ICT POLICY AND STRATEGIES: TOWARDS E-GOVERNANCE AND SUSTAINABLE DEVELOPMENT-THE CASE OF EAST AFRICAN COMMUNITY AND KENYA

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DECLARATION

This thesis is my original work and has not been presented for a degree in any other University

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ACRONYMS AND ABBRIVIATIONS

- ADB Africa Development Bank
- ALGAK Association of Local Government Authorities of Kenya
- AISI African Information Society Initiative
- ASYCUDA Automated System for Customs Data and Management
- ACWICT African Centre for Women, Information and Communications Technology
- ASP American Society for Public Administration
- BBK Barkley's Bank of Kenya
- CATIA Catalyzing Access to ICT in Africa
- CBS Central Bureau of Statistics
- CBI Cross-Border Initiatives
- CBO Community Based Organization
- CCK Communications Commission of Kenya
- CDI Community Development Index.
- CDF Constituency Development Fund
- CET Common External Tariff
- CEO Chief Executive Officer
- CIDA Canadian International Development Agency
- C-HTML Compact Hypertext Markup Language
- CSK Computer Society of Kenya
- COMESA Common market of East and Southern Africa

- *CSS* *Closed Source Software*
- DFID Department for International Development
- DGSP Democratic Governance Service Program (DGSP)
- DHS Demographic and Health Surveys
- DSS Decision Support System
- EAC East African Community
- EABC East African Business Council
- EADB East African Development Bank
- EAIDSNet East Africa Integrated Disease Surveillance Network
- EAIF East African Internet Forum
- EASSy East African Submarine Fibre Optic Cable System
- EMIS Education Management Information System
- EU European Union
- FCC Federal Communications Commission
- FDI Foreign Direct Investment
- FiMo Fixed and Mobile
- FM Frequency Modulated
- GDP Gross Domestic Product
- GIS Geographical Information Systems
- GITS Government Information Technology Services
- GoK Government of Kenya
- G2B Government to Business
- G2C Government to Citizen

- G2G Government to Government
- IBO Internet Backbone Operators
- ICANN Internet Corporation for Assigning names and Numbers
- ICASA Independent Communications Authority of South Africa
- ICT Information and Communication Technology
- IDI Option-based Investment Decision Index
- IDRC International Development Research Cooperation
- IFMS Integrated Financial Management Systems
- IGAD Inter-Governmental Authority on Development
- IT Information Technology
- ITU International Telecommunication Union
- ITP Index of Technological Progress
- IPPD Integrated Public Personnel Data
- IUCEA Inter-University Council for East Africa
- ISPs Internet Service Providers
- JICA Japanese International Cooperation Agency
- JKUAT Jomo Kenyatta University of Agriculture and Technology
- KBS Knowledge Based System
- KENIC Kenya Network Information Centre
- KiF Kenya ICT Federation
- KeKoBI Kenya Kountry Business Incubator
- KENET Kenya Education Network
- KLGRP Kenya Local Government Reform Programme

- KPA Kenya Ports Authority
- KRA Kenya Revenue Authority
- LAEDAP Local Authority E-Service Delivery Action Plan
- LAN LAN Local Area Network
- LASDAP Local Authorities Service Delivery Action Plan
- LATF Local Authority Transfer Fund
- LVFO Lake Victoria Fisheries Organization
- MCDS Monitoring Council Decision System
- MDG Millennium Development Goals
- MuL_Net Multi-Layered and Networked Framework
- NCS National Communication Secretariat (NCS)
- NEPAD New Partnership for Africa's Development
- NICI National Information and Communication Infrastructure
- NGO Non-governmental Organization
- NHIF National Housing Insurance Fund
- OECD Organization of Economic Co-operation and Development.
- OSS Open Source Software
- PCs Personal Computers
- RIO Reference Interconnection Offer
- REPSS Regional Payments and Settlement System (REPSS)
- R&D Research and Development
- SADC Southern Africa Development Community
- SAS Statistical Analysis Software

