the drop in pricing of mobile services and its increased penetration.

However, there are variations in the off-peak call charges. For example, MTN's off-peak on-net calls is GH¢0.1 per minute, Zain's is also GH¢0.1, while Vodafone's is GH¢0.09. Southwood (2006) argues that there is usually only a small percentage difference in price between the cheapest and the most expensive in most African markets. His argument is evident in the pricing of mobile telephone services in the country. However, cumulatively those small marginal differences can make a significant difference to overall mobile communications expenditure.

Generally, there has been a decrease in the tariff levels in the country and there appears to a correlation between the drop in pricing of the service and its increased penetration. As evidenced in Figure 7, the constant reduction in tariffs since 2004 resulting from the liberalised market has contributed to the increased penetration of mobile telephone services. The question is, has the downward trend in the mobile tariffs hit the end of the road? Southwood (2006) argues that there is more room for the mobile telephone operators to reduce their price levels as the operators have not reached the bottom of the price elasticity curve. Most of the mobile telephone operators have resorted to promotions to reward loyal customers instead of general reduction of tariffs to benefit all. For example, Tigo once introduced a promotion which they called 'My Tigo Number One.' Under this promotion, Tigo subscribers send an SMS designating an existing Tigo customer as their number one and enjoy a reduced tariff for a whole day.

[19] Source: http://www.nca.org.gh/index.php?option=com_content&view=article&id=202&Itemid=108

In spite of having the lowest prices among the 18 countries, Ghana's tariff regulation was perceived to be inefficient. The rating is based on a strong perception that prices could still go down.

Table 11: Tariffs of Mobile Telephone Operators (Prepaid in Ghana Cedis)[20]

	MTN	Tigo	Vodafone	Zain	Kasapa	Average
On-Net	0.14	0.15	0.144	0.12	0.0954	0.1299
Off-Net and Fixed	0.14	0.162	0.144	0.12	0.1494	0.1431
UK	0.3	0.354	0.162	0.17	0.2118	0.2396
USA	0.144	0.132	0.162	0.17	0.2118	0.1640
Canada	0.144	0.132	0.162	0.17	0.2118	0.1640
Italy	0.44	0.54	0.192	0.36	0.2118	0.3488
Nigeria	0.192	0.198	0.372	0.17	0.2118	0.2288
South Africa	0.44	0.354	0.234	0.36	0.2118	0.3200
Germany	0.3	0.132	0.192	0.36	0.2118	0.2392
China	0.144	0.132	0.162	0.17	0.2118	0.1640
UAE	0.44	0.354	0.372	0.36	0.2118	0.3476
SMS-On Net	0.04	0.0403	0.04	0.04	0.0438	0.0448
SMS-Other Networks	0.05	0.0477	0.0424	0.04	0.0438	0.0448
SMS-IDD		0.1124	0.0848	0.12	0.0636	
MMS	0.18	0.212	0.19	0.18		0.1905
Data	0.195 /MB	1.0 / MB	0.2 / MB	0.2 / MB	0.00072/sec	

This promotion is likely to benefit those in the urban areas who are literate as well as have access to the mass media to know about the promotion. It would be beneficial if all callers were made to enjoy a certain percentage reduction of the call charges.

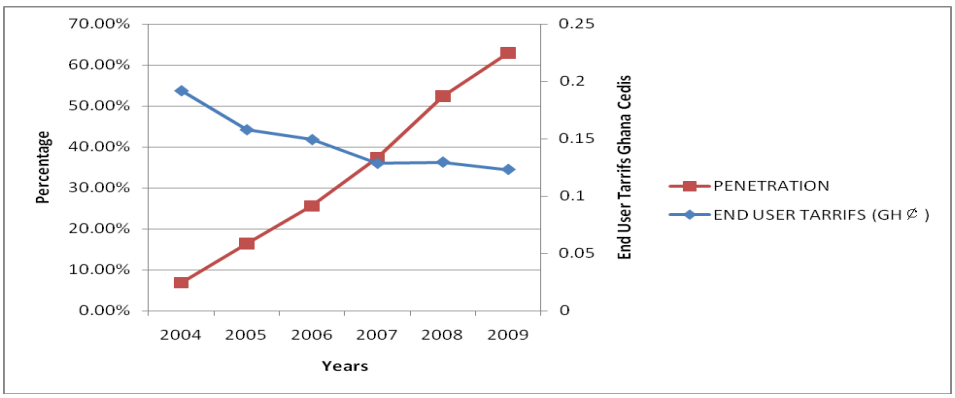

Figure 7: Penetration vs. End-User Tariff Actual (2000–2009): Source: Peprah, 2010

The level of mobile telephone prices is related to user patterns. Other factors, such as improved national economy and availability of disposable incomes also contribute to increased patronage of the service. Using OECD pricing and user baskets, Ghana has the lowest prices of the 18 African countries reviewed by Research ICT Africa .

Burkina Faso, Tanzania, Uganda, Nigeria and Mozambique are among the countries with higher prices. Ghana's reduced tariffs result from fierce competition in the market but are also associated with a drop in ARPUs as discussed earlier. For example, MTN ARPU fell from US$14 in 2007 to US$8 in 2008 representing a decrease of 175%.

