

**A SURVEY OF THE EXTENT OF ICT ADOPTION IN
STATE CORPORATIONS IN KENYA.**

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BY

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**A MANAGEMENT RESEARCH PROJECT SUBMITTED IN
PARTIAL FULFILLMENT FOR THE DEGREE OF
MASTER IN BUSINESS ADMINISTRATION (MBA)**

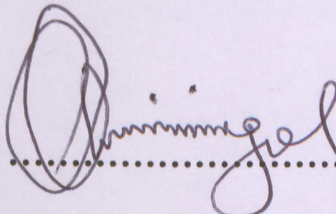
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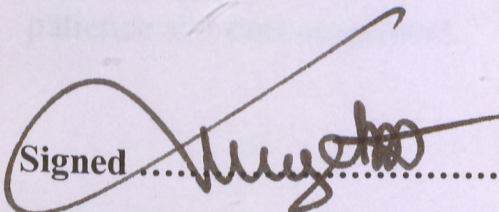
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DECLARATION

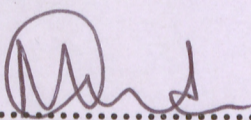
This Management Research Project is my original work and has not been presented for a degree in any other University.

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I am also grateful to my wife, Anthony and Kingsley for her patience and support during the many nights I had to work late hours in my studies and had to take over some of my parental duties.

DEDICATION

I dedicate this work to the Holy Trinity, God, the father, the Son and the Holy Spirit for all the blessing and mercy I have received and to Mary Wambura, my wife, Anthony and Kingsley my children for their prayers, patience and encouragement.

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ABSTRACT

Ever-evolving and increasingly powerful Information and Communication Technologies (ICT) have fundamentally changed the nature of global relationships, sources of competitive advantage and opportunities for economic and social development. The explosion of the ICT has resulted in a world in which virtually everyone, everywhere, has the potential to reap the benefits of ICT connectivity.

New value propositions based upon ICT emerge as individual in the private and government business begin to accept and understand their usefulness.

ICT adoption and application provides new ways to do business; it creates new opportunities for the firms, eliminate barriers that had traditionally stifled flows of information and promote efficiency in a host of activities. ICT have become a tremendous engine for economic growth and productivity.

This study investigated the extent of adoption of ICT in state corporations. The extent of adoption of ICT determined was an indication of the level of readiness for corporations to participate in networked digital economy.

Questionnaire was developed to be able to collect data on the following four critical areas of ICT adoptions and application namely networked access (Internet connectivity) Infrastructure; e-Champion or e-Leadership and policy infrastructure; human capacity development infrastructure; information security and telecommunication regulation Infrastructure. The data was collected from 50% of the total state corporations population.

The results obtained from the analysis indicated to a large extent that the state corporations were below level 34% of ICT adoption. That means that, the state corporations were in the second lowest level of readiness to use ICT to achieve competitive advantage that is geared towards improving the quality and responsiveness of the services, minimize inefficiencies and increase transparency.

ABBREVIATIONS

CCK	Communication Commission of Kenya	
CID	Center for International Development	
CTIA	Computers and Telecommunication in Africa	
ICT	Information and Communication Technologies	
Kbps	Kilobytes per second.	
NECTEC	National Electronics and Computer Technology Center	
NII	National Information Infrastructure	
NITC	National Information Technology Committee	
OECD	Organization For Economic Co-operation and Development	
PCIP	Pacific Council of International Policy	
PUMA	Public Management and Governance	
SWG-IT	Sector Working Group on Information Technology – Ministry of Finance (Kenya)	
USAID	United State Agency for International Development.	
WWW	World Wide Web	

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CHAPTER 1

INTRODUCTION

1.1 Background

The definition of Information and Communication Technologies (ICT) encompass computer hardware and system, computer software and system, computer controlled systems and communication equipment system and the services all these systems provide (O'Brien, 2001; Laudon, 2000; Wendy 1997).

ICT is one of the most potent forces in shaping the 21st century. Its revolutionary impact affects the way people live, learn and work and the way government interacts with civil society. ICT is fast becoming a vital engine of growth for the world economy. It is also enabling many enterprising individuals, firms and government, in all parts of the globe, to address economic and social challenges with greater efficiency and effectiveness (SWG, 2001).

Recent advances in ICT are having significant impacts in all facets of governments, economics and social activities worldwide. The ICT is facilitating new ways of creating and delivering products and services to global market through electronic-business (e-business) models, sources of competitive advantage and opportunities for economic and social development (Hare, 2002).

Hare (2002) argued that ICT forms the integral part of the economy and society to enable countries to enter global markets and address the most critical issues that they face – including inefficiency, high business transaction cost, corruption and others – ICT application can be used put them on the right track.

According to Peters (2001), private companies have registered gains due to appropriate adoption of ICT, thus ensuring greater productivity in their processes. Government business units in an effort to be more customer-driven and service oriented are expected to adopt appropriate ICT in order to increase efficiency, increase transparency and reduce transactions costs and serve the citizen/customer better.

A deeper understanding of the extent of adoption and application of ICT use can be gained from the wealth of "electronic readiness" (e-Readiness) assessments as suggested by Kirkman (2000). The e-Readiness assessments seek to gauge how ready the state corporations are to participate in the information economy or information society.

e-Readiness is the degree to which the corporation is prepared to participate in the information society. It is gauged by assessing a corporation's advancement in the areas that are most critical for ICT adoption and application (McConnell, 2001).

e-Readiness has become a sufficiently widespread concept used to assess government organs to adopt ICT (Kirkman, 2000; Peters, 2001; McConnell, 2001; Oros, 2002).

Oros (2002) and Richard (2002) recognized the following four critical areas as subjects of assessment:

1. Electronic Champion (e-Champion) and policy infrastructure readiness: An e-champion or small group of e-champions are leaders with vision who put ICT onto the agenda, who set ICT within a broader reform agenda, and who make it happen as well make appropriate ICT policies. Richard (2002) contends that, of all the ICT adoption and application areas of concern, this is probably the most critical; it is pre-condition for successful ICT adoption and application.
2. Network Access (Internet connectivity) infrastructure readiness: This address overall availability and reliability of network or Internet connectivity. Peters (2001) suggested that Internet access backbone, telecommunications equipments and computers, must be addressed in any ICT adoption and application plan.

Significant investment in corporation's ICT infrastructure may be needed for the ICT applications.

Understanding ICT usage may indicate the corporation's readiness to manage information and ICT projects as well as whether the ICT framework meets global standards. In addition, it may allow ICT efforts to build on previous computerization projects that had been successful.

3. Human capacity development infrastructure readiness: This tackles the issues regarding capacity-building needed to enable workforce to handle ICT issues. Sufficient number of skilled, ICT literate personnel (including managers with experience in procuring, evaluating and implementing ICT solutions) are essential. Change management issues must also be addressed as new work practices are introduced. For example consider the attitudes, knowledge and skills in place that are required to initiate, implement and sustain ICT initiatives. Also to be considered is general resistance to change; lack of customer-orientation; resistance to data-sharing; and others. The level of resistance to change and level of involvement by officials in setting policies and practices will greatly impact how fast or smooth the implementation of ICT will be.
4. Information security and telecommunication regulation infrastructure readiness: This is concerned with the issues regarding data protection and appropriate telecommunication regulation, so as to allow information exchange. Establishing data protections and telecommunication reforms will be needed to ensure, among other things, the privacy, security of electronic interactions and electronics signatures.

Peters (2001) explained that in some countries like Argentina, India, Singapore, usage of ICT have improved state corporation services, reduced costs to the organization operations and improved the competitiveness to the private sector. ICT solutions had consolidated state corporation's services by constructing or enhancing systems that eliminate duplicative processes, enhance interoperability, reduce redundancy, foster

integrity and provide measurable improvement in performance and service delivery to the public. It enables the corporation's departments to communicate easily internally, thus reducing the internal resources spent like time and finances utilized on the workflow processes. These benefits accrued from ICT usage could also be realized in Kenya state corporations.

Its Kenyan government priority to minimize inefficiencies and corruption and increase productivity in its organs and state corporations. Since ICT applications are tools of productivity and efficiency leading to a better transparency and accountability in the functioning of government organs administration – then it may provide a weapon against corruption, minimize inefficiencies and increase productivity in state corporations. Hence the need to assess the level of ICT adoption in Kenyan state corporations (SWG, 2001).

1. In 1997, an International Data Corporation (IDC) studied 55 nations that accounted for 97% of the world's ICT expenditure and estimated the global expenditure to be US \$680 billion (Idar, 1997).
2. In 1994, Gartner predicted that the global expenditure on ICT in 2002 would be in the region of US\$ 3.3 Billion, significantly larger than the estimated 1999 spend of US\$ 2.2 Billion (Foreman, 1994).
3. Locally in Kenya SWG (2001) reports that in the year 2001 and 2002 a total of Sh. 27 Billion were ICT resource requirements utilized in the following areas: government connectivity, National Information Infrastructure (NII), provision of electronic services (e-services), human resources development and policy and ICT strategy development.

1.2 Statement of the Problem

In a relatively short space of forty years, ICT especially computers have become central to efficient operation of most industrialized nations according to Holmes (2001). It is now recognized that many industries, organizations and government bodies could not operate efficiently, and in some cases not at all without appropriate implementation of ICT. Therefore a significant proportion of organizations, in both private and public sector, can now be considered to be ICT centric. That is, their ability to function within the increasingly competitive global economy is only possible through the effective and continued appropriate applications of ICT (Holmes, 2001).

Furthermore, it has been noticed generally that most organizations worldwide are investing increasingly on ICT, with indications that technology is becoming the dominant component of almost any modern enterprise, public institutions such as the state corporations.

This moves towards greater ICT adoption is reflected within these investment trends:

1. In 1997, an International Data Corporation (IDG) studied 55 nations that accounted for 99% of the world's ICT expenditure and estimated the global expenditure to be US \$680 million (McArthur, 1997).
2. In 1999, Gartner predicted that the global expenditure on ICT in 2002 would be in the region of US\$ 3.3 Billion, significantly larger than the estimated 1999 spend of US \$2.2 Billion (Foremski, 1999).
3. Locally in Kenya SWG (2001) reports that in the year 2001 and 2002 a total of Sh1.27 Billion were ICT resource requirements utilized in the following areas; government connectivity-National Information Infrastructure (NII), promotion of electronic activities (e-activities), human resources development support and policy and ICT strategy development rollout.

From the above statistics, it is indicative to note that, organizations have and continue to invest in ICT, Kenyan state corporations and government agencies included. It is critical that state corporations, just like private sector businesses are expected to provide top quality services. It is therefore, in the interest of state corporations to appropriately adopt and apply ICT so as to achieve competitive advantage that could be geared towards improving the quality and responsiveness of the services, minimize inefficiencies and increase transparency.

From the literature review, appropriate adoption of ICT involves a focus on the four most critical areas namely electronic champion (e-champion) or e-leadership and policy infrastructure; network access (Internet connectivity) infrastructure; Human capacity development infrastructure and Information security and telecommunication regulation infrastructures (Oros, 2001; Richard, 2002).

Payback is expected after every investment, ICT included. It is therefore expected that state corporations need to “match their ICT spending to appropriate ICT on the four critical areas”, above (Wendy, 1997).

The questions that arose from the above observations are: Have state corporations in Kenya appropriately implemented ICT to match the level of heavy ICT investments in these corporations? To what extent therefore has ICT been adopted and applied in these government business units?

These broad question(s) resulted into the following research questions on each assessment criteria:

1. Is adoption and application of ICT projects a corporation's priority?
2. Are networks connectivity – Internet connectivity reliable?
3. Have corporations developed human capacity that can support and use ICT applications?
4. Is processing and storage of networked information secured?

1.3 Objectives of the study

The broad objective of the study is to establish the degree to which the state corporations are prepared to participate in the networked economy. It is gauged by assessing the corporation's relative advancement in the four areas (e-champion and policy infrastructure, human capacity development infrastructure, network access- Internet connectivity infrastructure and information security and telecommunication regulation infrastructure) that are most critical for ICT adoption.

The specific objectives of the study are:

1. To assess the extent to which the existing state corporations utilize the ICT in their operations so as to further their productivity.
2. To establish challenges/barriers to ICT adoption and application in the state corporation sector.

1.4 Importance of the study

State Corporations are demanded to improve efficiency and transparency by adopting ICT applications (Peters, 2001). The ICT applications improves the quality and responsiveness of the services through integrating information to reduce redundancy and duplication and foster data integrity and consistency and therefore the findings of this survey will be a valuable addition information about the extent to which ICT is adopted in the state corporations in Kenya, which in essences indicates the level of readiness to participate in network or digital economy.

1. The study will be of value to researchers as a basis for further analysis and planning of the factors that need considerations for the adoption and application of ICT solutions in the state corporations.
2. The study will also provide an important context for understanding what it takes for the state corporations to adopt and apply of ICT.

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CHAPTER 2

LITERATURE REVIEW

2.1 Information and Communication Technologies (ICT) Framework

Included in ICT infrastructure are networking and computer hardware, underlying application software technologies for e-business applications, and the applications representing automated business processes (Kirkman, 2000; Oros, 2002).

According to Kirkman (2000) a deeper understanding of the level of adoption of ICT in state corporations is gained from electronic readiness (e-Readiness).

Kirkman et al (2000) refers to e-Readiness as the process for assessing the extent to which the government organs are ready to adopt ICT so as to increase efficiency, effectiveness and transparency.

The foundation for all e-Readiness is based on modern technologies and the access to those technologies in the areas of communications and information systems.

Richard (2002) contended that e-Readiness is a prerequisite to participate in the networked electronic economy (e-economy) that depends upon the integration of ICT. The priority actions should therefore focus on deployment of basic infrastructure; universal access for citizens including through publicly available facilities and complementary means; education, electronic business (e-business) and systems and web content development.

Oros (2001) and Richards (2002) recognized the four most critical criteria namely electronic champion (e-champion) or e-leadership and policy infrastructure; network access (Internet connectivity) infrastructure; human capacity development infrastructure and information security and telecommunication regulation infrastructures as the most

relevant for consideration in assessing the extent of ICT adoption and application in the state corporations.

