ICT IN GHANA: PROSPECTS AND CHALLENGES

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ABSTRACT

This paper looks at how Information and Communication Technology (ICT) can be applied in Ghana. Problems in the ICT world are discussed alongside investment potentials and possible applications of ICT in Ghana. It is suggested that with proper planning and direction, ICT can be explored to enhance the living standards of the Ghanaian.

Key words: Ghana, traditional mindsets, digital divide, ICT applications, ICT policy, network security.

1. INTRODUCTION

The application of Information and Communication Technology (ICT) throughout the world has been growing and breaking new grounds at a rapid pace. Those developing countries who saw the 'light' early enough took advantage by making sure that they kept right on the heels of the developed countries as the latter broke new technological bounds.

Unfortunately, most African countries did not see this light early enough and now the technological or digital divide between African countries and the developed world is so large that it even looks unbridgeable from certain points of view (Phelan, 2004).

To make matters worse, some workers who could make use of computers and Information Technology to streamline their day to day activities are unwilling to make use of this technology due to apprehension.

Secondly the computer to person ratio in Africa is so low that many people do not get the opportunity to use computers to become acquainted with them. In 2001, out of approximately 800 million people, only 1 in 130 had a computer. The digital divide is even most extreme in the countryside, where a lack of roads, telephone lines and electricity separates the rural majority from their urban counterparts (Mutume, 2003). Sadly enough, the few computers that are available are not efficiently networked to facilitate information interchange.

Thirdly, the availability of internet services is also very low. In 2002, only 1 in every 250-400 people had internet access in sub-Saharan Africa outside South Africa (Mutume, 2003). This is partly attributable to the low bandwidth capacities in use on the continent. Also, since the major backbone of the internet lies in America, Canada and Europe, the cost of routing packets of information from these places to Africa is quite high. This leads to the extremely high cost of internet access.

2. DIFFICULTIES OF THE ICT SECTOR

The following are some of the difficulties that the ICT sector of a developing country like Ghana faces.

2.1 Gap between our traditional mindsets and technological advancements

Owing to our penchant for traditional beliefs and values, most Africans have find it difficult to break away from ancestral traditions and beliefs. Such predisposition undermines acceptance of new emerging technologies, let alone their adoption. A fundamental change of the mindset is required if we are to take advantage of the emerging technologies.

Early introduction of computers to children is one way of inculcating open-mindedness in the general population towards these technologies. A person who has used computers from childhood will most likely be more receptive to related technological advancements. This is because such a person will be conversant with the use of computers and the associated advantages. On the other hand someone who has not really used computers before will be more apprehensive in promoting the use computers and ICT networks in his work environment.

2.2 Dynamic nature of the ICT world

The advancements in the manufacture of silicon chips and improvements in their operational speeds continue to drive even more rapid developments in ICT applications which are very difficult to keep pace with. This is easily illustrated by the fact that what is supposed to be state-of-the-art computer systems these days become technologically obsolete, within only a couple of weeks, as a result of the rapid introduction of faster and better performing chips.

For a third world country like Ghana, the problem is even more compounded by the fact that we do not have the capital to experiment with such technologies. It will be next to impossible to have a company in

Ghana closely following technological advancements in the ICT world since it would require the use of quite a lot of money for constant upgrades.

The most pragmatic approach for us is not to go in for cutting-edge technology devices but rather to opt for slightly older devices which at the same time are not too outdated. By so doing we can at least stay within touching distance of the advancing world.

With this method also we will increase our development rate at not too huge a cost to the national capital.

2.3 Gap between business strategies and ICT

Many businesses in the past have been setup without considering how ICT can be used to enhance their efficiency and output. This could be attributed to the apprehension of business owners to exploring and experimentation with new ICT breakthroughs within their businesses.

Gradually, this trend appears to be changing as more and more companies are now beginning to appreciate the benefits of using ICT networks to enhance performance and to offer better customer services.