In spite of having the lowest prices among the 18 countries, Ghana's tariff regulation was perceived to be inefficient. The rating is based on a strong perception that prices could still go down. The clamour for lower tariffs buttresses the argument by Southwood (2006) about the existence of room to reduce mobile telephone tariffs.

[20] Source: http://www.nca.org.gh/index.php?option=com_content&view=article&id=202&Itemid=108

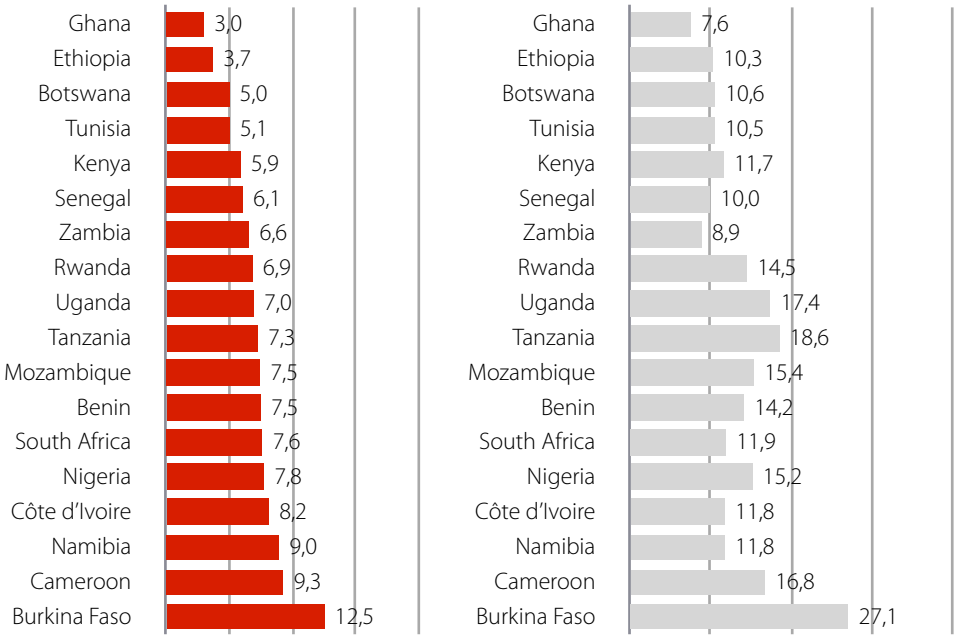

Figure 17: OECD Low Usage Basket USD and PPP (Source: www.researchictafrica-data.net)

This is a challenge to the mobile telephone operators since tariffs are unregulated and depend on the dynamism of the market. Further, many users want the regulator to play a more pivotal role in mobile pricing rather than leaving it to the market, as market forces alone should not be the determinant of mobile tariffs.

Interconnection Termination rates

Cost-based interconnection tariffs have been developed and are being implemented in the country. This is to provide a sound basis for interconnection charges in the country.

According to the glide path, interconnection rate between the mobile networks for 2008 and 2009 was US$0.035. The rate for mobile to fixed-line networks was to increase from US$0.032 in 2008 to US$0.033 in 2009 and the vice versa. This removes the distortions which led to the situation where it was cheaper to terminate calls from fixed-line networks to mobile. In addition, termination rate between fixed-line networks increased from US$0.018 to US$0.026 for the same period.

According to the glide path, in 2010 and 2011 there will be uniform interconnection tariffs of US $0.035 for both mobile and fixed-line telephones, as well as for international calls. The net gainers for the new interconnection tariff regime will be the fixed-line telephone operators whose rates are to rise from the US$0.031[21] in 2008 to US$0.035 in 2010. Further, the reduction in international interconnection tariffs is set to remove artificial costs imposed on international calls and make such calls less expensive. The implication is that operators are to compete more on quality of service, marketing and promotions to attract and maintain subscribers. The migration to the 2010 level has been stalled due to a regulatory/technical hitch between the government and the operators.

Though Ghana's TRE score for interconnection was positive, the effective implementation of the interconnection model would have enhanced the situation further. It is important that the NCA provides a platform for the resolution of this problem to enable consumers to benefit from the improved interconnection regime.

Broadband Internet Services

There is no uniform pricing of broadband Internet services in the country due to the fact that the market is unregulated. Consequently, market dynamism is to underpin the pricing mechanisms. Tables 12–14 show the different pricing of broadband Internet services in Ghana.

[21] The original figures were in local currency (GH¢)

Though the Internet market is unregulated, it is important that the NCA and the government provide some incentives that can stimulate dynamism in the market.

Table 12: Vodafone Broadband Internet Charges[22]

	Speed	Charges (US$)	
		Installation	Monthly
Home Starter	256kbs	39	32
Easy Surf	512 kbs	39	39
Fast and Reliable	1024kbs	39	136
Heavy User	4mb	Free	199
Super	4 mbs	Free	245
Anywhere	4 mbs	Free	280

Comparing the rates of the three ISPs, Vodafone broadband offers the lowest rates for higher bandwidth. For example, Vodafone offers a bandwidth speed of 4mbs for US$245 per month, while Internet Ghana offers only 512kbs for US$274. Again, Busy Internet offers 128 kbs dedicated service for US$750 which is obviously more expensive than the 4mbs Vodafone Broadband is offering.