2.1.1 e-Champion and Policies infrastructure

To lead state corporations towards ICT adoption and application, the state corporations in Kenya may have to take a stand and be willing to make a sacrifice to implement policies that will foster the implementation of ICT, and at the same time encourage home-grown innovation and adaptation (Amimo, 2002).

Like any government reform efforts, leadership will be required to implement every ICT project. Without active leadership will, the financial resources, inter-agency coordination, policy changes and human effort required to plan and implement ICT will not be sustained (Oros, 2002). Richards (2001) argued that introduction of ICT policies in corporations build capacity to create right environment for digital economy that may support online services and automate process within business.

Oros (2002) contended that nothing is more critical to the success of ICT than leadership will. Behind every successful ICT project is a visionary leader or leader who push for the change even through difficult moments. The right leader has authority, is willing to take risk, is willing to secure funds for the program, will commit time on an ongoing basis, and will publicly endorse and advocate ICT adoption and application.

He further explained, that in one of African country, the top thinkers on technology from academia and the private sector agreed on fifteen pages worth of recommendations to the government about its ICT policy. However, because the minister in charge was not interested in the project, the recommendations languished and were not implemented. They likely become obsolete as technologies changes and the ICT sector continues growing in an uncoordinated manner. This type of mistake should be avoided.

According to McConnell (2001), only a few rated e-readiness countries are benefiting from strong e-leadership, demonstrating a limited awareness of the critical importance of

helping their countries move forward quickly into the new information economy. Some governments are beginning to automate their own processes, and a few are offering online services to citizens. A growing number of governments are creating public-private councils that work together to meet national goals. In other countries, changes in national leadership had interrupted ongoing initiatives and slowed the rate of progress.

Oros (2002) recommended the following key elements that need to be addressed in this criterion.

1. Priority given by corporation to promote the development of ICT;
2. Extent of involvement of senior management on ICT adoption and application;
3. Availability of policies to promote adoption and application of ICT.

McConnell (2001) and Peters (2001) argued that corporation leaders need to be proactive in taking the initiative to establish a ICT policy and strategy, so as to speed up the ICT adoption and application process.

Oros (2002) confirmed that in India, the Chief Minister of Andhara Pradesh state, Chandrababu Naidu had been a champion of ICT implementation for the last six years. He spent at least one hour each day addressing some aspect of ICT. With his constant attention, the Chief Minister led in the development of comprehensive blueprint for ICT. He pushed for the introduction and use of computers and ICT applications for agencies while also securing multi-million dollar funding for statewide ICT projects. The senior members in the state corporations in Kenya should also be in forefront on matters regarding adoption of ICT , so as to champion its development.

2.1.2 Network Access – Internet connectivity infrastructure

This involves issues related to the availability, cost and quality of ICT networks, services and equipment. Connectivity addresses the overall availability and reliability of networked computers (Richard, 2002).

Richard (2002) argued that broad benefit of ICT will not be available without substantial investment in Internet accessibility, computer hardware and system, computer controlled systems and communication affordability.

According to McConnell (2001), key connectivity elements of concern include:

1. Availability of communication services and Internet;
2. Affordability and reliability of Internet access, including the cost of service, downtime and the prevalence of sharing access among individuals;
3. Capabilities and reliability of the support on Internet backbone service;
4. Extent of demonstrated progress on ICT adoption and application, including efforts to automate corporation processes and offering online services.

Peters (2001) argued that a dense networking infrastructure to support digital communications is the obvious backbone of any information society. New broadband and wireless technologies need to be funded and developed so that eventually all businesses can be connected. However, he appreciated that deployment of broad bandwidth would not happen overnight. Upgrading, replacing, and adding to communication infrastructure is not cheap. This requires strategic planning and financial resources for a successful implementation.

Dawn (2002) confirmed that the status in mid 2001 for the USA, Canada, and the leading European countries was that the research communities within each were on high speed 2.5 Gigabits per second (Gbps) networks. US universities and private and public sector partners are on Internet2. Canadian equivalents are on CA*net 3. The Netherlands launched SurfNet5 in late 2001 and Norway is on NORDUnet. The Dutch SurfNet link to Internet2 was upgraded with a gigabit Ethernet connection in November 2001. Singapore is on SingAREN and the latest data stated that they were at 622 Mbps capacity.

SWG (2001) suggested that Kenya should invest on Internet backbone that enable necessary environment, which facilitate deployment, utilization and exploitation of ICT.

And in particular state corporations should also invest on reliable Internet access bandwidth that can support electronic business advocated by ICT.

2.1.3 Human capacity development Infrastructure

This tackles the issues regarding skills and competencies needed to develop, maintain, manage, and utilize ICT programs, projects and systems. Capacity-building needs to enable workforce to handle information, adapt to changes in their responsibilities and develop new competencies (Oros, 2002).

According to SWG (2001) report, the most successful development and deployment of information technology requires a cadre of highly skilled information resources management practitioners at all organizational levels. The focus should be on developing “human infrastructure”, through integrated education, training, and skilled-based programs to enable a critical mass to utilize computers and online resources.

McConnell (2001) argued that intellectual capital is the greatest strength of a corporation. He further suggested that the more successful countries for example Singapore, often with private sector assistance and leadership, have invested heavily in raising general public awareness and in promoting technological education. Such investments create increased interest and skills, and produce long-term economic growth. This could also be adopted in Kenya state corporations as well.

McConnell (2001) observed that beyond a cadre of skilled partners, ICT needs a workforce that is able to use ICT applications and are interested in it.

Key human infrastructure elements for concern include:

1. Capacity building;
2. Overcoming resistance from within the corporation.

Oros et al (2002) contended that civil servants resistance in ICT implementation is severe in developing countries where human resources may be less robust, the economy less

stable and job opportunities less plentiful. But this could be handled through offering adequate and necessary training opportunities.

Oros (2002) suggested that workforce including leaders of units and lower level employees, should receive adequate training in advance of the new ICT system's introduction. If they understand the new methods, they are likely not to resist the ICT adoption.

Further, he gave an example that in Tanzania, before procuring a new, integrated Human Resources and Payroll system, the government hired an outside consultant to create manual describing all existing human resources management processes. The manual not only helped with preparation for procurement of the new system but also now helps to serves as a useful training tool to help official understand changes from "old" to the new system. This concept could also be applied in Kenyan state corporations with an intention of helping the workforce understand the changes and overcome resistance in the process of ICT adoption.

2.1.4 Information security and telecommunication regulation infrastructure

A vital aspect of ICT adoption is the level of information security that a corporation can assure. At base, the question is one of trust. Inadequate protection of personal data creates barriers to information exchange. Failure to recognize electronic signatures or to permit the use of encryption undercuts trust in the new ways of doing e-business. Weak telecommunication regulations hinder the growth of ICT (Richard, 2002).

Peters (2002) suggested the following key elements need consideration. This include:

1. Strength and effectiveness of telecommunication regulation.
2. Extent of efforts to protect electronic privacy.

According to SWG (2001) report, Kenya should enact and enforce laws governing data interception and interference, fraud, and forgery via computer systems and the Internet. This will facilitate prosecution of Cyber-Crime.

McConnell (2001) argued that digital signatures, encryption, password, and the infrastructures to support their use are becoming essential for further growth of ICT. Several countries have recently adopted laws that recognize the validity of electronic signatures, and most countries do not regulate the use of encryption. He further recommends India and Malaysia, which serve as two examples of countries that have been particularly forward-looking in the realm of information technology legislation. Both are notable for the comprehensiveness of recently enacted legal frameworks designed to create predictability about information security. This could also be implemented in Kenya

2.2 Justification of ICT adoption

Richard (2001) contended that by focusing specifically on state corporations, some of the benefits of ICT adoption and application initiatives are:

1. cut costs;
2. speed up decision making and service delivery and enhance transparency;
3. minimize corruption;
4. increase the capacity of corporation;
5. improve the quality of decision making and service delivery;
6. enable innovative approaches to corporation process;
7. Business process streamlining and re-engineering initiatives, etcetera.

He argued that, the above, in turn, could have broader effects. First, by improving the work of corporation, ICT adoption, improve the lives of all those businesses and citizens that interact with corporations. Secondly, by being catalytic. Within corporation itself, ICT adoption can catalyze cultural changes that improve corporation operation. In society more broadly, the presence of ICT adoption initiatives can be national change

catalyst in two ways: first by its demonstrator effect to other sectors; second, by building local ICT capacities.

He emphasized that in India, the decision under Rajiv Gandhi to press ahead with computerization of passenger reservations on the railways corporation had a major catalytic effect. It sent out ripples into both business and civil society that have helped put India where it is today in ICT terms.

This could also be adopted, but in such a way that it fits the Kenyan environment.

Michael et al (1999) wondered whether efficiency and effectiveness gains earlier identified could be achieved without recourse to ICT adoption? They observed, that in theory, perhaps they could. There are certainly good arguments for 'putting your house in order' by non-technology reforms prior to ICT use. However, good corporation's operations require an ever-increasing speed, volume, connectedness and complexity of information handling. The proportion of corporations' reforms that can be conducted without ICT is therefore dwindling rapidly. Secondly, and still recognizing the importance of an integrated approach, ICT are a major tangible lever to change: they change attitudes; work pace, and even whole work cultures in a way that earlier levers have not. They further explained that corporations that had introduced ICT are highly cost effective.

Richard (2001) suggested that cost/benefit analysis is not a viable way to evaluate ICT adoption. Recent estimates suggest at least 80% of the costs of ICT-related projects are taken up in intangible, largely hidden costs.

Richard (2001) and Michael (1999) agreed that indeed, there is a strong argument for not making cost/benefit analysis the central plank of decision-making. Where this has happened in Western government, not only are the figures involved spurious, but initiatives tend to be restricted to basic clerical automation, preventing real progress with ICT adoption. In developing countries, where ICT costs can be 2 or 3 times higher while clerical costs are up to 10 times lower, even these basic projects would probably be struck

out. Richard (2001) strongly argued corporation must take a leap of faith, an acceptance that ICT adoption and application is the future of corporation operations, whether they like it or not.

Peters (2002) suggested that developing country corporations like Kenya can either jump on adopting ICT and try to steer it as best as they can. Or they can stand aside and watch other corporations in other nations ride off into the future without them.

2.3 ICT : A tool to enhance transparency and improve services

There is increasing evidence that corruption practices and non-transparent operations in an organization, state corporations included or even in a country undermines development and productivity. This could lead to poor services to the customers/public (Stamoulis, 2001).

Gustavo (2001) explained that in Argentine government, the perceptions of corruption were a major political issue in the electoral campaign of 1999. The political party "ALIANZA" candidate for president, Fernando de la Rúa, promised that, if elected, he would head a Gobierno de Cristal, eliminating the corrupt practices that periodically came to light during the previous administration, and thereby restore citizens' confidence in government. The government took an initiative of launching ICT programs under the name "Cristal". Cristal mission was to disseminate online, and in an easily understood format, all information concerning the use of public funds in Argentina. This included information not only about the amounts of money devoted to different programs, but also how these funds were administered. The average number of visitors to the Cristal site each month rose steadily, increasing by nearly 200%. To date, most user comments are critical, generally it increases accountability and transparency in the government organs. It is actually a tool to control corruption, in government organs. This is a similar situation where the current Kenya government aims at fighting and eliminating corruption. The adoption and application of ICT and provision of online information about the amount

devoted to contracts and how the funds are administered could also be applied in Kenya and could be a tool of transparency that can be used to fight corruption.

Gustavo (2001) contended that the availability of online system facilitated by ICT had increased transparency and reduced corruption in Argentina. Actually the following items as stated in "Article 8 of the Fiscal Responsibility Law of Argentina (No. 25.152)" are now available on the online system.

1. purchase orders and public contracts,
2. payment orders submitted to the National Treasury and other treasuries of the National Public Administration,
3. payments issued by the National Treasury and other treasuries of the National Public Administration,
4. financial and employment data concerning permanent and contracted staff, and those working for projects financed by multilateral organizations,
5. a list of retirees and pensioners of the armed forces and security forces,
6. an account of the public debt, including terms, guarantees, interest costs, etc.
7. inventory of plant and equipment and financial investments,
8. outstanding tax and customs obligations of Argentine companies and people,
9. regulations governing the provision of public services, and the regulatory organizations themselves,
10. all information necessary for the community control of social expenditures.

From the above examples this could also enhance transparency and accountability in the Kenya state corporation if appropriate ICT are adopted.

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Rajeev (2001), explained that ICT adoption in the Department of Revenue in Karnataka - India had tremendously reduced corruption (bribes), inconvenience and harassment. He explains that 20 million records of land ownership of 6.7 million farmers in the state had been computerized. Previously, farmers had to seek out the Village Accountant to get a copy of the Record of Rights, Tenancy and Crops (RTC) -- a document needed for many tasks such as obtaining bank loans. There were delays and harassment. Bribes had to be

paid. By the year 2001, for a fee of Rs.15 (Shs 24), a printed copy of the RTC could be obtained online at computerized land record kiosks (Bhoomi centers) in 140 offices.

With the computerized system, administrators can quickly determine the number of approved and overdue orders. Information collected from one urban office indicated that earlier 3,000 mutations were handled annually. After computerization, there is a 50% jump in the number of mutation requests. This change indicated a level of approval of the new system by the population, and willingness to update changes in land ownership that were previously left undocumented.

This could also be adopted in Kenya state corporations to improve the service quality, but then, the ICT solutions need be designed in manner to fit the Kenyan environment.

2.4 Selecting ICT Projects in the Best Way

Holmes (2001) argued that picking the right ICT projects, especially the very first ones, is critical. A successful initial project can become the selling point for all future and create momentum needed to move ICT projects ahead. A small success story can become a powerful example that others can imitate.

He further argues that, like all reforms it is important to show early and not spend too much time on developing visions, strategies and work plans. Identify a few high-profile problems and address them with pilot ICT solutions quickly (for example, within a year or less) that will address both the back office operations of state corporation and access/interface with the customers or clients.

2.4.1 Do an ICT diagnosis

Michael (1999) suggested that performing ICT diagnosis is a necessary starting point, it is helpful to start an assessment of how a corporation currently uses technology and what ICT resources are available. Michael (1999) contends that an ICT “snapshot” might consider: Has corporation’s ICT units already undertaken successful project? Why did it work? What are the current expenditures on ICT? What have been the results? Are

different units using compatible platforms? What are key obstacles current ICT projects are facing?