When we get to the point where every small, medium or large scale company uses or implements ICT technology in enhancing their overall business output, then we can say that we are on the path to serious advancement. And it will be at this point that Ghana will begin to really step into the technological world, thereby minimizing the digital divide between us and the developed nations.

2.4 Cost of improving and sustaining networks

There is quite a substantial initial startup cost with developing a state-of-the-art network for information interchange. This, plus the added cost of maintaining and improving the communication network makes most people a little apprehensive. The more important concern though is whether the investment returns of the communication network can justify the implementation of such a network.

Considering a developing country like Ghana it is not easy to come up with the funds to support the implementation of state of the art networks. As a result, even though most companies and institutions might know the immense benefits obtainable from a good communication network they are unable to afford one.

2.5 Unavailability of bandwidth

The current network scheme in Ghana does not allow for large information traffic. It is only currently that VRA is putting up a fiber optic network. Hopefully, after the VRA's fiber optic network is installed, the national bandwidth capacity (internally) will increase

substantially and then companies who need to transmit data from one part of the country to another can capitalize on the opportunity presented. This will save them the initial startup cost of having to put up their own data transmission links.

Most connections to the internet are via dial-up systems which offer very low download and upload speeds.

It is quite obvious from the above statements that we do not have the necessary infrastructure to support huge amounts of information traffic.

2.6 Limited number of ICT educated personnel

Personnel, highly educated in the use of ICT networks to enhance information interchange and development are in very short supply in Ghana. As a result, even if the ICT networks are put up in certain places there is just not sufficient number of personnel to man the system and to see to its continuous operation. This problem can be solved by increasing the number of educated ICT personnel in the country.

If the government adopts this as part of its development policies it will go a long way to improve the nations overall development. This is because those companies who might not be giving out their optimum output will begin to do so since they will now have streamlined their activities and they will have a very efficient way of sharing their information.

2.7 Security of information accessible via ICT net works

In the developed countries where ICT networks are really being used almost in all spheres of life, cyber-terrorism is quite high. The following list shows some of the various methods or ways in which this warfare goes on:

Cyber-terrorism
Information warfare
Cyber-crime
E-Commerce attacks
- ♦ Credit card numbers
- ♦ Visa source code
- ♦ Smart cards
- ♦ Bank account
- ♦ Distributed denial of service attack
- ♦ Extortion
- ♦ Organized crime
- ♦ Identity theft
- Hacking
  - ♦ Attacks on Government sites
  - ♦ Attacks on e-business
- Malicious Code Attacks
  - ♦ Viruses

- Macro-worms
- Worms
- Trojan horses
- Logic bombs

The proliferation of all the above cyber-crimes can be attributed mainly to inadequate laws on technological crimes. However, as these crimes have been on the increase for the past couple of years, the law makers have now seen the need to implement some laws that guard against such crimes. Some organizations involved in preventing cyber-crime and in the computer forensics field are found in (forensics.com; intenet-crimeforum.org.uk).

3. POSSIBLE USES OF ICT IN GHANA

We now look at the possible areas where ICT may be applied for the benefit of the nation Ghana.

The government decentralization process can only be successful if each district on the micro-level and the respective regional macro-level can identify and effectively harness its resources. One of the tools that can be used for rapid development of the district or the region is ICT. There are many areas where ICT, when properly applied, can bring a lot economic and social gains and rapid infrastructure development

3.1 ICT Education

The world is now becoming a global village with the introduction of the internet and its related technologies. This is apparent by the fact that just with a mouse click one can sit in Africa and get access to loads of information sitting somewhere on a server in America, Europe, Asia, etc.