Table 13: Internet Ghana Broadband Internet Charges[22]

Service Type	Speed	Set Up Fees (US$)	Monthly Charges (US$)
Skyburst Prestige	256kbs	-	75
Skyburst Campus	256kbs	-	55
Skyburst Night-shift	128–2mb	-	55
DSL (Small Office)	256kbs	206	150
DSL (Office)	512	206	274
DSL (Home)	256	78	73

Vodafone Ghana appears to have adopted a predatory pricing system to undermine and out-compete all the ISPs in the country. Though there are many companies providing Internet services in the country, there is no real competition between them, and this is negatively affecting the development of the Internet market. As indicated earlier, Vodafone controls a major share of the Internet market in the country.

Table 14: Busy Internet Broadband Internet Charges[23]

Service Type	Speed	Shared	Assured	Dedicated (US$)
BusyPro	128 kbps	95	140	750
BusyMax	256 kbps	175	230	1,190
BusyUltra	512 kbps	350	440	2,100

The broadband Internet market is characterised by local and some foreign operators, and unlike the mobile telephone market, the operators lack the financial muscles to compete aggressively with Vodafone. As we shall discuss later, high operational costs in terms of high prices for leased facilities and the lack of widespread telecom infrastructure have contributed to the high cost of service. Though the Internet market is unregulated, it is important that the NCA and the government provide some incentives that can stimulate dynamism in the market. The terrestrial national fibre backbone and the proliferation of submarine cables landing in Ghana should contribute to lower operational costs so that the savings are passed on to consumers in the form of lower tariffs.

[22] Source: www.Internetghana.com
[23] Source: www.busyInternet.com

Human Development and ICTs

ICT skills capability is an important component for building a knowledge economy by fostering competitiveness, growth, employment, education and lifelong training, and social inclusion (Lanvin and Passman, 2008). ICT is knowledge-intensive and requires a certain level of literacy and numeracy to effectively appreciate and use the service. Consequently, the national ICT4AD policy identified human resource development in ICTs as one of the priority focus areas to help the country develop a knowledge-based economy.

Ghana's Human Development Index ranking of 152nd in the world in 2009 is an indication of the handicap of African countries, in effectively exploiting ICT opportunities to enhance their socio-economic activities and more importantly participate in the information society.

Table 15: Household Survey Results Compared to Commonly Used E-Skills Indicators (Source: Schmidt and Stork 2008)

Country	UNDP Education Index	Adult Literacy Rate (% Aged 15 and Older), 1995-2005	Combined gross enrolment ratio for primary, secondary and tertiary education (%), 2005	E-skills7 index (min=0, max=7)
Botswana	0.773	81.2	69.5	0.47
Cameroon	0.660	67.9	62.3	0.83
Cote d'Ivoire	0.457	48.7	39.6	0.38
Ethiopia	0.380	35.9	42.1	0.11
Ghana	0.555	57.9	50.7	0.49
Kenya	0.693	73.6	60.6	0.99
Mozambique	0.435	38.7	52.9	0.08
Namibia	0.783	85.0	64.7	0.67
Rwanda	0.602	64.9	50.9	0.09
Senegal	0.394	39.3	39.6	0.56
South Africa	0.806	82.4	77.0	1.25

Generally, the existence of an e-skill capability in Ghana is very weak. From Table 15, it is only South Africa whose e-skill index is above 1, with Kenya almost at 1. The rest of the selected countries, including Ghana (0.5), had an e-skill index below 1. The human development index of Ghana is 0.526, ranked 152nd in the world in 2009. This is an indication of the handicap of African countries, especially Ghana, in effectively exploiting ICT opportunities to enhance their socio-economic activities and more importantly participate in the information society.

Initiatives to Build ICT Skills in Schools

The government's White Paper on Ghana Educational Reform emphasised the need for the country's education system to support the building of human resource capacity as one of the pre-conditions of achieving a knowledge-based economy. Consequently, it called for an education system that will empower the youth, especially those between 12 and 19 years, with ICT skills.

Consequently, the new education reform, which became operational in the 2007/2008 academic year, placed much emphasis on ICTs, science and technology, and made ICT a core subject in all Senior High Schools.

Further, the Ministry of Education has introduced a Policy on ICT in Education. The overall goal of the policy is to equip graduates from Ghanaian educational institutions – formal and non-formal – to confidently and creatively use ICT tools and resources to develop requisite skills and knowledge needed to be active participants in the global knowledge economy by 2015 (Ministry of Education, Science and Sports, 2007). The policy is to provide the underlying principles and guidelines in using ICT to facilitate teaching and learning, as well as to equip students with ICT skills.