Oros (2002) argued that diagnosis itself could be a starting point for building consensus among those charged with adoption and application ICT. A statement of the problem agreed upon by officials and other can be excellent basis for further cooperation. ICT leaders must determine how to communicate the results of the diagnosis if, for example they might be discouraging to civil servants.

Michael (2002) further warns that the goals and target client must match the available ICT and reflect the diagnosis. For example, it is useless to create a website for online banking if communities have no affordable or regular access to the Internet.

2.4.2 Shop Around

According to Oros (2002), the corporations should not re-invent the wheel. He suggests that corporations should borrow ideas from corporations in other regions or countries that have successfully implemented similar ICT projects, be it online transactions or electronic-business (e-business). He recommends that corporations should visit these corporations and talk with the officials in charge. This is a relatively low cost way of learning do's and don'ts for specific projects. Of course, advice from elsewhere will need to be adapted to fit the local context.

2.4.3 Match the project to the vision

The goal and audience of ICT projects should be consistent with the overall ICT vision. Once this requirement is fulfilled, there are a number of addition strategies for choosing first project. One option is tot make the first project one that directly benefit a large number of citizens, like one that improves the process for administration a state corporation benefit. Another option is to start with the ICT project that affect all corporation units, like procurement or a corporation intranet, so all corporation workers have a stake in the ICT process. (Peters, 2002; Richard, 2001).

Oros (2002) confirmed that in Chile, the availability of affordable housing was critical public concern. One ICT project in the National housing corporation was to enable to people apply for mortgage online, thereby avoiding the time and costs of applying in person at corporation's offices that were located only in major cities. During its first 5 months of operation, some 40,000 applicants had been processed through 70 service centers nationwide. This could also be adopted in Kenya state corporations to introduce online services but services to be designed in manner to fit the Kenya environment.

2.4.4 See ICT from the user's perspective

Richard (2002) contested, that if the target customer for the ICT services has no access to the technology needed to obtain the service, ICT plans must address how to provide that technology. This maybe a less immediate issue for the ICT projects applied to "back office" support services, which often improve "over-the-counter" services for the public. He however observes that, matching the intended services and access to necessary technology and available resources is always a critical issue.

Richard (2002) further gave an example, where in Brazil's Bahia State created mobile services centers (trucks equipped with computers) that travel to rural areas to deliver services to more than 400 communities in the State. These mobiles units had access to computer networks and databases enabling them to issue ID card, birth certificate and labor ID cards. Mobile health units use similar approach bringing health services, information and electronic records for patients to the State's 100 poorest communities. Over five million people had received services by year 2002.

This example could be used to help the state corporations see the ICT project from the user's perspective, and observe and ensure that necessary ICT infrastructures are in place.

2.4.5 Pick winners

Build on existing capacity, enthusiasm and excellence within the corporation. An initial diagnosis may reveal certain corporation units that are more advanced, forward thinking or capable than others. Start with the best agencies and services – the "strongest links." Base the initial ICT programs-pilot projects-on existing centers of excellence. Sometimes

the choice will not be where to begin with ICT, but which existing project to push (McConnell, 2000; Richard 2002).

Richard (2002) argued that a few pilot projects can provide experiences that show more clearly the potential and challenges of ICT. He explains that pilot project can be documented and used to strengthen the vision and planning processes, even if the pilot systems are replaced later with new, better systems. He contends that pilot projects not only solve immediate problems but can also lead to a more systemic ICT effort.

2.4.6 Think ambitiously, but implement discretely

The common advice followed by the private sector in e-business “think big, start small, scale fast” – is equally useful for ICT projects. Develop a long term, ambitious set of ideas for ICT (whether revealed to public or not), but begin with a project that can be accomplished. It is risky to start with a series of large, national, cross-agency projects. The ICT plan should be diverse but realistic and training must be part of it (Oros, 2002).

2.4.7 Survey customer's need and want

According to Richard (2002), customer or clients are the experts in evaluating what they want and need. He suggests that another strategy is to survey citizens or businesses to identify their most pressing needs and how best to address them. Deliver something relevant and useful. However, he foresees that sometimes corporation's needs to be ahead of its customer. For example, sometime customer will demand service or an opportunity only after the corporation begins providing it.

2.5 Planning and managing ICT projects

Chandra (1995) argued that effective management is vital for success of ICT or business projects. Being able to deliver a project on time and within budget, coordinate effectively among corporation's agencies and oversee private sector partners, all depends on capable management. Before moving forward with the ICT project, set up management mechanisms at both the corporation's level and the project level.

2.5.1 Ensure the project management team has sufficient authority

Without authority from corporation's e-champion, the officials responsible for ICT adoption and application cannot ensure plans are carried out. Consider creating a central ICT agency within a corporation or as an independent body. Create teams responsible for the project success at both the corporation senior level and project management level. (Oros, 2002).

Richard (2001) gives an example of Thailand case, where the government established a National IT Committee (NITC) – a ministerial level coordinating committee – and tasked the National Electronics and Computer Technology Center (NECTEC) to be the lead agency for the country's ICT and ICT efforts. NECTEC was empowered by the Cabinet to be the driving force in Thailand's ICT development and implementation of the national ICT agenda as well as specific ICT projects, training and legislative drafting. It also serves as the secretariat for NITC. The state corporation could also adopt the technique whereby a corporation can form an ICT committee to foresee the ICT adoption and application.

2.5.2 Develop a work plan to implement the priority ICT projects

Peter (2002) argued that vision and strategies are not enough. A detailed work plan will help steer the agencies and officials responsible for implementing ICT. The work plan should focus on at least five key elements:

1. **Content Development:** Includes development of applications, open standards, local language interfaces, user guides, and e-learning material.
2. **Competency building:** human resources and training programs must be implemented at all levels.
3. **Connectivity:** local networks and Internet connections must be applied across the corporation.
4. **Cyber Laws:** to provide a legal framework that supports the objectives of the ICT policies and project.

5. Citizen interfaces: a proper mix of delivery channels is needed to ensure that ICT applications are accessible and affordable for users.

Peters (2001) contended that ICT management is more than implementing projects; it means planning for capacity building. Training employees at all levels of the bureaucracy, including senior officials, should be integral part of the work plan. Often the target audience will need some simple training, as well, to utilize any new ICT system. This training should be part of the management designs. Capacity building needs to enable official to handle information, adapt to changes in responsibilities and develop new competencies. He further suggested, that officials need to be trained so as to become a new kind of “knowledge-based” employees. “Knowledge management”, as it is called is a key element of ICT and should be part of any ICT project.

2.6 Managing ICT projects in a Corrupt Environment

Despite the preceding analysis of ICT adoption limitations, experience suggests public servants often perceive that ICT introduction is going to have a significant effect of reducing corruption. These perceptions will feed into the process of planning any new information system. The effect of these perceptions is likely to be particularly marked where a new ICT system is being introduced in the presence of practices that are currently corrupt (Richard, 1998). He gave an example where one of government's pensions office, computerization was roundly resisted; many of the factors which at first were seen to underlie the resistance included:

1. fears of loss of jobs,
2. fears that staff would not have the necessary skills,
3. health and safety concerns.

He further reveals that what emerged during that investigation, was that the main fear lay around the issue of corrupt incomes. Pensions staff had the power to deny claimants access to pension payments or to provide claimants with access to certain types of higher-income pension. He explained that the staffs were using this power to extract bribes from

pensionable claimants. They feared that computerization would remove this power. Hence, their true reason for resistance. This could also be true in Kenya state corporations, and it is important to investigate the true reason of resistance to ICT adoption and application, if it actually exists.

Rajeev (2001) suggested that where resistance and corruption are linked, there are three possible reactions that can be drawn from the case studies above:

1. If the ICT system will not have an effect, make this (subtly) clear;
2. If the ICT system will affect corruption and the stakeholders are not that powerful, then 'tough it out', that is, push on in the likelihood that resistance can be overcome;
3. If the ICT system will affect corruption and the stakeholders are powerful, change the design plans so that the key corrupt processes are not computerized or are not exposed to monitoring by ICT.

He contended that 'Toughing it out' can also be tried in the last case, and this would seem to be the morally correct route to take. However, it will greatly increase resistance to IT and the risks of information system failure.

Maybe, this is also experienced in the Kenya state corporations and therefore whatever the reaction, the link between ICT and corruption impact has to be recognized in the planning process of ICT systems. This link must also be teased out as a component of resistance to ICT adoption.

2.7 Summary of Literature review

From the below explanation, it is clear how the literature review had assisted the researcher to develop the statement of the problem. From the above literature review it is recognized that ICT as utilized in corporations in other countries had proved to be a powerful tool used to address a host of issues, for example a tool to improve services, enhance transparency, reduce corporation's cost, reduce redundancy; among others. The value of ICT increases as its number of users grows. By participating in the digital

economy not only add value to the corporations business by improving the quality and responsiveness of the services, minimize inefficiencies and increase transparency, but also benefits corporations from the ability to use network to communicate and trade with other networked users. But on the other hand, it had been realized that deployment of ICT face several challenges and barriers. To avoid ICT projects failure, it is necessary for the corporations to select ICT project in the best way; to plan and manage ICT and to know how to manage the ICT in corrupt environment.

Despite the existence of these challenges/barriers some corporations in other nations had overcame these challenges and successfully adopted ICT and obtained its tremendous benefits. For these reasons it becomes important to question whether the state corporations in Kenya had adopted ICT and assess the extent of adoption. This in essence is a measure of readiness of participation in the networked digital economy, which in broader terms indicates the benefits accrued from ICT. And therefore it means the lower the extent (in percentage) of ICT adoption; the lower the benefits accrued from ICT. From theoretical concept as suggested by Oros and Richard, the critical areas of assessment are e-champion and policy infrastructure; human capacity development infrastructure; network access – Internet connectivity infrastructure and information security and telecommunication regulation infrastructure.

CHAPTER 3

RESEARCH METHODOLOGY

In the adoption and application of ICT within the corporation, at least two parties are normally involved. These are the management of the state corporation (Information Technology Manager, Managing Director or Human Resources Manager) and specialist Information technology staff (Systems Administrator or IT Officer). Management gets involved because ICT solutions require substantial investment. A specialist IT staff is needed due to the technical orientation of ICT systems.

Therefore, a research design that captures the perspectives offered by these parties was required. A questionnaire (a copy is available in Appendix 2) was administered to those parties in order to determine the extent of adoption and application of ICT.

3.1 Research Design

This study was conducted through a cross-sectional survey on Kenya state corporations as listed by the ministry of finance (Appendix 3). The primary objective of the study was to survey the extent of adoption and application of ICT in state corporations in Kenya based on the Oros an Richard conceptual framework.

The component of assessment consisted of the four critical criteria namely e-Champion/e-Leader and policy; Network Access – Internet connectivity Infrastructure; Human capacity development infrastructure and Information security and telecommunication regulation infrastructures.

The responses from the questionnaire were analyzed and explanations of the research questions derived from them.

3.2 Population

The population is the entire group of people or cases of direct interest to the investigation. For this research, the population comprised of all 105 state corporations as listed by the ministry of finance.

3.3 Sample

Using stratified sampling, the corporations were clustered as per the parent ministry/sector. The names of the corporations in each cluster were arranged in ascending order. Every first, third, fifth, seventh and so on, name of the corporation was selected to be part of the sample. A sample totaling 54 state corporations, which constituted 50% of the total state corporations in Kenya, was selected.

Table 3.3.1 Selected Sample

Parent Ministry /Sector	Number of Corporations	Sample selected
Agriculture & Rural Development	40	20
Education, Science & Technology	13	7
Energy	5	3
Finance	12	6
Health	6	3
Tourism, Trade & Industry	20	10
Transport & Communications	9	5
Total	105	54

Source: Ministry of Finance 2002

3.4 Data Collection

The major method of data collection was through a self-administered questionnaire.

The study utilized primary data. The collection instrument that was used was a questionnaire.

Since this study seeks to obtain data from comparable replies, the use of standardized questionnaire was utilized. The questionnaires consisted of both close and open-ended questions. The questionnaire was divided into two sections, section A was used to collect general information on the corporation's name, sector or parent ministry and position the respondent held in the corporation. Section B was developed to cover each of the four critical criteria namely e-Champion/e-Leader and policy, Network Access – Internet connectivity Infrastructure, Human capacity development infrastructure and Information security and telecommunication regulation infrastructures.

The researcher used e-mails and “drop and pick later” methods of data collection and was available to clarify any issues that arose. The reason for this was because the respondents did not had time for the interview method and also due to time and cost limitations. The questionnaire was filled by the staff in-charge of ICT issues in the corporation. These were IT or computer directors/managers or computer system administrator/officer. A brief explanation (copy is available in Appendix 1) was given to such contact individuals as to the purpose of this study.

3.5 Data Analysis And Presentation

The data collected from this study were presented through the use of summarized percentages, proportions and frequency distributions. Open-ended questions responses were coded and analyzed according to the theme of the questions.

The following tools were used in the data analysis:

1. Microsoft Access database management system (DBMS). Access was used to develop a simple system to facilitate data capture, storage and analysis. This system consisted of:

Database: This was the repository for all the data collected.

Data entry forms. These were used to enter data into the access database. The forms followed the format of the questionnaires.

Query utilities. Simple query utilities were developed to query the data and provide various reports.

2. Microsoft Excel 2000: This is a spreadsheet package that was used to import data from the access database and analyze each of the indicators to provide results useful to get the extent of adoption of ICT.

The data analysis methodology used is outlined below:

Data was captured using Access-based system. These data was verified to ensure that there were no data entry errors.

Preliminary data analysis was performed using the access query utilities to provide various reports.

Data was imported from Microsoft Access database into Microsoft Excel.

Then analysis of data using the Microsoft Excel to provide the required reports was done. Necessary calculations were carried using either the Access system or Microsoft Excel depending on the complexity of the analysis required. Based on the results, the extent (in percentage) of adoption of ICT, of various criteria were determined. Finally, an average percentage of the four critical criteria was considered to be the overall extent of adoption and application of ICT in state corporations in Kenya.