In Ghana however the facilities for accessing the information are not very good. In the Ashanti Region for instance, a recent inventory of ICT facilities in second cycle schools shows that out of 50 schools, 26 percent have no telephones lines, 44 percent have only 1 central office line and 30 percent have 2 or 3 lines. Of these schools 66 percent have computers with only 6 percent having access to internet service (Akorli, 2002; Akorli, 2001). At the Kwame Nkrumah University of Science and Technology, however, major steps have been taken over the last three years to develop a solid infrastructure for an effective use of ICT to provide services to established institutions in the region. A Kumasi Virtual Center for Information Technology (KVCIT) has been set up to increase access to educational resources using modern information and communication technologies (Singh, 2002).

Many universities in developed countries now have facilities and structures in place for long distance education. This reduces the need for the university to set up a physical campus with accommodation for its students since most of the students will be using the long distance education. This goes a long way to reduce the actual cost in setting up a university with housing facilities and lecture theaters, etc.

Secondly if students are educated using ICT policies they will grow up being used to the use of ICT in various areas of life. This will go a long way in making them ready to practice and try out cutting edge technologies as they emerge. By so doing it will get to a point where all or most business will be very much into the use of ICT in streamlining their activities.

One other major possible use of ICT in education is to provide a platform for the dissemination of instructional information. This is very useful in a country like Ghana in which teachers and educational staff are lacking in number. With a good ICT policy in place one teacher will be able to take students from say two or more educational institutions through the same course work. He can put up instructional materials and notes for download by the students.

With the use of video conferencing the students will have a near-classroom experience since the teacher will be able to give lectures in a manner close to real-time. Students will see their lecturer and they will be able to ask questions when they do not understand something.

3.2 ICT Healthcare

A networked healthcare system has the following advantages:

- A medical practitioner will be able to easily get access to some drugs that he might not have with him. He may therefore be able to prescribe an out of stock drug for his patient.

- Patients can also more easily choose where they would like to go for medical treatment and consultations.

- A medical practitioner can easily get in touch with one of his colleagues who has specialized in that field to get the information that he needs.

Unfortunately networked heath institutions are hard to come by in Ghana. For example, out of 28 departments of Health Institutions in Ashanti only 18 percent have access to the internet (INIIT, 2002).

3.3 ICT Tourism

If all the hotels, tourist centers, parks and forest reserves put up websites on the internet it will give an opportunity for prospective tourists to get a taste of what they can expect when they come on their tours. They can then plan out their whole tour and apportion the correct amount of money they will need for the tour. Also, since most people in developed countries

are used to booking their hotel accommodation in advance it will be easier for them to be able to do such bookings over the internet and be assured of a reserved room for them than for them to come all the way to realize that the hotel is overbooked and they cannot get accommodation.

Secondly, with these tourist attractions and hotels advertised on the internet, many people who might have no intentions of sight seeing might come across some of these sights and develop the interest to come touring.

3.4 ICT Culture

With this sector, the government can decide to have all the various cultures in Ghana documented carefully and their documented information placed on the internet.

Quite a lot of people of African origin in the Diasporas are interested in finding out about certain specific cultures to help them to find out their roots and backgrounds.

With a well documented site of such cultures in Ghana it will afford an easy and organized way for these people in the Diasporas to get access to the information they require. This in turn might even cause them to make arrangements to come down to learn more about their background hence increasing the tourism benefits.

What is more, with such useful information documented and displayed on the internet, many of the people in developed countries will see it and learn more about Ghana from it.

3.5 ICT Commerce and Business

Currently in Ghana very few medium and small scale companies utilize the full benefits of ICT policies in their setup. A study of these enterprises in Kumasi indicates that 70 percent use fixed telephone lines, 44 percent use mobile phones, 15 percent use facsimile while less than 5 percent use email (Obeng, King, 2002). Most of the bigger companies are now realizing the huge benefits of having a good state of the art ICT network in place. As a result most of these bigger companies are now laying the structures in place for a good ICT network.

If the medium and smaller companies would take a cue from this and also put in place good ICT networks alongside the bigger companies it will go a long way to ensure that the rate at which the ICT sector increases in the country is faster.