Usually the ICT training within the educational institutions (basic and secondary) is geared towards:

- Equipping learners with the requisite ICT skills so as to be competitive in the knowledge economy;
- Equipping teachers with tools to enhance teaching and learning;

Internet connectivity of most of the NEPAD e-schools has been terminated for non-payment after the initial payment under the project elapsed.

- Promoting efficiency in the management of schools.

To help achieve these objectives, a number of schools have benefited from initiatives such as the Microsoft Partners in Learning Programme, NEPAD e-Schools Initiative, CISCO Academy, Global Teenager Project and Oracle Academy Initiative, among others.

Most of these projects have adopted different strategies to contribute to skills development. For example, The Microsoft Project trains students to acquire technical knowledge to handle technical problems with schools' ICT facilities. As at May 2009, 60 teachers from schools in Accra, Kumasi, Takoradi and Tamale had been educated as trainers to train students in their school. Obviously, the projects may equip the students with hands-on experiences which can contribute to the development of a critical mass of technical expertise in ICTs.

Given the fact that these initiatives are donor driven, they end when donor funding dries up. For example, under the NEPAD e-school project, the selected schools were provided with generally costly VSAT for Internet connectivity and paid a subscription for one year. Regrettably, Internet connectivity of most of the schools has been terminated for non-payment after the initial payment under the project elapsed. This has affected the sustainability of these projects and may hamper the achievement of their established objectives.

Further, many of these initiatives were not implemented within any defined policy framework, which led to a duplication of efforts (Ministry of Education Science and Sports 2006). Also, the majority were on a pilot basis and had not been replicated in other education institutions due to lack of funding. Consequently, their impacts have not been sustainable.

Again, before the Ghana Educational Reform program, some resource-endowed schools had introduced computer learning into their own syllabi. However, there was no approved syllabus for the teaching of basic ICT in schools. This resulted in uncoordinated learning of computer and other ICT skills. However, with the coming into operation of the new education system, a comprehensive syllabus has been introduced for all schools in the country.

Initiatives to Build Skills Generally

The host of initiatives established to support ICT skills formation in the educational institutions have not been successful due to the issue of sustainability.

The national ICT policy recognised the need for the every citizen in the country to gain adequate knowledge and skills to participate in the global information and knowledge-based economy. But the development and implementation of definitive strategies and action plans to equip the large number of illiterate, elderly and physically challenged people is long overdue. One of the key areas to assist the illiterate to gain ICT skills and computer literacy could be through the Non-Functional Educational Programme of the Ministry of Education. However, due to lack of infrastructure and syllabus, ICT skill training is not integrated into the Non-Functional Education system of the country.

Another mechanism which, when utilised effectively, may contribute to skill development amongst the less literate and illiterate is that of community information centres (CIC) and E-care centres. CICs are one of the establishments to increase access to ICT services in the underserved and the rural areas of the country. There are also the E-care centres which are run by Vodafone Ghana. Both the CIC and E-care centres provide opportunities for people to acquire basic skills and knowledge in ICTs. As mentioned earlier, the CICs suffer from serious operational challenges which should be addressed to allow them to play this important role.

It is evident that the host of initiatives established to support ICT skills formation in the educational institutions have not been successful due to the issue of sustainability. The replication of these initiatives had not been possible due to lack of commitment on the part of the government to provide adequately for the projects after the donor funding ceased. Further, there was no effective coordination of the projects/initiative, which resulted in duplications.

To ensure the achievement of the full benefits from these programmes and initiatives, there is a need to harmonise these programmes to provide a better focus so as to impact skills and capabilities that are widely valued in ICT sector. The ultimate goal is to provide the citizenry with the possibility of increasing their skills, and to strengthen their ability to utilize ICTs. The work by La Cava, Lytle, Kolev, and Clert (2005) emphasised the importance of ICT skills as a key to employability. In their work on the youth in Eastern European countries, it came out strongly that lack of e-skills was a hindrance to employment.

Garrido, Badshah and Coward (2009) argue that training programmes on ICTs should expressly provide people with the skills they need to be hired by a local company, obtain a better-paying job,

or start a microenterprise. It is paramount that the youth of Ghana, who constitutes 51% of the country's population, are helped to acquire e-skills to facilitate their employability.

A critical aspect of building ICT skills is the availability of avenues for employment. The impact of the skills will not be felt if there is a critical mass of skilled people without a vibrant ICT market to employ them. Consequently, there should be synergy between e-skills development and the ICT market. The ICT market conditions should determine the type of e-skills it requires for both its present and future uses. However, this is not the situation in the country as there is a weak linkage between the academia and the industry. This problem needs to be addressed adequately to achieve synergy between these institutions so that the e-skills developed in the country are beneficial to the industry.

E-Applications & Services

The Ghana Electronic Transaction Law of 2008, Act 772 provides the framework for the development of e-applications/services in the country. This section looks at the major e-services and their impact on the socio-economic development of the country.

E-Financial Services

An e-financial service is one of the electronic services which is not well developed in Ghana. The Ghanaian financial sector has few e-financial services which are mostly in their formative stages. The main nation-wide e-financial service is the electronic payment system called E-Zwich. It was introduced by the Bank of Ghana in 2008 to provide a common electronic platform linking payments of all licensed banks and non-financial institutions in the country. The E-Zwich payment system facilitates cashless transactions and reduces pressures on the local currency.