The extent of adoption of ICT was determined in percentage. The percentage between 0% and 25% represented the lowest level relative advancement in each criterion in the adoption and application of ICT that was considered to be stage one. Stage one represented the lowest level of adoption and application of ICT whereby the corporations are not ready to participate in the networked digital world.

While 75% -100% represented the highest-level relative advancement in ICT adoption and application in each criterion which was considered to be stage four. Corporations at stage four are considered to be in the highest level of adoption of ICT and therefore in state of preparedness to participate in the networked digital world. Firms in this category are considered to be receiving tremendous ICT benefits.

The response rate indicated that from 54 questionnaires sent out, empirical results were obtained from 49 state corporations. This response rate translated to 90.7%, which was considered satisfactory.

Table 1.1: Survey of the state corporations investigated:

Firm Name/Category	Distributed Questionnaires		Completed and Returned	
	Number	Percentage	Number	Percentage
Agribusiness & Food Development	20	37%	18	36.7%
Manufacturing, Services & Technology	7	12.9%	6	12.5%
Energy	3	5.4%	3	6.1%
Finance	6	11.1%	6	12.5%
Health	3	5.6%	3	6.1%
Transport, Trade & Industry	10	18.5%	8	16.1%
Transport & Communications	8	14.8%	5	10.2%
Total	54	100%	49	90.7%

CHAPTER 4

DATA ANALYSIS AND FINDINGS

The data collected was analyzed using descriptive statistics. Frequency tables and percentages had been used extensively to draw conclusions. The presentation of the analysis was captured in two parts. The first part captures the general information about the corporation's name, sector or parent ministry. Section II attempts to address the earlier stated objectives of the study.

4.1 Survey of the State Corporations Investigated

As per the list obtained from the ministry of finance, corporations were clustered as per the parent ministry and using stratified sampling technique and a sample of 54 corporations was selected.

The response rate indicated that from 54 questionnaires sent out, empirical results were obtained from 49 state corporations. This response rate translated to 90.7%, which was considered very satisfactory.

Table 4.1.2: Survey of the state corporations investigated:

Parent Ministry/Sector	Distributed Questionnaires		Completed and Returned	
	Number	Percentage	Number	Percentage
Agriculture & Rural Development	20	37%	18	36.7%
Education, Science & Technology	7	12.9%	6	12.5%
Energy	3	5.6%	3	6.1%
Finance	6	11.1%	6	12.5%
Health	3	5.6%	3	6.1%
Tourism, Trade & Industry	10	18.5%	8	16.3%
Transport & Communications	5	9.3%	5	10.2%
Total	54	100%	49	100%

From table 4.1.1, it can be deduced that the responding corporations were as follows: Agriculture & Rural Development (36.7%), Education, Science & Technology (12.5%), Energy (6.1%), Finance (12.5%), Health (6.1%), Tourism, Trade & Industry (16.3%), Transport & Communications (10.2%)

4.2 e-Champion and policy infrastructures

Figure 4.2.1 Dedicated Official who foresee implementation of ICT projects

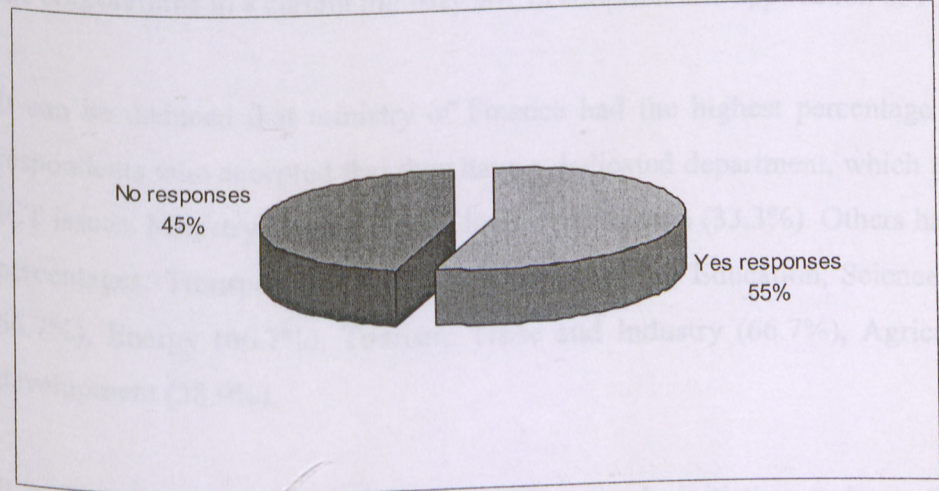


Figure 4.2.1, most (55%) of the corporations accepted that they have an official whose major responsibility is to foresee implementation of ICT solutions. This therefore means that most of the state corporations considered ICT projects, important and crucial.

Table 4.2.2 Special department dedicated to ICT implementations

Parent Ministry/Sector	Frequency (YES responses)	Percentage
Agriculture & Rural Development	7/18	38.9%
Education, Science & Technology	4/6	66.7%
Energy	2/3	66.7%
Finance	5/6	83.3%
Health	1/3	33.3%
Tourism, Trade & Industry	5/8	62.5%
Transport & Communications	4/5	80%
Total	26/49	53.1%

Table 4.2.3 (a) Senior/Top management involvement in ICT projects

From table 4.2.2, 53.1% of the respondents accepted that they have a dedicated department whose major responsibility is to foresee the adoption and implementation of ICT solutions. This is a clear indication that most of the state corporations have given higher priority to ICT projects implementation and application.

It is important to mention that the level of percentage of acceptance indicates how serious the corporations in a certain ministry are, in adoption and application of ICT.

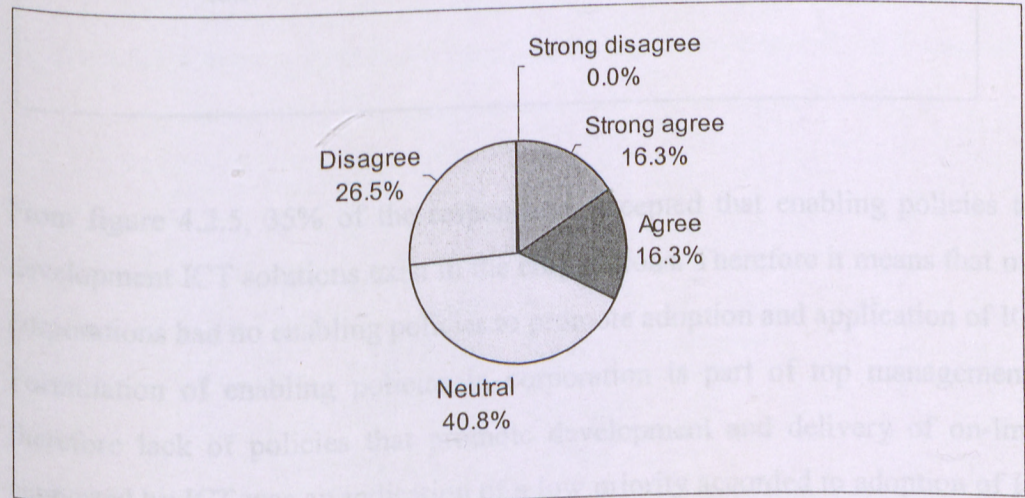
It can be deduced that ministry of Finance had the highest percentage (83.3%) of the respondents who accepted that they have a dedicated department, which takes care of the ICT issues. Ministry Health had the lowest percentage (33.3%). Others had the following percentages: Transport & Communications (80.0%), Education, Science & Technology (66.7%), Energy (66.7%), Tourism, Trade and Industry (66.7%), Agriculture and rural development (38.9%).

It is important to highlight that the corporation's initiative to have a dedicated ICT department is associated to corporations moving fast into the networked world; this is supported by the fact that most of corporations in the ministry of the finance which is a leader in this indicator, have automated their own processes and market some of their products via internet even though they do not have a Web for order processing.

Table 4.2.3 (a) Senior/Top management involvement in ICT projects

Parent Ministry/Sector	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Agriculture & Rural Development	-	2/18	11/18	5/18	-
Education, Science & Technology	-	1/6	3/6	2/6	-
Energy	2/3	1/3	-	-	-
Finance	4/6	1/6	-	1/6	-
Health	-	-	2/3	1/3	-
Tourism, Trade & Industry	-	2/8	2/8	4/8	-
Transport & Communications	2/5	1/5	2/5	-	-
Total	8/49	8/49	20/49	13/49	-
Percentage	16.3%	16.3%	40.8%	26.5%	-

4.2.3 (b) Senior/Top management involvement in ICT projects

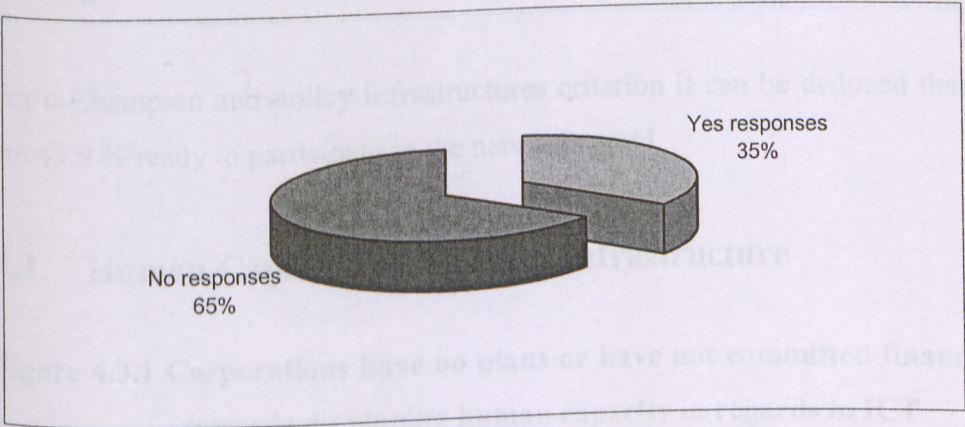


From Figure 4.2.3 (a and b), 16.3% strongly agreed and 16.3% agreed that senior or top management are involved in deployment of ICT solutions. This was an indication of a low level of priority accorded to the ICT adoption and application in state corporations. 40.8% were indifferent and further 26.5% disagreed. This means that most of respondents beliefs that most of ICT projects do not get senior management strong support. And for this reason they associated the failure of earlier ICT projects implementation to low or lack of enough support from senior management.

4.2.5 Summary of e-Champion and policy infrastructures criterion

It is important to mention that, for example the ministry of finance which had the highest respondents who strongly agreed that senior management get involved in ICT project, are benefiting from strong e-leaders who had ICT vision and champion the adoption of ICT and are helping their corporations move forward quickly into the new information economy.

Figure 4.2.4 Policies to promote development and delivery of on-line services



From figure 4.2.5, 35% of the respondents accepted that enabling policies to promote development ICT solutions exist in the corporations. Therefore it means that many of the corporations had no enabling policies to promote adoption and application of ICT. Formulation of enabling policies in corporation is part of top management role and therefore lack of policies that promote development and delivery of on-line services supported by ICT was an indication of a low priority accorded to adoption of ICT, by the policy formulator or makers.

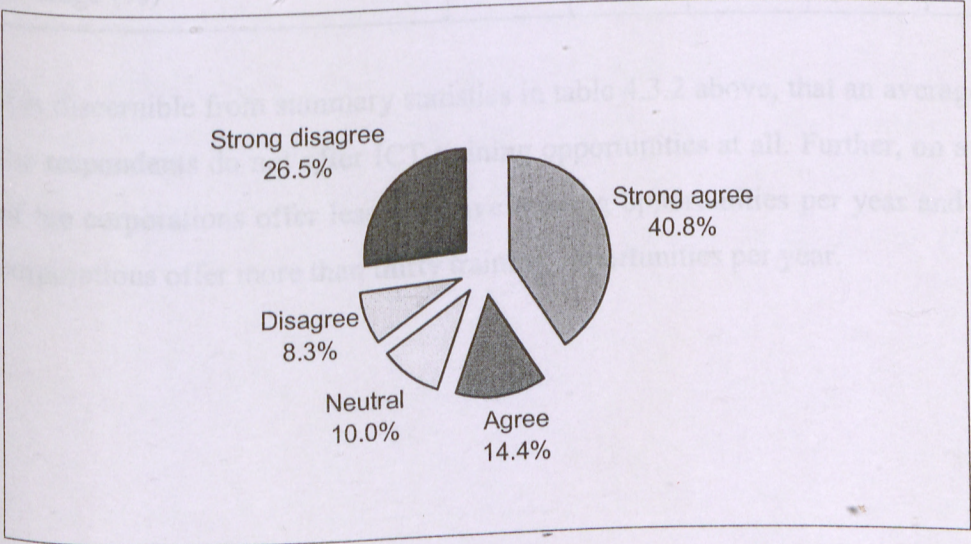
4.2.5 Summary of e-Champion and policy infrastructures criterion

Indicators	Extent
Dedicated Official who foresee implementation of ICT projects	55.0%
Special department dedicated to ICT implementations.	53.1%
Senior/Top management involvement in ICT projects.	32.6%
Policies to promote development and delivery of non-line services	35.0%
Average	43.9%

For e-Champion and policy infrastructures criterion it can be deduced that corporations are 43.9 % ready to participate in the network world.

4.3 Human Capital Development Infrastructure

Figure 4.3.1 Corporations have no plans or have not committed financial resources towards developing human capacity in regards to ICT



From figure 4.3.1, 40.8% strongly agreed and 14.4% agreed that corporation’s officials had not established plans, or committed financial resources in developing human capacity in regards to ICT projects. Further 10.0% of the respondents were indifferent, that means

respondents were not sure whether the corporations have made or planned to make financial commitment towards developing workforce to adopt ICT.