These companies will even be able to offer better services to their customers. This will in turn also help them to retain their customers and help them to increase their overall earnings. For example, the Ghana

Telecom has increased considerably, the number of telephone fixed lines in the last few years. Ghana Telecom increased its fixed phone lines from 78,900 in 1996 to 240,000 in 2001 (Telephones and Communication, 2004; www.ghanaweb.com). The number of mobile phones has also increased considerably. The first cellular phone service in Ghana was initiated by Mobitel in 1992. In that year alone, 19,000 Ghanaians owned mobile phones. Four companies now compete for cellular customers, and usage rose from 22,000 to 702,000 subscribers between 1999 and 2003 (Telephones and Communication, 2004; www.ghanaweb.com). In the banking system, ICT has made it possible for one to save and withdraw money from any branch of the bank where he has an account. At the beginning of 2004, approximately 95% of banks in Ghana had their branches networked (Bank Executive, 2004).

Most countries in Asia and Latin America have realized the need for having a good ICT network in place for advertising their products and have therefore taken advantage and advertised their products on the internet. In fact, in most developed countries one hardly needs to walk into a store to pick up certain kinds of goods. One can simply sit in the comfort of ones home and order the goods to be delivered to his doorstep. The ease of such purchases serves as an incentive to possible customers.

4. THE INVESTMENT POTENTIALS IN THE ICT SECTOR IN GHANA

There are many investment potentials in ICT which can be exploited to the benefit of the country. This point is buttressed by taking a look at some Asian countries who took the advantage of the information technology age and globalization of the world into a village to make available to the whole world their goods and services.

Currently, America as a nation is now beginning to thrive on offshore programmers for most of their day to day programming needs. This is because they realized that labour is relatively cheap offshore as compared to hiring the services of an American programmer (http://www.economictimes.indiatimes.com). If Ghana as a nation has a good information network we could even bid for the jobs that these American companies are putting up.

From the above paragraph it is obvious that there are immense potentials and benefits to be gained by developing a very efficient and effective communication network which is linked to the internet.

The potentials can be classified into two main, but broad categories. The direct returns potentials and the indirect returns potentials.

4.1 Direct Returns Investment Potentials

These investment potentials will yield physical returns to both the investors and the nation. Under these are the ICT tourism, culture, commerce and business.

The returns of these investments are classified as being physical here because it's almost a spontaneous process. When the ICT investments are made in these fields or areas it will begin to generate returns to both the nation and companies who are making use of these investments.

4.2 Small and Medium Scale Companies

Some of these small and medium scale companies can be identified as weavers, carvers, metal workers (gold, brass and silver smiths), etc. A few of these are on the internet selling their products (Cordella, 2002; eShopAfrica.com). If more of these small and medium scale companies can be convinced to make use of the developing technology to make their goods and products available to the whole world by the use of ICT technology and networks it will go a long way to bring income to them and also to the government as a whole. These businesses may either have their own personal websites or register at least a webpage on a general website on which they can publicize their products. Their products will then be available to all kinds of interested buyers all over the world.

Secondly if their goods are now being exported to buyers all over the world it will serve as an incentive to these small and medium scale companies to improve upon the quality of their goods and it will also lead to healthy competition among the other companies who are also into the production of the same or similar kind of products.

4.3 The Tourist Attractions

Africa in general is noted for its diverse flora and fauna (Allottey, 2003; de Wet, 2002). Even though most of us living in Ghana seem to pay very little attention to this, there are a lot of researchers outside Ghana who are interested in seeing such diversity.

If all or as much of these flora and fauna can be documented and placed on the net it will serve as an attraction to those outside Ghana who are interested in such things.

Secondly, aside the plant and animal diversity our own cultural heritage and practices can be documented and made available to people outside the country via the internet.

This will serve an educational purpose as well as an attraction to would be tourists.

Aside the parks and reserves and various communities that will benefit from such research and tourism carried out by other people, is the government. The government will gain from all these tourists and researchers who will be flocking into the country just to see the flora, fauna and our cultural practices.