Though the introduction of the system has received much publicity, its uptake has not been very pronounced due to a lack of enthusiasm among the implementing banks and non-financial institutions. Apart from cash withdrawals using the facility, the banks are not to charge commissions for any other transactions and the banks see this as a disincentive. Consequently, the banks are not aggressively marketing the E-Zwich as one of their products. Also there are few sales points (shops, hotels, restaurants etc) where E-Zwich can be used for transactional purposes.

Though the introduction of electronic payment has received much publicity, its uptake has not been very pronounced due to a lack of enthusiasm among the implementing banks and non-financial institutions.

Other electronic payment systems available in the country include txtNpay and MTN money transfer, but these are also in their formative stages. The txtNpay system is offered by Afric Xpress and commenced business in the early part of 2009. The txtNpay or mobile wallet[24] can be used to perform various local payment services such as money transfer, payment of bills, buying airtime top-ups for mobile telephones etc. Presently, the company is actively promoting its services among students of the University of Ghana. MTN Ghana, in 2009, also introduced a money transfer service in conjunction with some of the local banks such as EcoBank, SGS SSB etc. However, it is too early to assess its impacts.

A few banks, such as CAL Bank, Ghana Commercial Bank, Eco Bank, Barclays Bank, Zenith Bank, and Guaranteed Trust Bank among others, have introduced Internet and SMS banking services where customers can access some of the traditional banking activities, such as checking:

- Account statements
- Account history
- Loan/Standing instruction enquires
- Balance enquiries
- Transaction details
- Statement requests
- Notification of transactions

[24] The "txtNpay" technology uses an application which is SMS-based and essentially consists of an electronic platform that is directly accessed from the customer's mobile handset.

E-government

The process of applying and adopting electronic services to facilitate governance in the country has been initiated. Under the ICT4AD, the various government ministries have developed their own ministerial ICT policy statements. These statements give indicators on how the various Ministries are going to deploy and use ICT to achieve their mandates. In addition, all the Ministries are to establish an ICT Division to help them implement and integrate ICTs in their activities. However, lack of placement and carrier progression within the civil service structure for ICT employees has hindered the establishment and employment of competent for this division in all ministries. Some of the Ministries (Ministry of Finance, Lands and Forestry, Food and Agriculture, Energy etc.) have already established an ICT Division, but the activities of these divisions are merely in the form of provision of support services such as maintenance of local area networks and minor computer repairs. The use of the division to provide technical training and information management systems are non-existent and this requires serious attention.

An important project aimed at building the necessary structures to facilitate e-government is the e-Ghana project. A component of the project focuses on developing certain structures that can facilitate e-government. Developments within the sector show evidence of the implementation of the e-Ghana Project. Initial activities and programmes in preparation of full e-government deployment include:

- National Data Centre (Pilot)
- Government Enterprise Architecture
- Government ICT Interoperability Standards
- Public Sector ICT Training

Policy Issues

A number of policy issues still have to be addressed to facilitate the rapid development of the sector to meet the aspirations of Ghanaians.

The study has reviewed the performance of the ICT sector in Ghana. It is evident that some progress has been made, especially towards the achievement of the ICT4AD and NTP. However, a number of policy issues have to be addressed to facilitate the rapid development of the sector to meet the aspirations of Ghanaians.

Implementation of Legal Framework

The last quarter of 2008 saw the promulgation of a number of laws to govern the ICT sector in Ghana. Most of those laws had been outstanding for a long time and therefore their promulgation has provided the full complement of laws for the sector.

A fast-track approach to implementing these laws, especially the various structures/institutions mentioned under the laws, is necessary to advance the development of the ICT sector. For example, the Electronic Transaction Act 772 called for the establishment of a Certifying Agency to issue licences for encryption and authentication services, as well as Domain Name Registry for domain name (.gh) registration in the country. However, these important structures have not been established by the National Information Technology Agency which was given the mandate to do so. Currently, Network Computer System Company Limited continues to register domain (.gh) names in the country.

A fast-track approach to implementing these laws, especially the various structures/institutions mentioned under the laws, is necessary to advance the development of the ICT sector.

The delay in establishing these structures could have an inimical effect on the development of the sector and industry. The delay is aggravated by the fact that ICT is a dynamic sector where changes in the market and technologies are rapid and complex. It is important, therefore, that these structures mentioned in the laws are quickly established to enable them to understand the intricacies of the sector and perform the assigned tasks.

Regulatory Environment

Comparison between RIA's 2006 and 2009 TRE shows some improvements in the regulatory environment in the country. Ghana had positive assessments in interconnection and market entry indicators. In the other indicators, there were some improvements, however regulating tariffs deteriorated.

Besides the TRE, there is evidence to point to some improvements in the regulatory environment. For instance, the industry harmony, established interconnection module and two companies with SMP (which reduces the burden on Vodafone to provide interconnection facilities) serve as pointers to buttress this fact. However, much still remains to be done to enable the regulatory environment to serve as fulcrum to attract more foreign investment into the country.