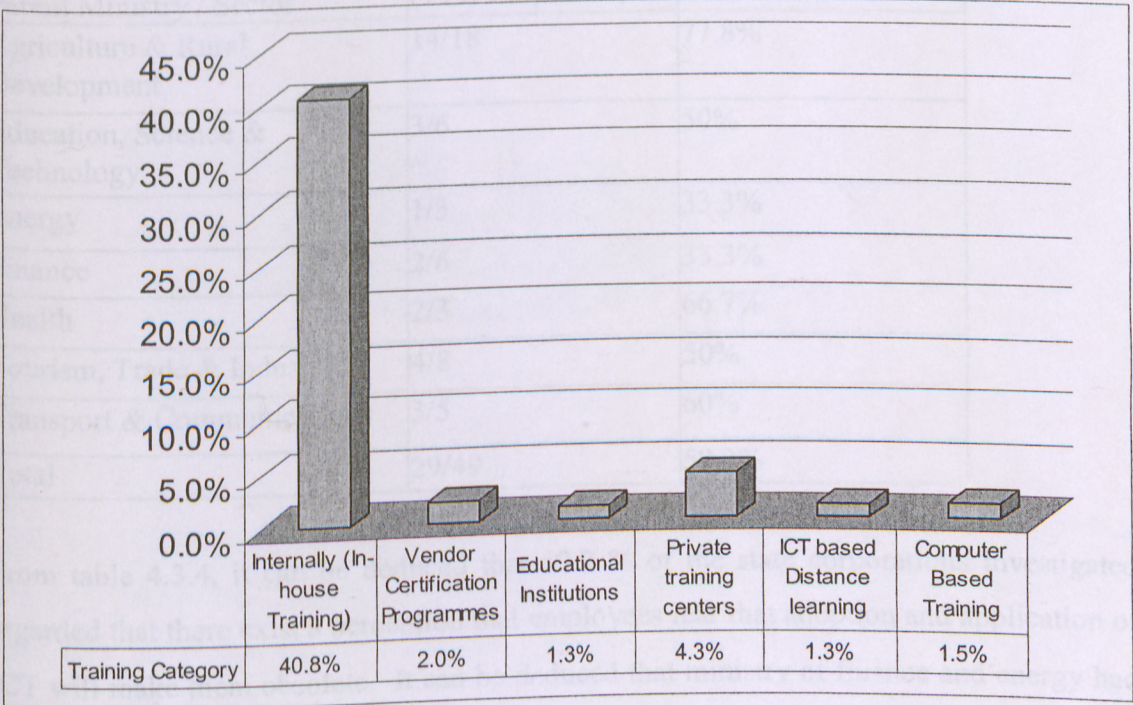
This is a clear indication that most of the state corporations had not budgeted for human capacity development towards ICT solutions. Therefore, it means that corporations had shown a low priority to development of human capacity towards adoption and implementation of ICT.

Table 4.3.2 ICT training opportunities per year

	None	< 5	5-10	10-15	15-30	>30
Internally	26.5%	8.2%	12.3%	10.2%	2.0%	40.8%
Vendor Certification Programmes	50.6%	20.3%	13.8%	7.6%	6.3%	2.0%
Educational Institutions	82.0%	30.3%	4.7%	2.0%	1.7%	1.3%
Private training centers	65.2%	20.7%	4.1%	3.2%	2.5%	4.3%
ICT based Distance learning courses	85.5%	4.5%	3.4%	1.8%	3.5%	1.3%
Computer Based Training (CBT)	87.5%	5.2%	3.6%	2.0%	1.2%	1.5%
Average (%)	66.2%	14.9%	7.0%	4.5%	2.9%	8.4%

It is discernible from summary statistics in table 4.3.2 above, that an average of 66.2% of the respondents do not offer ICT training opportunities at all. Further, on average 14.9% of the corporations offer less than five training opportunities per year and only 8.4% of corporations offer more than thirty training opportunities per year.

Figure 4.3.3 Corporations offering more than thirty ICT training opportunities per year.



From figure 4.3.3, 40.8% of the corporations offer more than thirty in-house (internal) training opportunities. It is clear that other training categories are not well practiced. It therefore means that most of the state corporations consider in-house training more important as in comparison with other categories (vendor certifications, educational training, private training center, ICT based distance learning and computer based training).

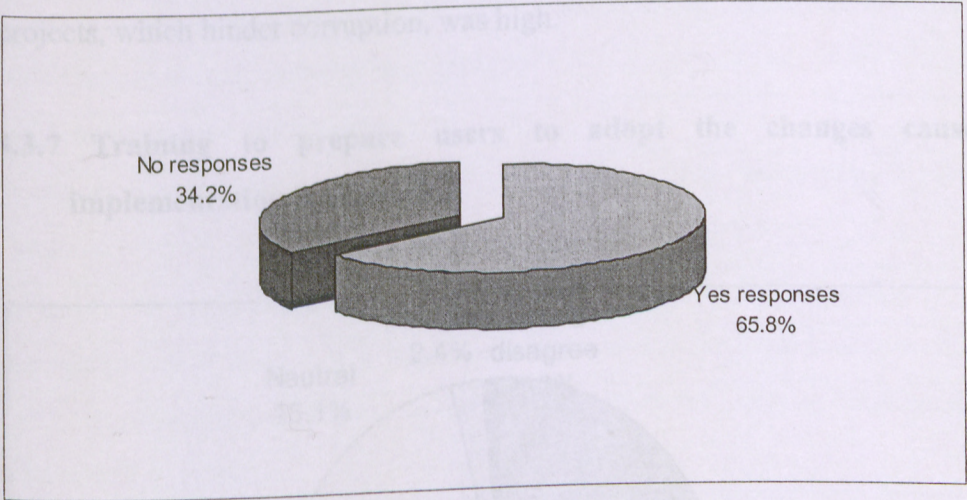
Table 4.3.4 Employees fear that ICT implementation will make them obsolete.

Parent Ministry / Sector	Frequency (YES Responses)	Percentage
Agriculture & Rural Development	14/18	77.8%
Education, Science & Technology	3/6	50%
Energy	1/3	33.3%
Finance	2/6	33.3%
Health	2/3	66.7%
Tourism, Trade & Industry	4/8	50%
Transport & Communications	3/5	60%
Total	29/49	59.2%

From table 4.3.4, it can be deduced that 59.2 % of the state corporations investigated regarded that there exist a perception that employees fear that adoption and application of ICT will make them obsolete. It can be deduced that ministry of finance and energy had the lowest percentage (33.3%) of the respondents who accepted that there exists a perception that employees fear that adoption and application of ICT would make their service obsolete and make them lose their jobs. Ministry of Agriculture & Rural development had the highest percentage (77.8%). Others ministries had the following percentages: Health (66.7%), Transport & Communications (60.0%), Education, Science & Technology (50.0%) and Tourism, Trade and Industry (50.0%).

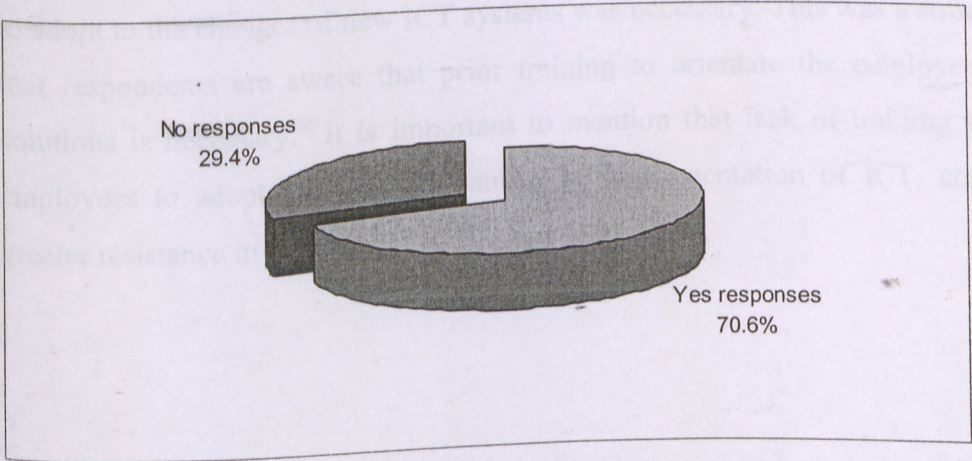
It is important to mention that the higher the percentage of respondent who accepted that there exists a perception that employees fear that adoption of ICT, the higher the resistance from within the corporations. Therefore it means that as per this indicator ministry of finance and energy were considered to have the least resistance from within the corporations and ministry of Agriculture and Rural development had the highest resistance to adoption and implementation of ICT.

Figure 4.3.5 Employee fear that the ICT implementations will make them lose power.



65.8 % of the respondents agreed that there exists a perception that employees fear that they will lose power that they had created in their present systems if the ICT systems are implemented. This is an indication that resistance emanating from the fear perceived by the employees that they will lose power due to implementation and adoption of ICT was relatively high.

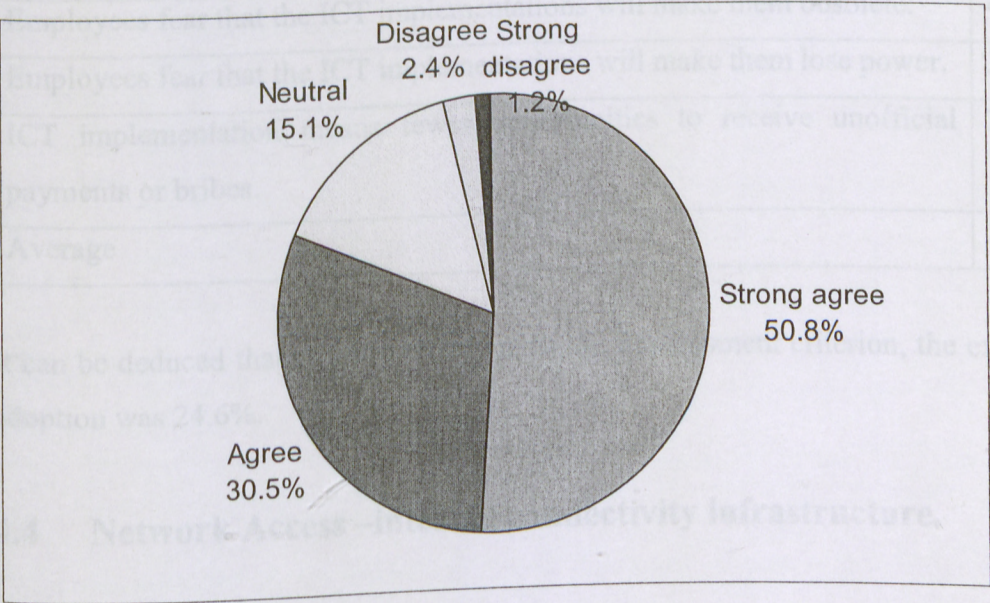
Figure 4.3.6 ICT implementation means fewer opportunities to receive unofficial payments or bribes



From figure 4.3.6, 70.6% of the respondents accepted that there exists a perception that there is a concern that new, automated processes will mean fewer opportunities to receive

unofficial payments or bribes in return for using their discretion to help certain parties. This was a strong affirmation that resistance among corporation to implement ICT projects, which hinder corruption, was high.

4.3.7 Training to prepare users to adopt the changes caused by ICT implementation is necessary



From figure 4.3.7, 50.8% strongly agreed and 30.5% agreed that training to prepare user to adopt to the changes of new ICT systems was necessary. This was a strong affirmation that respondents are aware that prior training to orientate the employees to the ICT solutions is necessary. It is important to mention that lack of training to prepare the employees to adopt the changes caused by implementation of ICT, contributes to a greater resistance in adoption of ICT.

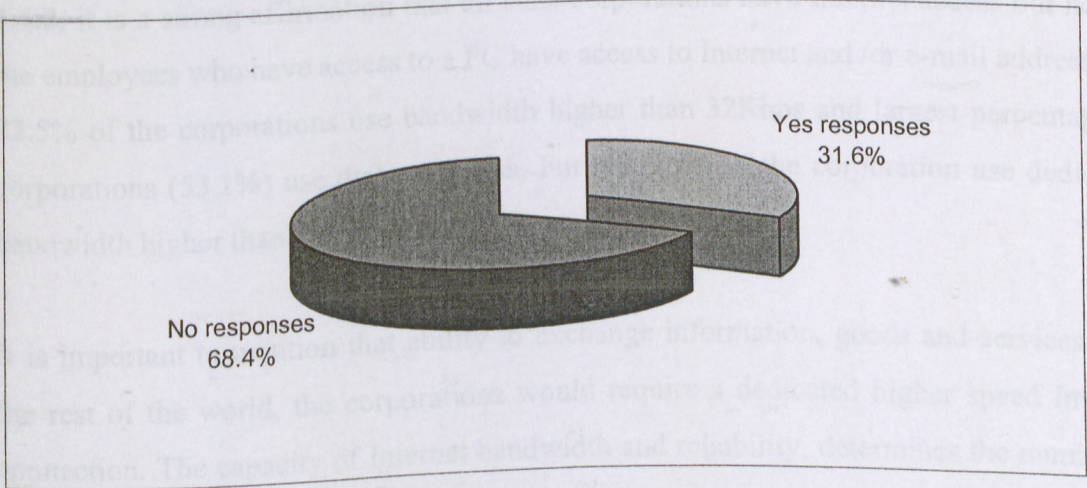
Table 4.3.8 Summary of human capital development infrastructure criterion

Indicators	Extent
Corporations have plans or have committed financial resources towards developing human capacity in regards to ICT.	34.8%
ICT training opportunities per year.	32.8%
Corporations offering more than thirty ICT training opportunities per year.	8.4%
Employees fear that the ICT implementations will make them obsolete.	40.8%
Employees fear that the ICT implementations will make them lose power.	34.2%
ICT implementation means fewer opportunities to receive unofficial payments or bribes.	29.4%
Average	24.6%

It can be deduced that as per the human capital development criterion, the extent of ICT adoption was 24.6%.

4.4 Network Access –internet connectivity infrastructure.

Figure 4.4.1 All employees who have access to a PC have e-mail and/or Internet access



31.6 % accepted that all employees who have access to a PC have e-mail address and/or Internet connection. That means that a large percentage of the corporations do not allow all employees who had access to PC to access Internet and/or e-mail.