4.4 Networking the key Firms

Some of the main revenue-generating sectors of the Ghanaian economy are the timber firms, the cocoa industry and the gold mining industry.

Inter-networking some of these crucial firms will go a long way to streamline the activities of these firms.

The following are some of the benefits that will be gained by the networking of some of these firms.

4.4.1   Timber Firms

Since the timber industry became a very lucrative venture many small scale and medium scale timber companies have sprung up. Most of these companies are not licensed to fell trees. This is leading to the rapid deterioration of the country's rainforest (Asmah, 2004). This is of very big concern to environmentalists and indeed should be a great concern to all individuals since the survival of the human race, and for that matter our descendants, is dependent upon the survival of these forests. If the licensed timber firms are all networked and information about each of them is well documented it will in the first place make them aware of the names of the legal timber companies and will even make each company know or have an idea as to where each other company is carrying out its operation at any time. Thus if they, or for that matter any individual comes across any 'company' felling trees in any area they can go and check up to see if that company is a legal company that has been licensed to fell trees. By so doing the indiscriminate felling of trees will reduce. This will go a long way to safeguard our rainforests and the human race for that matter.

4.4.2   Cocoa Industry

If the cocoa industry is well networked they will be able to easily share their experiences and information together. This will prevent them from making the mistakes that their other colleagues have made in the past. This will ensure that huge losses of cocoa farms that have occurred in the past due to lack of information on the part of farmers will not be repeated (ICT4AD-Framework, 2003). The cocoa companies can even decide to put their act together to obtain a unified front when it comes to the sale of their products. The overall increase in annual cocoa that will result from the increased coordination between these cocoa companies will go a long way to make the country increase its cocoa export and thus increase the government's capital for development of the nation.

4.4.3   Gold Mining Industry

The main gold mining company in the country is the Ashanti Goldfields Company. Apart from this company there are numerous pockets of small scale miners that use unprofessional methods for mining gold (Hilson, Potter, 2003). Some of these methods are even harmful to the miners but due to lack of education they still carry out such practices. This industry could be well documented and valuable information placed on the internet and made available to these small scale mining company so that they will desist from the harmful practices that they are currently involved in.

4.5 Indirect Returns Investment Potentials

These are investment potentials whose returns are not physically realized over a short period of time. It will however enhance the efficiency and the output of the work force.

With a very good network in place, information dissemination will be a very easy and straight forward thing. Accessibility to valuable information will also be very high and this will go a long way to improve the overall value and effect of a company. The services they offer to customers will also be improved due to the fact that their customers will have easy access to useful information they might need to make some decisions and will even serve as an incentive to make the customers remain with the companies in question.

5.   POSSIBLE METHODS OF ENSURING SMOOTH IMPLEMENTATION OF AN ICT POLICY IN GHANA

A precautionary step that will benefit us very much as a nation, as we develop our ICT sector and policies will be to take a look at the developed nations and to learn from their mistakes. As a nation developing her ICT policies and networks we should put in place mechanisms to safeguard our system from having to go through the normal developmental stages that is fraught with mistakes. It will also make the ICT policy and network setup a smooth operation.

By this method we will consider all the developmental stages that the developed nations went through before they finally got to the stage they are at now. The following is an in-exhaustive list of some of the check points that we need to pay attention to whilst we develop our ICT sector as a nation.

5.1 Ensure a secure ICT network

Ensuring that an ICT network has the required security is a very essential part of the implementation of an ICT network or policy (Akorli, 2001). This is because the very people (businesses, government, individuals, etc) that will be using the ICT network and policies you

design must have faith in the system. If they do not have faith or their personal data is not secure in your ICT network then you do not expect them to even agree to use your ICT network in the first place. The people who make use of your ICT network must be assured of a certain level of security otherwise they will not see the need to place their businesses at stake for the purposes of testing out your ICT network. As was cited earlier on in this paper the cyber-crime rate is quite high nowadays, as a result fewer people will be willing to take such risk as putting their high profile information accessible to others via the internet. More so in a country like Ghana that is now trying to break free from our traditional mindsets.