It should be noted that most of the ICT market segments are unregulated and that the interplay of market forces is therefore meant to drive dynamism and competitive pricing of services. However, it is becoming increasingly evident that market dynamism alone cannot determine pricing in the sector as required. For example, it took government intervention to bring the price of SAT-3 from US $12,500 a month for 2mb duplex in the early 2000 to the current level of US$4,500. Furthermore, there are 35 companies providing Internet services in the country, but the market has been very uncompetitive. Some form of interventions is required to engender the competitive ICT market.

The TRE analysis emphasises the point that there is more to be done to considerably improve the regulatory environment in the country. Anti-competitive behaviour (e.g. predatory pricing in the Internet market), the refusal of the ISPs to provide data on subscription levels, poor implementation of universal access obligations, and poor quality of service amongst other factors, continue to plague the market. These are affecting effective and efficient development of the sector.

Consequently, the NCA should be allowed a free hand to build capacity, visibility and credibility as well as the regulatory skills to guide the growth of the sector. The NCA can network with better performing regulatory authorities in Africa and elsewhere to facilitate an efficient and responsive regulatory environment.

High cost of international bandwidth

Presently, Vodafone has a monopoly on the SAT3 international submarine fibre cable which provides connectivity to international Internet services. The discussion on the pricing of Internet services showed variations in the pricing level. Vodafone broadband Internet has the lowest pricing in the country. There has been a long-standing argument that Vodafone is undercutting and undermining the other ISPs through predatory pricing. Many of the ISPs have argued that Vodafone cannot sustain its pricing level if the same bandwidth price is offered to its Internet subsidiary. Other costs have added to the high facility cost in the country. For example, the NCA has different fees for the location of VSATs and also the fees/charges are per site and not a flat rate which covers all VSATs a company has installed. For public VSAT in an urban area, one pays an application fee of US$1,000, an authorisation fee of US$2,000 and an annual fee of US$2,000 per site. Invariably, the high cost of Internet access is linked to a corresponding high cost in facility leasing and regulatory fees. This point is supported by Esselaar, Gillwald and Stork (2006) who identified the high cost of leased lines as contributing to the high Internet pricing in South Africa.

A study by GISPA (2008) provides some answers to the abysmal performance of the industry. The key factors are limited coverage of fixed communications infrastructure, which has hampered large scale deployment of the DSL broadband service in particular, improper pricing of access to bandwidth, copper, fibre, and submarine lines, and high regulatory charges on the use of satellite technology. Consequently, the high cost of the service is affecting the rapid uptake of the service, especially by non-corporate customers (residential subscribers). Therefore, improving the penetration of Internet service requires efforts to lower leased facility prices, which may correspondingly lower Internet pricing and make the service affordable to many people.

The RIA survey in 2007/2008 showed that the low uptake of Internet into homes is largely due to the issue of cost, though Bowen (2010) argues that lack of knowledge about the Internet is a contributory fact. For example, one has to pay US$78 for a set-up fee and monthly charge of US$73 to subscribe to the Internet Ghana Limited facility dedicated for homes. In the case of Busy Internet, the set-up fee is US$200 and there is a monthly shared facility fee of US$95 in the Busy Pro service category.

The low uptake of Internet into homes is largely due to the issue of cost, particularly set up costs.

One of the factors which negatively affect rigorous competition in the Internet market segment is the lack of strong presence of multinational companies. Even if they exist, they are not effective, as witnessed in the mobile telephone market. There are a few providers, such as Africa Online and iBurst Ghana, Zipnet, which are subsidiaries of foreign operators, but their impact in terms of massive investments and rigorous competition as epitomised in the mobile telephone market is absent. The pricing level needs to be addressed to encourage uptake, especially by non-corporate subscribers.

Reviving the Fixed-line Telephones

The analysis showed that the deployment of fixed-line telephones has been slow and between 2003 and 2008 the subsector experienced a negative compound average growth rate (CAGR) of 13.1, while that of mobile telephones was 70.8 percent (ITU, 2009a).[25]

Fixed line telephony should be included as a priority sector and benefit from incentives from Ghana Investment Promotion Act.

It is argued that fixed-line telephones still have useful roles to play in the development of the information society, and therefore require a strong and innovation policy intervention to revamp the subsector. The intervention should explore ways of increasing investment in the sub-sector to expand the coverage, as well as improve the quality of the infrastructure. The fixed-line telephone should be included in the list of the priority sectors to benefit from incentives under the Ghana Investment Promotion Act.[26]

Basic infrastructure should be revived to take advantage of any technological breakthroughs that might occur. Though wireless technology, largely WiMax, is increasingly replacing fixed lines as the infrastructure for Internet, the wireless technology has its own problems – instability of signals, interference and the issue of points of presence make fixed-line telephone necessary. Development in the market indicates that Zain Company Limited (formerly Westel) is only concentrating on mobile telephone service instead of fixed-line telephones. The former company was licenced as the second national network operator and it should therefore be required to fulfil its licence obligations as a second national network provider and a mobile telephone service provider. This may introduce competition and dynamism into the market, which is currently a monopoly for Vodafone Ghana.