Figure 4.4.3 Response time of Internet Service Provider (ISP) in case of Internet

Table 4.4.2 Type of access to the Internet

Yes responses						
Parent Ministry / Sector	Non-Existent	Dial-up	Dedicated 32 Kbps	Dedicated 64 Kbps	Dedicated 128 Kbps	Dedicated > 256 Kbps
Agriculture & Rural Development	-	14/18	3/18	1/18	-	-
Education, Science & Technology	-	4/6	1/6	-	1/6	-
Energy	-	1/3	-	2/3	-	-
Finance	-	1/6	-	4/6	1/6	-
Health	-	1/3	2/3	-	-	-
Tourism, Trade & Industry	-	4/8	2/8	2/8	-	-
Transport & Communications	-	1/5	2/5	2/5	-	-
Total	-	26/49	10/49	11/49	2/49	-

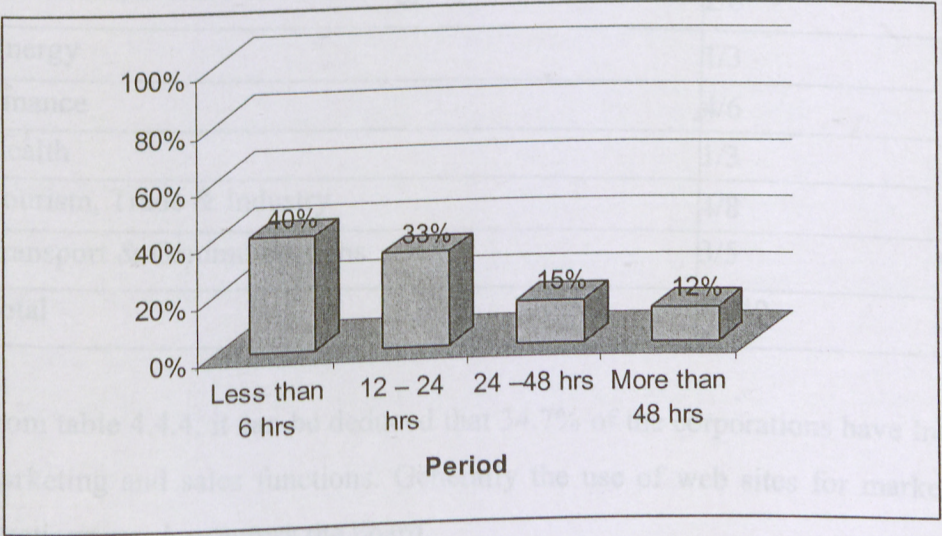
From the table 4.4.2, it can be explained that none of the respondents accepted that Internet access does not exist in the corporations. That means all the respondents agreed that their respective corporations have access to Internet. From figure 4.4.1 and table 4.4.2, it is a strong affirmation that all state corporations have Internet access but not all the employees who have access to a PC have access to Internet and /or e-mail address.

22.5% of the corporations use bandwidth higher than 32Kbps and largest percentage of corporations (53.1%) use dial-up access. Further, none of the corporation use dedicated bandwidth higher than 256Kbps.

It is important to mention that ability to exchange information, goods and services with the rest of the world, the corporations would require a dedicated higher speed Internet connection. The capacity of Internet bandwidth and reliability, determines the number of Internet users and types of online activities the network can support. An effective support

of exchange of information and transfer of large files requires a higher dedicated Internet bandwidth connection; the higher the Internet bandwidth, the better.

Figure 4.4.3 Response time of Internet Service Provider (ISP) in case of Internet related problem or failure.



From figure 4.4.3, 40% of the respondent accepted that ISPs takes less than six hours to respond or solve Internet problem or failure. Further 33%, 15% and 12% accepted that ISP response lies between 12 to 24 hours, 24 to 48hours and more than 48 hours respectively. Further, most of the respondent (73%) indicated that ISP takes less than a 24 hours to respond to Internet problem or failure. This was a strong indication that support level by the ISP can be regarded as good.

Table 4.4.4. Use of Internet Web (World Wide Web) for marketing and sales functions

Parent Ministry /Sector	Frequency (YES responses)	Percentage
Agriculture & Rural Development	2/8	11.1%
Education, Science & Technology	2/6	33.3%
Energy	1/3	33.3%
Finance	4/6	66.7%
Health	1/3	33.3%
Tourism, Trade & Industry	4/8	50%
Transport & Communications	3/5	60%
Total	17/49	34.7%

From table 4.4.4, it can be deduced that 34.7% of the corporations have Internet Web for marketing and sales functions. Generally the use of web sites for marketing and sales functions was low across the board.

The answers to question 14, was a strong affirmation that state corporations do not use web for order processing or online services. None of the respondents accepted that the corporations use the web for the order processing.

It is noticeable that although some of the corporations use web for marketing functions, none of them use the web for order processing services.

The answers to opened ended question 15, was a strong affirmation that none of the corporations has ever carried out a survey regarding online user's public satisfaction with the corporation online versus offline services.

It is clear that although some of the corporations use web for sale or marketing function and not for order processing, none have taken initiative to conduct a survey on the benefits the users/customer would gain from the ICT online services. This is an indication that state corporations have not gathered user's or public's or customer's view or opinions regarding online service. Incorporating customer's or user's or public's view

when planning to implement ICT online services assist the corporation to implement customer oriented ICT solutions.

Table 4.4.5 Summary of indicators involved in Network Access – Internet connectivity infrastructure criterion

Indicator	Extent
Not all employees who have access to a PC have e-mail and/or Internet Access.	31.6%
Type of access to the Internet.	26.5%
Response time of Internet Service Provider (ISP) in case of Internet related problem or failure.	40.0%
Use of Internet Web (World Wide Web) for marketing and sales function	34.7%
Average	33.2%

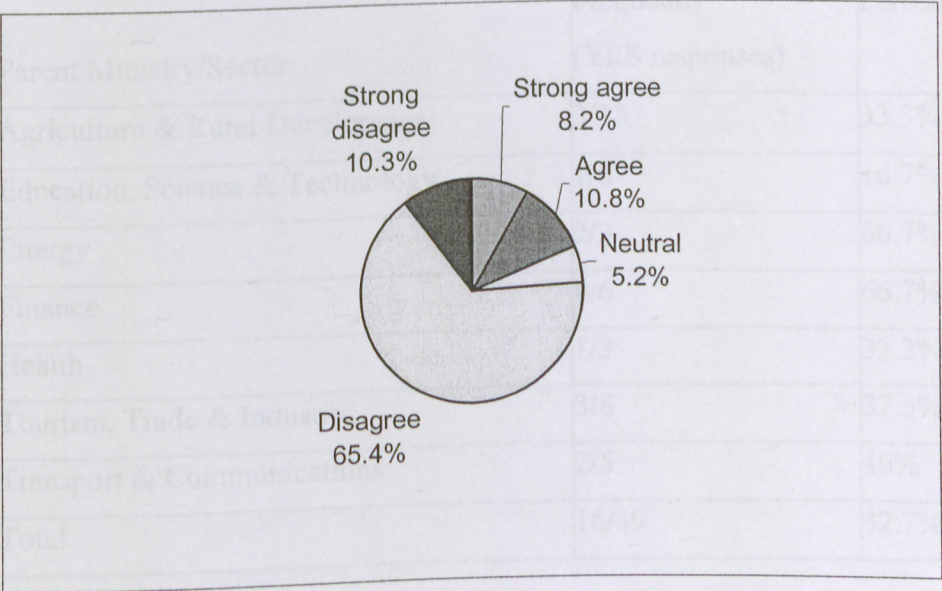
It can be deduced that, as per the network access (Internet connectivity) infrastructure, the extent of ICT adoption of state corporations was 33.2%.

4.5 Information security and telecommunication regulation

Infrastructure

Table 4.5.2 ICT security and/or continuity Policies exist in state corporations

Figure 4.5.1 Telecommunication regulation in Kenya foster growth of ICT



From figure 4.5.1, 65.4% of the respondents, disagreed and 10.3% strongly disagreed that current telecommunication regulations in Kenya fosters the growth of ICT in the corporations. Further, 5.2% of the respondents were indifferent, that means they were not sure whether the telecommunication regulation foster the ICT.

Generally, it means that most of the respondents had an opinion that telecommunication regulation in Kenya does not foster the ICT growth.

Further, responses from the open ended question clearly indicated that monopolistic telecommunication provider and regulator may in principle have policies to foster growth in ICT adoption but in reality do not practice or rather management do not implement those policies. Incumbent operator, Telkom Kenya is a monopoly and the telecommunication regulator CCK (Communication Commission of Kenya), is going through the learning curve towards effectively regulating the telecommunication.

Figure 4.5.3 ICT Disaster recovery plans exist in state corporations

Table 4.5.2 ICT security and/or continuity Policies exist in state corporations

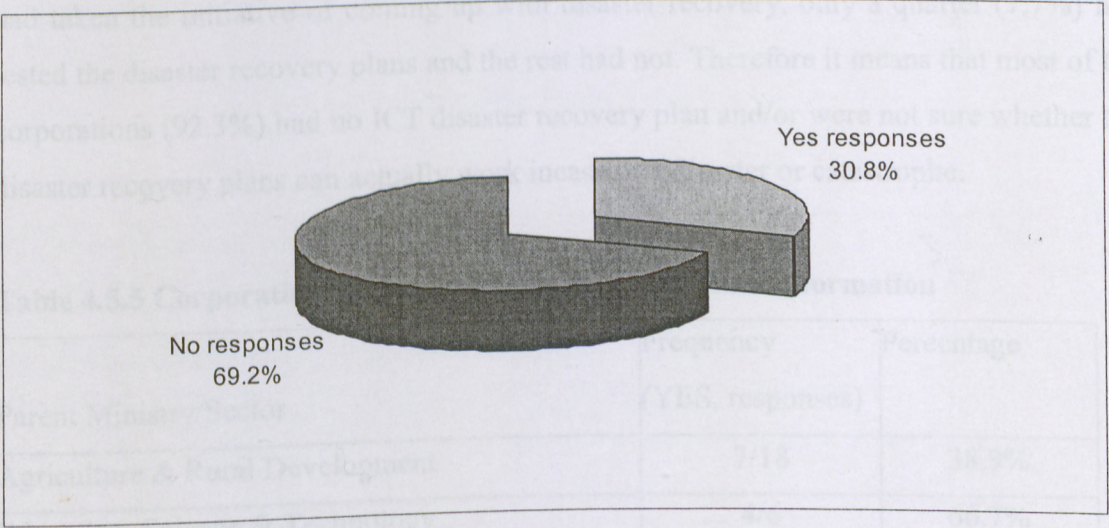
Parent Ministry/Sector	Frequency (YES responses)	Percentage
Agriculture & Rural Development	3/18	33.3%
Education, Science & Technology	1/6	16.7%
Energy	2/3	66.7%
Finance	4/6	66.7%
Health	1/3	33.3%
Tourism, Trade & Industry	3/8	37.5%
Transport & Communications	2/5	40%
Total	16/49	32.7%

From the above table 4.5.2, It can be deduced that 32.7% of the corporations have ICT security and /or contingency policies.

It can be deduced that ministry of Finance and Energy had the highest percentage (66.7%) of the respondents who accepted that ICT security and/or continuity policies exist in their respective corporations. Ministry of Education, Science & Technology had the lowest percentage (16.7%). Others had the following percentages: Transport & Communications (40.0%), Tourism, Trade and Industry (37.5%), Health (33.3%) and Agriculture and rural development (33.3%).

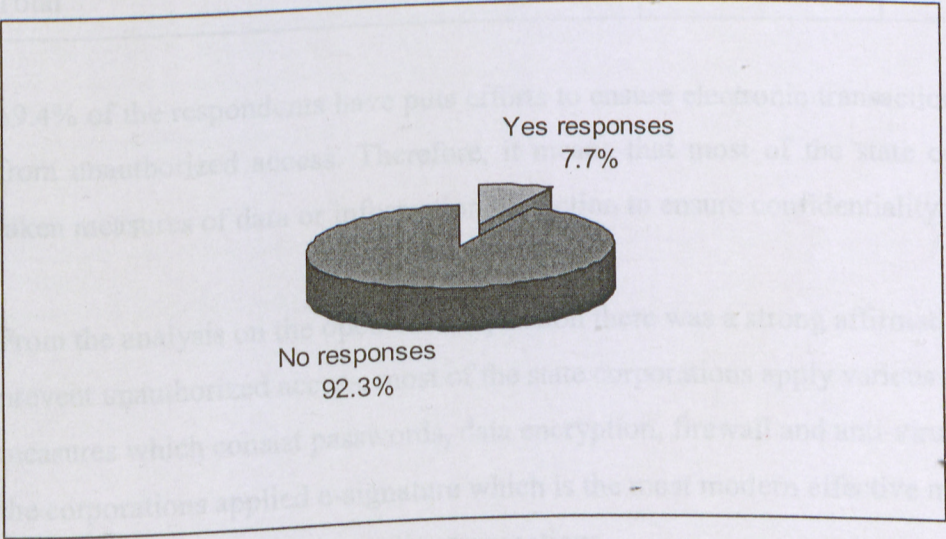
It is noticeable that a lower percentage of the state corporations have ICT security and/or continuity policies and therefore is an indication that few state corporations are concerned in ensuring that timely deterrent, preventive and detective plans (which are components of security or continuity plans) are in place to minimize ICT risk and vulnerabilities.

Figure 4.5.3 ICT Disaster recovery plans exist in state corporations



From figure 4.5.3, it clear that 30.8% (15 out of 49) of the respondents agreed that disaster recovery plans exist. This is an indication that few of the state corporations have ICT recovery measures which are necessary to enable state corporations to get back into business in the shortest time possible incase of a disaster or catastrophe.

Figure 4.5.4 Corporations had tested disaster recovery plans



From table 4.5.4, 7.7% of the respondents accepted that their respective state corporations had tested disaster recovery plans. This was a strong affirmation that most of the respondents who accepted that the corporations had disaster recovery plans had never tested those plans.

It is important to point out that 30.8% (stated on figure 4.5.3) of these corporations that had taken the initiative of coming up with disaster recovery, only a quarter (7.7%) had tested the disaster recovery plans and the rest had not. Therefore it means that most of the corporations (92.3%) had no ICT disaster recovery plan and/or were not sure whether the disaster recovery plans can actually work incase of a disaster or catastrophe.