The following are the four main bases upon which information security is built.

5.1.1   Confidentiality

This mainly means that the information available to users via a network should be such that it provides individuality and confidentiality to different users. That is, any information that I supply over the network about myself should be confidential and limited only to my viewing and not to other users of the system. This is quite a difficult task to perform, considering the fact that there are a thousand and one hackers out there who can hardly wait to break into your system just for the fun of it. This is even aside those who want to break into your system for the financial benefit they will gain from it.

5.1.2   Integrity

This is concerned with making sure that the people who supply the information for use by others over your network are assured that the information they make available to others will remain pristine. If the information is prone to getting corrupted by other people who are not supposed to be able to render it corrupt, then there is a security leak in your system. The integrity of such information however, depends to a large extent on the kind of security those who put up the information place on it rather than on the physical network that makes the information accessible to others for use over the internet.

5.1.3   Availability

The information that is made accessible to prospective users over a network should be such that it as accessible to all users and the information providers themselves. This part of the security is very dependent on the kind of network that does the distribution of the information as compared to the kind of information that is available for distribution. For this matter the network designers must make sure that their estimates of the information traffic over the network and projections for rate of increase of network traffic is quite ac-

curate. Failing to do this to the best accuracy attainable will most likely lead to an initial working network but as the number of users of the network increases and the network traffic also increases correspondingly, the network will not be able to handle the increased traffic hence the availability of the information will be very low. Another key issue here is that the use of these ICT networks and policies is to enhance the availability of information to as many users as possible. As a result if the information is there but inaccessible for a greater portion of the time then the ICT network fails to realize its purpose.

5.1.4   *Ability to Audit*

This is concerned with making sure that the people who made the information available in the first place and are authorized to change it have the access and ability to make changes as and when they like to suit their organization. This ability to make changes should be limited to only those personnel who are authorized to do so. The former sentence as explained earlier however is more dependent on the security checks that the information designers place on it. Finally the information providers should be able to audit and make checks on the information they have made available to users to find out how much their information is being accessed and used by the people.

If all these security checks are put in place whilst designing our ICT policies it will go a long way to make sure that the integrity of the information people make available to others over the network is very high and this will even serve as bait to other prospective users of the network.

5.2 Promulgate Laws that guard against technological crime

If the law makers make an effort to promulgate laws that guard against some of the cyber-terrorism and cyber-crimes that were listed earlier on in this paper it will dissuade possible cyber-terrorists and hackers from engaging in these activities.

Thus instead of looking at just the technological aspect of securing the data that the network users make available to others via the network, the problem of cyber-crime will also be tackled from the judiciary point of view.

5.3 Ensure that available bandwidth meets current network traffic and projections

This is a very crucial part of the development of the ICT policies and networks. This is because if particular attention is not paid to the current network traffic and projections made into the future to estimate the trend of network traffic the network will be put in place but will soon become a white elephant.

If the network is put in place without an estimation of

the current network traffic there are two main scenarios that may occur.

The network might not be able to handle the current network traffic due to inappropriate bandwidth. In which case there is no way it will be possible to handle future network traffic, which is almost always on the rise.

The second scenario may present the case in which the network will be able to handle the current traffic well but due to the absence of traffic projections it will soon become over-burdened due to the increased network traffic within a couple of years time.

However, if accurate calculations are made to project the network traffic increase rate, room can be made to accommodate the increased traffic rate for a number of years. The network that is put in place will be able to serve its purpose for the number of years for which the projection was made.

6. CONCLUSION AND RECOMMENDATION

This paper goes through the application of ICT in the life of the Ghanaian and looks at areas where ICT could be used to further improve the standard of living of the Ghanaian in both the rural and urban centers.

It is recommended that to achieve the above, ICT training must be included in education and community projects for both males and females.

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