It has been suggested that mobile technology has the potential to realise the information society aspirations of states (Grantham and Tsekouras, 2004), but the point is no single communication technology can support the information society. It requires the combination of technologies and this argues for more attention being given to develop the fixed-line network.

The explosion of submarine fibre cables terminating in Ghana, as well as the national terrestrial fibre backbone network may require a very good fixed-line telephone infrastructure to support them. ASDL broadband Internet will still be available and useful for Internet connectivity and expansion. Consequently, the development of these networks, especially the high-speed fibre networks, should be in tandem with an efficient fixed-line telephone infrastructure.

Co-location and Facility Sharing

The issue of co-location and shared facilities by the telephone operators has become very important. The public outcry and the subsequent temporary ban on the construction of telephone masts raise the need for discussing it dispassionately. The NTP granted the NCA the authority to:

- ensure that operators have reasonable and timely access to necessary public rights of way, subject to appropriate local safeguards and operator liability for costs and damage;
- facilitate and review negotiations concerning the terms and conditions, including cost allocation, for such shared uses; and
- establish requirements to allow competing operators to co-locate their equipment on each others' premises (Ministry of Communication, 2004).

As mentioned in this study, there is some element of co-location and shared facilities among the telephone operators in the country. However, widespread telecom facility sharing has not taken place due to two key factors, which are technical and business issues.

The technical design of cell sites of most operators did not take into consideration space for co-location, but instead were aimed at meeting the technical specifications and needs of the company involved. Therefore, the size and strength of the mast may not allow additional antenna-load from a different operator. Further fluctuations in the electromagnetic waves due to weather changes have resulted in a situation where antennas are constructed on a telephone mast at different heights to ensure good reception.

[25] The negative compound growth indicates that over the years, the fixed line telephones lines have declined instead of increasing, as has been the case with mobile telephones.

[26] The Ghana Investment Promotion Act identifies a number of critical sectors of the economy where incentives can be given to support the growth of those sectors.

Another important mitigating factor is the cost of land, especially in the urban areas, for the construction of towers and base stations. Land in the urban areas has become very expensive since many landowners see this as a lucrative business to attract the highest economic rent. For example, a piece of land for a cell site in Accra attracts a monthly rent of US$3,000. The attractiveness of this has resulted in landlords in metropolitan areas offering open spaces in their houses for the construction of masts.

Beside the issue of the land, lack of standards for mast construction has resulted in the low uptake of co-location and telecom facility sharing in the country. Though the various Acts have granted the NCA the authority to regulate and implement co-location and facility sharing in the country, it has not been able to effectively do so. Presently, co-location has been left in the hands of the operators and most of them have decided to construct their masts due to lack of trust. The current impasse in the industry should encourage the NCA to facilitate the implementation of the co-location policy in the country.

Conclusion and Recommendations

The competitive pressures in the mobile market have created a dynamic market with considerable consumer welfare gains.

Ghana has made some progress in improving access and use of ICT facilities in the country as a way of achieving a knowledge economy as well as facilitating the socio-economic development of the country. More importantly, the favourable market entry conditions have contributed immensely towards the growth of the sector, especially the mobile sub-sector. This was epitomised by the positive TRE score for market entry conditions in the country. The competitive pressures in the mobile market have created a dynamic market with considerable consumer welfare gains. This has to be sustained to ensure that the positive results affect other segment of the market (i.e. effectiveness in anti-competitive and tariff regulation, among others).

However, much remains to be done to achieve this status and the following recommendations are aimed at facilitating the process.

Regulatory Recommendations:

- The NCA should build on its experience to improve its capacity, visibility and credibility as well as the regulatory skills to guide the growth of the sector. This can be achieved through resisting political and industrial capture, and networking with better performing regulatory authorities in Africa and elsewhere to facilitate efficient and responsive regulatory environment.
- The regulator should intervene in the Internet market to engender dynamism to promote growth of the industry. The Internet market should be made competitive so as to attract adequate foreign investment, buy-ups and mergers as epitomised in the mobile telephone market. A competitive market will be characterised by aggressive market strategies which will invariably affect tariffs.
- The implementation of co-location and telecom facility sharing regulatory requirements as contained in the NTP, which should be enforced by the regulator and not according to the whims and caprices of the operators. The impasse over mast construction in the country should encourage the NCA to enforce the co-location obligation, including developing guidelines for cost sharing for the operation of the cell sites.
- NCA should also develop standards for mast construction and ensure compliance of such standards.

Policy Recommendations

- Though market forces are to shape the development of the Internet industry, it is necessary for a national policy to provide a conducive environment for the industry to thrive. Consequently the government, working with stakeholders, should own and expedite action on the national broadband policy to provide a framework to catalyse the development of the industry.
- Government, as a matter of urgency, should provide a clear and elaborate policy with incentive schemes to revamp the fixed-line telephone market. For a start, it should be included in the list of the priority sectors under Ghana Investment Promotion Act so as to benefit from the incentive schemes listed therein. A developed fixed-line telephone market will complement other technologies that can be employed to reach information society status.