Table 4.5.5 Corporations have put efforts to protect data/information

Parent Ministry/Sector	Frequency (YES, responses)	Percentage
Agriculture & Rural Development	7/18	38.9%
Education, Science & Technology	4/6	66.7%
Energy	3/3	100%
Finance	6/6	100%
Health	4/6	66.7%
Tourism, Trade & Industry	6/8	75.0%
Transport & Communications	4/5	80%
Total	34/49	69.4%

69.4% of the respondents have puts efforts to ensure electronic transactions are protected from unauthorized access. Therefore, it means that most of the state corporations had taken measures of data or information protection to ensure confidentiality and privacy.

From the analysis on the open-ended question there was a strong affirmation that, to prevent unauthorized access, most of the state corporations apply various data protection measures which consist passwords, data encryption, firewall and anti-virus but none of the corporations applied e-signature which is the most modern effective means of data protection especially on the online transactions.

Table 4.5.6 Summary of the extent of the indicators in Information security and telecommunication regulation Infrastructure criterion

Indicators	Extent
Telecommunication regulation in Kenya foster growth of ICT.	24.3%
ICT security and/or continuity Policies exist in state corporations	32.7%
ICT Disaster recovery plans exist in state corporations.	30.8%
Corporations had tested disaster recovery plans	7.7%
Corporations have put efforts to protect data/information.	69.6%
Average	33.02%

It can be deduced that, as per the information security and telecommunication regulation infrastructure criterion, the extent was 33.02%.

Table 4.5.7 Summary of extent of ICT adoption per criterion

Criteria	Extent
Networked Access – (connectivity) Infrastructure;	33.2%
e-Champion or e-Leadership and policy Infrastructure;	43.9%
Human capacity development Infrastructure;	24.6%
Information security and telecommunication regulation Infrastructure	33.02%
Average	33.7%.

Considering all the criteria, on average the overall percentage of extent was below 34%.

4.6 Challenges/ barriers to ICT adoption process

From the analysis on the open-ended question 20 and 21, there was a strong affirmation that the following were the major challenges/barrier to ICT adoption in the state corporations:

1. Lack of enough corporations' leaders "will" to spearhead ICT adoption. Most of the respondent clearly indicated that the corporations are lacking ICT visionary leaders. Respondents recognized that the right leader should have authority, should be willing to take risk and secure funds for the ICT program. They also highlighted that without active leadership "will", the financial resources, inter-agency coordination, policy changes and human effort required to plan and implement ICT would not be sustained.
2. Resistance from within the corporations towards ICT adoption. The resistance was mainly as a result of fear that some of employees would lose or reduce power that they had created in their current system. And also the resistance was contributed by the fear that ICT adoption that leads to automation of processes would reduce opportunities to receive unofficial payment or bribes in return for using their discretion to help certain parties.
3. High costs on dedicated lease line for Internet connectivity. Most of the respondents called for an end of the telecom monopoly and introduction of competition in the telecom market. This would lead to competitive affordable prices for the lease communication lines that are reliable to support online transactions. It was clear that monopoly practices of the Telkom contributed to the high costs on the dedicated line and actually this made most of the corporations rely on the dial-up connectivity although unreliable and unstable.
4. Low availability of ICT facilities within the corporations. The most of the respondents indicated that their respective corporations have not adequately

invested on the ICT facilities. They noted that ICT had not been used for strategic business activities and therefore no good reason for heavy investment on ICT facilities. The respondent commented that corporation should provide a budget for ICT investment so as to have adequate facilities that can support ICT adoption.

5. Limited availability of financial resources for various ICT training opportunities. Most of the respondents indicated that corporations had not provided adequate budget for various training opportunities that is needed to prepare the employees to be capable to respond to the demands of the ICT application.

The literature review focused mainly on the diverse viewpoint of ICT adoptions, which was necessary in order to set a proper boundary for this study.

This study is not a replica of another study but is based on the conceptual framework as outlined in other earlier sections of this study.

5.1 Discussions

From the research findings as presented in chapter four of the study, several conclusions can be drawn in support of the ICT adoption and application framework. These are discussed in light of the objectives of the study.

As per the analyses in chapter four, ICT adoption and application is taking root in all state corporations – but some corporations like those under the Ministries of Finance (especially those in banking sector) and Energy are leading, others like those under the ministry of health and agriculture and rural development are lagging. Ministries of

CHAPTER 5

SUMMARY AND CONCLUSIONS

In this study, a proposed ICT framework by Oros and Richard was used to assess the extent of ICT adoption in the state corporations. The framework adopted for this study proposed four critical criteria namely e-Champion or e-Leadership and policy infrastructure, human capacity development infrastructure, networked access- Internet connectivity infrastructure and information security and telecommunication regulation infrastructure which formed the objectives of the study. The broad objective of the study therefore was to survey the extent of ICT in state corporations in Kenya, in addition to establishing some of the challenges/barriers to the successful adoption of ICT.

The literature review focused mainly on the diverse viewpoint of ICT adoptions, which was necessary in order to set a proper boundary for this study.

This study is not a replica of another study but is based on the conceptual framework as outlined in other earlier sections of this study.

5.1 Discussions

From the research findings as presented in chapter four of the study, several conclusions can be drawn in support of the ICT adoption and application framework. These are discussed in light of the objectives of the study.

As per the analyses in chapter four, ICT adoption and application is taking root in all state corporations – but some corporations like those under the Ministries of Finance (especially those in banking sector) and Energy are leading, others like those under the ministry of health and agriculture and rural development are laggards. Ministries of

Tourism, Trade and Industry, Transport and Communications, Education, Science & Technology were neither laggards nor leaders in adoption of ICT.

Some state corporations in the leading ministries had begun to automate their own internal processes, and marketing their products on the Web signaling to move fast to adopt and apply ICT.

1. e-Champion or e-Leadership

e-Champion (e-leader) and dedicated ICT department is a necessary first step for consideration. From summarized statistics, 55% of the state corporations had official who foresee adoption and implementation of ICT. Further, 53.1% admitted that they had a special department dedicated to ICT projects. This was a confirmation that the state corporations had realized that for successful adoption and application of ICT, issues regarding ICT require to be highly prioritized, that is, by first setting a dedicated department and officials whose work is to foresee the deployment of ICT projects.

Few corporations (32.6%) accepted that senior or top management get involved in adoption and application of ICT. This a strong affirmation that few of corporations have e-Leader or e-Champion who champions ICT adoption and application, to ensure that the financial resources, policy changes and human effort required in planning and adoption of ICT solutions are sustained. It therefore means that most of the state corporations lacked a leader who provided a vision of the digital future that inspire business to introduce ICT solutions.

It is necessary to have visionary leader or champion who see the adoption and application of ICT even during difficult moments like overall country's low economic situation.

2. Internet connectivity (network access) and support

Internet connectivity (network access) assessment is a second necessary step. This is assessing Internet availability and reliability. It as well, involved issues regarding the capacity of Internet bandwidth, connectivity and reliability of the support services from

Internet Service Provider (ISP). According to the statistics, 53.1% of the state corporations rely on dial-up access to Internet. And few corporations had dedicated data communication lease line. Dial-up type of access to Internet was not as reliable and as stable as dedicated lease line and due to its unreliability it could not support large number of users Internet connections and transmission of large files. This was proved by the fact that, few (34.7%) of corporations use Internet for marketing or sales function and none process order online. Further, few (31.6%) of corporations accepted that not all the employees who have access to a PC could access Internet or had e-mail address. Therefore for reliable connection, corporations' must invest on high-speed Internet backbone preferably higher than 64Kbps that can support e-business or web based business transactions.

Despite the fact that most of the corporations had relied on dial-up connection, most of the corporation accepted that support from Internet services provider (ISP) was good.

This was a strong affirmation that ISP's support response is good, but even though, it is important to emphasize that ISPs need to have competitive web designers, who can also incorporate the latest development technologies in Internet.

3. ICT training opportunities and resistance

From the analysis most (66.2%) of corporations do not offer training opportunities of any kind to the employees and few put lot of emphasis on in-house training ignoring other training categories like vendor certification programmes, education institutes, private training centers, ICT based distance learning courses to computer based. This was a strong affirmation why most state corporations do not plan or commit financial resources for the training aspect in regards to ICT adoption and applications. Further, it was an indication of low priority accorded to the ICT training aspect.

From the statistics most of the respondents agreed that resistance within the corporations had developed because employees fear that implementation of ICT would make them obsolete, lose power they had created before implementation of ICT and would get fewer

opportunities to receive unofficial payments or bribes in return for using their help to certain parties. But on the other hand, most of respondents accepted that training is necessary so as to prepare the employees to adopt changes of new ICT systems and therefore reduce resistance. This was strong affirmation that lack of training opportunities in corporations had contributed to resistance in adoption and application of ICT solution, and therefore it means that prior preparation, which includes training, giving user orientation sessions, documenting the new system and actively involving the employees on the ICT project at stages, would significantly reduce resistance from within the corporations.

To reduce ICT illiteracy and add experience to employee so that they can be able to use web based application supported by ICT- the state corporations need to offer a variety of training opportunities ranging from in-house, vendor certification programmes, education institutes, private training centers, ICT based distance learning courses to computer based.

4. Telecommunications regulations

Most (75.7%) of corporations agreed that telecommunication in Kenya does not foster the growth of ICT. From the open-ended question there was a strong affirmation that the CCK (Communication Commission of Kenya) regulations in Kenya still support monopoly of Telkom, which had led to exorbitant prices on telecommunication services including Internet connections. CCK was encountering challenges, which included spectrum management, service quality monitoring and policy instruments for bringing under regulatory regime of the converging technologies of ICT. Further, the respondents recommended for a removal of monopolist and/or privatize the incumbent operator on critical services such as Internet backbone services, so as to encourage competitiveness in the telecommunication market.

5 Continuity Plans

From the analysis, most of the corporations do not have security and disaster recovery plans. Few of corporations that had these continuity plans had tested them. That means a

high percentage of the corporations are not sure whether the continuity plans would work in case of an attack or disaster. It is advisable for the state corporations to ensure that ICT continuity policies are in place and are tested so as to ensure that corporations can fully be brought back into their former ICT functional and operational status within the shortest period possible, in case of disaster, catastrophe, virus attack, unauthorized access etcetera.

7. Data Protection

From the analysis, most (69.6%) of the state corporations had put efforts to protect electronic data. This was a confirmation that most corporations consider privacy and confidentiality as vital aspect, by implementing protection measures like passwords, data encryption, firewall and anti-virus like that prevent unauthorized access to the information. But none of the of the corporation use electronic signature (e-signature) as a means of data protection. e-Signature had proved to be effective in providing online information transactions protection. It is advisable for corporation also to deploy e-Signature as a measure of protection.

8. Challenges/barrier to ICT adoption

The challenges/barriers established in chapter four, negatively affected the extent of ICT adoption and that clearly indicated that the level of preparedness to participate in digital economy was low. Not unless the state corporations strategically plan to overcome challenges/barrier earlier mentioned in analysis, then they might not truly benefit from ICT adoption which is a tool being used by business firms, government organs and community worldwide to improve business transactions and services; enhance transparency and generally for competitive advantage among other benefits.

From the analysis ICT adoption had not been highly prioritized as a critical factor. It is important for the corporations to empower a visionary leader who should have enough authority and power so as to overcome the challenges/ barrier mentioned in chapter four. The ICT leader should have ICT vision that should be connected to corporation's business strategy.

5.2 Conclusions

The study sought to seek the extent of ICT adoption and application in the state corporations in Kenya. It was gauged by assessing corporations' relative advancement in percentage, in the various indicators, which were categorized in the four critical criteria namely e-Champion or e-Leadership and policy infrastructure, Human capacity development infrastructure, Networked access- Internet connectivity infrastructure and Information security and telecommunication regulation infrastructure.

According to the data analysis the criteria assessed were on average below 34%. This was the extent or level of adoption of ICT in the state corporations in Kenya and therefore the state corporations are considered to be in the second lowest level of readiness to participate in the digital network economy. The tremendous potential that ICT holds as catalyst for productivity; competitive advantage; improve services, in the state corporations was considered to be as low as 34%. That means the advantages of ICT was lightly felt or experienced in the state corporations.

Below is a summarized conclusions as per criterion:

1. e-Champion or e-Leadership and policy infrastructure

From the data analysis and explanatory comments below, the overall extent of adoption ICT for this criterion was 43.9%. This criterion was negatively influenced by most (67.4%) of the corporations lacked e-champion, they lacked leader or senior or top member of management who support and promote adoption and application of ICT. For adoption and application of ICT to succeed, support from both management mechanisms from corporation's senior level and at the project level should be strong.

Generally, only few of the investigated state corporations are benefiting from strong e-leader who would help the corporation move forward quickly into adoption and

application of ICT. Without active e-champion, the financial resources, policy changes and human effort required to plan and implement ICT solutions may not be sustained.

But on the other hand, this criterion was positively influenced by the fact that most state corporations had official and department dedicated to foresee the application and adoption of ICT project. This was an indication of a high level of priority to ICT issues.

2. Human capacity development infrastructure

This criterion was negatively influenced by the most (65.2%) of the corporations had no plans or had not committed financial resources towards developing human capacity in regards to ICT, this had resulted to availability of few training opportunities per year. The focus should be on developing human infrastructure, through integrated education, training, and skilled-based programs to enable a critical mass to utilize computers and online resources.

Resistance within the corporation had developed because employees fear that implementation of ICT would make them obsolete, lose power they had created before implementation of ICT and get fewer opportunities to receive unofficial payments or bribes. State corporations required a lot of training and sensitization on importance of ICT solutions so as to enhance fast adoption and application.

From the data analysis and explanatory comments above, the overall extent or level of adoption and application of ICT for this criterion was 24.6%.

3. Networked access (Internet connectivity) infrastructure

From the analysis in chapter four and below explanatory comments, the overall extent of adoption and application for this criterion was 33.2%. This had been negatively influenced by most of the corporations not having a high Internet bandwidth, which would adequately support the transfers of large files and online services. Further, most (53.1%) of the state corporations relied on dial-up connection that was unable to sustain massive effective Internet based services and also unable support large number of users

(employees who have access to a PC had e-mail address or Internet access). For effective adoption and application of ICT, state corporations must invest on reliable and stable high-speed connection.