Other Recommendations

- There is a need to build e-skills in the country through more structured and rigorous programmes whose impact on the national landscape will be strong. There should be a synergy between industry and academia so that the skills developed meet the requirements of the market and provide ready employment.

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Appendix

National Communication Authority Act, 2008, Act 769

The Act re-established the NCA as the central body to licence and regulate communication activities and services in the country. By this Act, the authority of the Authority has been strengthened, and it has put to rest the bickering between the NCA and National Media Commission over who had the mandate to allocate frequency to the electronic media. Further, the NCA's functions were expanded and included a provision to collaborate with the National Media Commission in the regulation and monitoring of licences of holders of frequency. Ensuring universal access to communication services was explicitely made as one of the functions of the NCA.

It is also charged with the responsibility to formulate a strategic plan; grant communication licences; regulate and monitor licences and holders of frequency authorisations and to ensure fair competition among licencees, operators of communication networks and service providers of public communications

The new law had provisions for ensuring good regulatory and best practices in terms of accountability, transparency, proportionality and consistency. The best regulatory practices also involve the protection of users of communication services and promote competition.

Another new dimension introduced was to make the appointment of the Director-General on a contract basis, renewable after five years. The import of this is to ensure that the Director-General commit him/herself to the development of an efficient and effective regulatory environment which is conducive to the development of the ICT sector.

National Information Technology Agency Act, 2008, Act 771

The National Information Technology Agency Act, 2008 Act 771 established the National Information Technology Agency (NITA). The object of the Agency is to regulate the provision of ICT services to ensure quality of the services and promote standards of efficiency. The act is to provide a legal backing for the establishment of the Agency which is one of the agencies enunciated in the national ICT4AD. The key functions of NITA are to:

- Establish and monitor the implementation of the national information communications technology policy;
- Serve as the certifying agency as provided under the Electronic Transactions Act;
- Play the dual role of enforcing the provisions and regulations of this Act and those of the Electronic Transactions Act; and
- Resolve matters involving domain names in accordance with the Electronic Transactions Act.

With the passage of the Act, GICTED has been upgraded to assume the role of NITA. However, it is unclear whether its original functions will be subsumed under the activities of NITA.

Electronic Transactions Act, 2008, Act 772

The Act is to provide legislation to support electronic communications and related transactions in the country. The object of the act is to:

- Remove and prevent barriers to electronic communications and transactions;
- Promote legal certainty and confidence in electronic communications and transactions;
- Promote e-government service and electronic communications and transactions with public and private bodies, institutions and citizens; and
- Develop a safe, secure and effective environment for consumers' businesses and government to conduct and use electronic transactions.

Generally, the Act provides the legal basis for electronic transactions in the country. It gives legality to electronic documents/records and digital signatures. It provided for the establishment of a Certifying Agency to issue licences for encryption and authentication services provided under the

Act. The National Information Technology Agency Act, 2008 Act 771, provided NITA with the authority to facilitate the establishment of the Certifying Agency.

The Act called for the establishment of a Domain Name Registry which will have the authority to administer and manage the country's domain name space and comply with international best practices in domain name administration. The Registry is to ensure access to the .gh domain name space by Ghanaian Internets hosts and users.

Further, the Act stipulates what constitutes a cyber crime and made provisions for cyber inspectors. About 32 offences are designated as cyber crime in the Act. They include: stealing, appropriation, charlatanic advertisement, forgery, criminal negligence, electronic trafficking, unauthorized access to devises, unlawful access to stored communication, child pornography etc.

The cyber crime inspector will have powers to seize computers, electronic records, programs, information, and documents where there is a reasonable ground to believe that an offence under the Act has been/is to be committed. On the whole the Act provides a comprehensive framework to support, facilitate and protect electronic transactions within public, private and general transactions including commerce.

Electronic Communications Act, 2008, Act 775

The Electronic Communication Act of 2008 complements Act 769 and defines the functions of the NCA. The NCA Act 769 concentrated on the established regulatory powers and functions of the NCA, while the Electronic Communications Act, 2008, Act 775 covers regulation of electronic communications and broadcasting services, and the use of the electro-magnetic spectrum.

Under the Act, the NCA is mandated to regulate the radio spectrum allocated for use by broadcasting organizations and providers of broadcasting services in accordance with the standards and requirements of the International Telecommunications Union (ITU) and its Radio Regulations as adopted by Ghana.

The Act dealt extensively with frequency authorization, obligations of licencees, classes of licences, obligations of operators of electronic communication networks and communication services and provided conditions under which the licences could be revoked.

Interconnection issues are also dealt with in this Act, which mandated all electronic communications networks to interconnect with each other. It provided for facility sharing as it enjoins communication networks to provide for the transmission and routing of the services of other operators or service providers. The achievement of universal access and the establishment of the universal access fund are captured in this Act and provided guidelines and functions of the Fund.

The Minister, on the advice of the NCA, is required, through a Legislative Instrument, to make regulations to govern electronic communication. The regulations are to cover the following issues: prescribed fees and tariffs, and the issue, conditions, duration, suspension or revocation of frequency authorisation.

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