4. Information security and telecommunication regulation infrastructure

From the analysis in chapter four the overall extent of adoption and application for this criterion was 33.02%. This criterion was negatively influenced by very few corporations had security, continuity and disaster recovery plan. Few of the state corporations that had the disaster recovery plans only a few (7.7%) had tested these plans. Therefore it is then questionable whether these disaster recovery plans can actually be implemented in case of a disaster/catastrophe. Most of the corporations were not sure that state corporations can be brought back into its former ICT functional and operational status within the shortest period possible, in case of a disaster.

But on the other hand, the criterion was positively influenced by most (69.6%) of the corporations had taken an initiative of having protection measures to ensure that unauthorized access to electronic data is minimized.

5. Challenges/barrier to ICT adoption

The corporations should have ICT plan that articulates corporation's ICT goals, policies, resources and priority projects on ICT adoption. The ICT manager must relate ICT system to corporation business strategy and by doing so the senior management/leaders of corporations will see the importance or value of ICT and therefore be in the forefront to support and champion the ICT adoption.

5.3 Limitations of the study and suggestions for further research

5.3.2 Suggestions for further research

This part of the study discusses the limitations of the study and includes suggestions for further research.

5.3.1 Limitations

This study was perceived by the respondents as too probing on their very core issues of ICT. There was an element of caution in respondents giving all the information required especially at this period when some of the senior ICT manager in some corporation have been implicated in corruption activities involving tendering of ICT projects and had been prosecuted. This limitation however, did not make the conclusions of this study not valid because other crucial information presented not directly was captured.

In addition, there are no locally known studies to assess the level or extent of adoption and application ICT among the Kenyan state corporations. The study therefore relied mainly on empirical studies on other countries, which operate in different cultural and economic settings.

Resources and time constraints were other major limitation for this study. A larger sample would have been preferable taking into account the type of analysis that was adopted for this study.

5.3.2 Suggestions for further research

This particular study can be extended to specific studies on either of the criterion for example e-champion infrastructure. It would also be important to carry out a purely empirical research without reliance on the conceptual model, as was the case with this study.

However, despite the limitations, given the increasing evidence of the need for the business and government organs to participate in the networked digital economy, this study should be considered as a first step in assessing the extent or level of adoption and application of ICT in state corporations. This work therefore sets up future contributions that will enable academicians; government agents and ICT managers/directors to better understand the challenges/barriers and extent of adoption of ICT in state corporations, which in essence indicates the readiness to participate in the networked digital world.

I intend my approach to this survey to be both consultative and collaborative and ensure that it causes minimal disruption to your schedule of activities. I kindly request you to provide the required information by responding to the questions in the questionnaire. The information required is purely for academic purposes and will be treated in the strictest confidentiality. Your name or the name of the company will not be mentioned in this report.

A copy of the research project will be made available to you upon request. I will appreciate your cooperation in this academic exercise.

Thanking you in advance.

Yours faithfully,

William M. Njogu (MBA student, UON).

Appendix 1: Letter to the respondents.

William M. Njogu,
P.O. Box 78340,
Nairobi.

To.....
P.O. Box
Date:

Dear Sir/ Madam,

RE: SURVEY OF THE EXTENT OF ADOPTION OF ICT IN STATE CORPORATIONS IN KENYA.

Am a postgraduate student undertaking a Master of Business Administration (MBA) degree at Faculty of Commerce, University of Nairobi. Am currently carrying out a research on the extent of adoption of Information and Communication Technologies (ICT) in state corporations in Kenya. This is a requirement to complete my MBA course project at University of Nairobi

I intend my approach to this survey to be both consultative and collaborative and ensure that it causes minimal disruptive to you schedule of activities. I kindly request you to provide the required information by responding to the questions in the questionnaire. The information required is purely for academic purposes and will be treated in the strictest confidentiality. Your name or the name of the company will not be mentioned in this report.

A copy of the research project will be made available to you upon request. I will appreciate your cooperation in this academic exercise.

Thanking you in advance.

Yours faithfully,

William M. Njogu (MBA student; UON).

Appendix 2:

STUDY QUESTIONNAIRE

UNIVERSITY OF NAIROBI

FACULTY OF COMMERCE

DEPARTMENT OF MANAGEMENT SCIENCE

NOTE: The information in this questionnaire will be treated confidentially and will not be used for any other purpose other than academic.

Section A:

Name of Corporation:.....

Position Held in the Corporation:.....

Sector or Parent Ministry.....

- Section B**
- e-Champion and Policy Infrastructure**
- Do you have an official whose major responsibility is to foresee an implementation of ICT solutions?
Yes () No ()
 - Do you have a special department that ensures ICT projects are actually implemented?
Yes () No ()
 - Senior Administrators of the corporation are involved in the deployment of ICT capabilities throughout the corporation.
Strongly Disagree() Disagree() Neutral () Agree() Strongly Agree ()
 - Enabling policies are in place to promote development and delivery of on-line services.
Yes () No ()

Human capacity development Infrastructure

5. The corporation officials have **not** established plans, or committed financial resources towards developing human capacity.

Strongly Disagree() Disagree() Neutral () Agree() Strongly Agree ()

6. How many ICT training opportunities per year are available through the following?

	None	< 5	5-10	10-15	15-30	>30
Internally (in-house)						
Vendor Certification Programmes						
Educational Institutions						
Private training centers						
ICT based Distance learning courses						
Computer Based Training (CBT)						

7. Is there a perception that there is fear that the ICT implementation will make employees obsolete; that they will lose their jobs?

Yes () No ()

8. Is there a perception that there is fear that employees will lose power that they have created in the current system if the ICT systems are implemented?

Yes () No ()

9. Is there a perception that there is concern that new, automated processes will mean fewer opportunities to receive unofficial payments or bribes in return for using their discretion to help certain parties?

Yes () No ()

10. Training to prepare users to adopt to the changes of new ICT systems is necessary.

Strongly Disagree() Disagree() Neutral () Agree() Strongly Agree ()

Network access – Internet connectivity infrastructure

11. Do all the employees who have access to a PC have e-mail addresses and/or Internet connection?

Yes () No ()

12. Does the corporation have access to Internet?

Yes () No ()

If YES,

(a) Tick the type of access to the Internet

Non-Existent	Dial-up	Dedicated 32 Kbps	Dedicated 64 Kbps	Dedicated 128 Kbps	Dedicated > 256 Kbps
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(b) What is the response time of your Internet Service Provider (ISP) incase of Internet problem or failure?

Less than 6 hrs	12 – 24 hrs	24 –48 hrs	More than 48 hrs
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13 Does the corporation use the Internet Web (WWW) for sale or marketing functions?

Yes () No ()

14 Does the corporation have an Internet Web (WWW) for order processing?

Yes () No ()

15. Have any survey been carried out regarding online user's/public satisfaction with the corporation on-line versus off-line services? Yes () No ()

If yes, what were the main results?

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.....

.....

Information Security and telecommunication regulation Infrastructure

16. Current telecommunication regulatory in Kenya fosters the growth of ICT in the corporation?

Strongly Disagree() Disagree() Neutral () Agree() Strongly Agree ()

Comment regarding the context, to any of the above answer:

.....

.....

.....

.....

(Use extra sheet of paper if necessary)

17. Does ICT security and contingency policy exist in the corporation?

Yes () No ()

18. Does disaster recovery plan exist corporation?

Yes () No ()

If YES, has it ever been tested?

Yes () No ()

19. Had the corporation put efforts to ensure electronic transaction are protected or prevention of unauthorized access to the corporation's data?

Yes () No ()

If YES,

Please specify the measures/actions the corporation have taken towards ensuring the data privacy/protections

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Challenges/barrier to ICT adoption

20. Please specify the challenges/barriers the corporation face in process of adoption of ICT.

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(Use extra sheet of paper if necessary)

Appendix 3 - List of Staff Corporations in Kenya

21. Please suggest possible solutions to the challenges/barriers mentioned in question 20 above.

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(Use extra sheet of paper if necessary)

Thank you for your assistance in having taken the time to answer the questions.

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Appendix 3 - List of State Corporations in Kenya

	State Corporations	Parent Ministry /Sector
1	Agricultural Finance Corporation	Agriculture & Rural Development
2	Central Agricultural Board	Agriculture & Rural Development
3	Chemelil Sugar company	Agriculture & Rural Development
4	Coast Development Authority	Agriculture & Rural Development
5	Coffee Board of Kenya	Agriculture & Rural Development
6	Coffee Research Foundation	Agriculture & Rural Development
7	Cooperative College of Kenya	Agriculture & Rural Development
8	Cotton Board of Kenya	Agriculture & Rural Development
9	Ewaso-Ng'iro North Development Authority	Agriculture & Rural Development
10	Ewaso-Ng'iro South Development Authority	Agriculture & Rural Development
11	Horticultural Crops Development Authority	Agriculture & Rural Development
12	Kenya Dairy Board	Agriculture & Rural Development
13	Kenya Forestry Research Institute	Agriculture & Rural Development
14	Kenya Industrial & Research Development Institute	Agriculture & Rural Development
15	Kenya Marine and Fisheries Research Institute	Agriculture & Rural Development
16	Kenya Plant Health Inspectorate Services	Agriculture & Rural Development
17	Kenya Seed Company	Agriculture & Rural Development
18	Kenya Sugar Board	Agriculture & Rural Development
19	Kenya Tea Development Authority	Agriculture & Rural Development
20	Kenya Trypanosomiasis Research Institute	Agriculture & Rural Development
21	Kenya Veterinary Vaccines Production Institute	Agriculture & Rural Development
22	Kerio Valley Development Authority	Agriculture & Rural Development
23	Lake Basin Development Authority	Agriculture & Rural Development
24	Muhoroni Sugar Company	Agriculture & Rural Development
25	Mumias Sugar Company	Agriculture & Rural Development
26	National Cereals and Produce Board	Agriculture & Rural Development
27	National Housing Corporation	Agriculture & Rural Development
28	National Irrigation Board	Agriculture & Rural Development
29	National Museums of Kenya	Agriculture & Rural Development
30	Nyayo Tea Zones Development Corporation	Agriculture & Rural Development
31	Nzoia Sugar Company	Agriculture & Rural Development
32	Pests Products Control Board	Agriculture & Rural Development
33	Pyrethrum Board of Kenya	Agriculture & Rural Development
34	Sisal Board of Board	Agriculture & Rural Development
35	South Nyanza Sugar Company	Agriculture & Rural Development
36	Sugar Development Fund	Agriculture & Rural Development
37	Sugar Research Foundation	Agriculture & Rural Development

38	Tana Athi Rivers Development Authority	Agriculture & Rural Development
39	Tea Board of Kenya	Agriculture & Rural Development
40	Tea Research Foundation	Agriculture & Rural Development
41	Egerton University	Education, Science & Technology
42	Higher Education Loans Board	Education, Science & Technology
43	Jomo Kenyatta Foundation	Education, Science & Technology
44	Kenya Agricultural Research Institute	Education, Science & Technology
45	Kenya Literature Bureau	Education, Science & Technology
46	Kenya National Examinations Council	Education, Science & Technology
47	Kenyatta University	Education, Science & Technology
48	Kenya Institute of Administration	Education, Science & Technology
49	Kenya National Library Services	Education, Science & Technology
50	Moi University	Education, Science & Technology
51	National Council for Science and Technology	Education, Science & Technology
52	School Equipment Production Unit	Education, Science & Technology
53	University of Nairobi	Education, Science & Technology
54	Electricity Regulatory Board	Energy
	Kenya Electricity Generating Company	Energy
55	(KenGen)	
56	Kenya Pipeline Company	Energy
57	Kenya Power and Lighting Company Ltd.	Energy
58	National Oil Corporation of Kenya	Energy
59	Capital Markets Authority	Finance
60	Central Bank of Kenya	Finance
61	Consolidated Bank of Kenya	Finance
62	Export Processing Zones Authority	Finance
63	Export Promotion Council	Finance
64	Industrial Development Bank	Finance
65	Kenya Commercial Bank	Finance
	Kenya Institute for Public Policy Research &	Finance
66	Analysis	
67	Kenya Post Office Saving Bank	Finance
68	Kenya Re-Insurance Corporation	Finance
69	Kenya Revenue Authority	Finance
70	National Bank of Kenya	Finance
71	Kenya Medical Research Institute	Health
72	Kenyatta National Hospital	Health
73	Moi Referral and Teaching Hospital	Health

74	National Health Insurance Fund	Health
75	Pharmacy and Poisons Board	Health
76	Radiation Protection Board	Health
77	Agro-Chemical and Food Company	Tourism, Trade & Industry
78	Betting Control and Licensing	Tourism, Trade & Industry
79	Bomas of Kenya Ltd.	Tourism, Trade & Industry
80	Film Censorship Board	Tourism, Trade & Industry
81	Hotels and Restaurants Authority	Tourism, Trade & Industry
82	Industrial & Commercial Development Corporation (ICDC)	Tourism, Trade & Industry
83	Investment Promotion Center	Tourism, Trade & Industry
84	Kenya Bureau of Standards	Tourism, Trade & Industry
85	Kenya Industrial Estates	Tourism, Trade & Industry
86	Kenya National Trading Corporation	Tourism, Trade & Industry
87	Kenya Shipping Agency	Tourism, Trade & Industry
88	Kenya Tourism Board	Tourism, Trade & Industry
89	Kenya Tourist Development Corporation	Tourism, Trade & Industry
90	Kenya Utalii College	Tourism, Trade & Industry
91	Kenya Wildlife Service	Tourism, Trade & Industry
92	Kenya Wine Agencies	Tourism, Trade & Industry
93	NGO Coordination Bureau	Tourism, Trade & Industry
94	Presidential Music Commission	Tourism, Trade & Industry
95	Safaricom Kenya Limited	Tourism, Trade & Industry
96	National Social Security Fund	Tourism, Trade & Industry
97	Communications Commission of Kenya	Transport & Communications
98	Kenya Airports Authority	Transport & Communications
99	Kenya Broadcasting Corporation	Transport & Communications
100	Kenya National Shipping Line	Transport & Communications
101	Kenya Ports Authority	Transport & Communications
102	Kenya Railways Corporation	Transport & Communications
103	Postal Corporation of Kenya	Transport & Communications
104	Telkom Kenya Ltd.	Transport & Communications
105	National Water Conservation and Pipeline Corporation	Transport & Communications

Source: Ministry of Finance (February 2003)

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