- SATRA South African Telecommunications Regulatory Authority
- SAPs Structural Adjustment Programs
- SIDA Swedish Agency for International Development Cooperation
- SIP Sustainable and Integrated Process-based
- SME Small and Medium Enterprises
- SSA Sub-Saharan Africa
- STAT_CAP Statistical Capability
- TBS Treasury Board of Canada Secretariat
- TESPOK Telecommunications Service Providers Organization of Kenya
- TKL Telecom Kenya Limited
- TLB Transport Licensing Board
- TTF Tourism Trust Fund
- TV Television
- UNDPEPA United Nations Division for Public Administration
- UN United Nations
- UNECA United Nations Economic Commission for Africa
- UNCITRAL United Nations Commission on International Trade Law
- USA United States of America
- UK United Kingdom
- UNICEF United Nations Children Education Fund
- USAID United States Agency for International Development
- UNDP United Nations Development Program
- UNIDO United Nations Industrial Development Organization

- VSATs Very Small Aperture Terminals (VSATs)
- VCL value chain layer
- WAN Wide Area Network
- WAP Wireless Application Protocol
- WHO World Health Organization
- WTO World Trade Organization
- WISIS World Summit on Information Society
- 2G Second Generation

ABSTRACT

The answers to the research question as to how ICT policy and e-strategy can spur good governance and sustainable development in Kenya and the EAC Sub-region have been articulated in this thesis by presenting both developed generic ICT policy statements and specific ones matching Kenya and EAC. This thesis strongly argues that ICT policy and e-strategy not charity, shall determine whether new technologies become tools for good governance and sustainable development. It challenges governments to take lead in incubating new ICT applications if faster and sustainable adoption of the technology is expected.

The surveys conducted at ALGAK and in Bungoma district in Kenya revealed that local authorities were neither informed nor involved in the ongoing national e-government implementation. Also exposed by research is the anecdotal evidence that the e-government rollout was being implemented using a top-down approach. This thesis argues the pros and cons of such action and proposes a suitable model based on research.

This thesis presents the observation that the Kenyan laws and regulations relating to ICT had five key characteristics that made them inadequate. The probable basis for the identified characteristics is cited, followed by the accompanying recommendations of the appropriate legal and regulatory reforms needed in order to create an enabling environment in Kenya.

Trends in ICT indicators such as mobile phone subscribers, mobile communications revenue, annual telecommunication investment and International bandwidth of OECD, COMESA and EAC countries have been studied and discussed.

A generic and holistic e-strategy conceptual framework named Multi-Layered and Networked MuL_Net is described. The MuL_Net model has been partially tested and the results are presented.

The thesis also discusses the findings to the question as to whether the Kenya ICT policy formulation process was informed by the existing local ICT initiatives and if any linkages existed between them.

CHAPTER 1

1.1 Introduction

1.1.1 Background to the scope of Study

The Kenya National ICT policy only acknowledges participation of the ministry of local government in its formulation. It is not clear what the ministry contributed since issues related to its domain are not directly reflected in the ICT policy document. All forums that have been convened in the name of stakeholders such as First ICT Convention march 2004 and the Second ICT Convention March 2005 both held at Safari Park Hotel Nairobi-organized and sponsored by AITEC, KiF, IDRC, CATIA, TESPOK; National ICT Policy Stakeholders Conference June 2005 at Sun N' Sand Beach Hotel Kilifi-organized and sponsored by the ministry of Information and Communication, none of them was attended by local authorities representatives, nor any concern raised at these forums to have the local authorities represented, or even have their views sought. This thesis attempts to argue and predict that the position taken to ignore the local authorities will pose challenges during the implementation of both the ICT policy and the e-government strategy. This is because, ultimately the measure of impact and success of the national ICT policy and e-government strategy will largely depend on how citizens adopt ICT and use it for development. Global trends are advocating for the contemporary bottom-up approach that supports community-led development with the local authority at the focal point.

In order to establish the position of local authorities in Kenya as concerns their involvement in both national ICT policy and e-government strategy development and implementation, a survey was conducted. The survey benefited a lot from the fact that all the 175 local authorities in Kenya are members of a national association called *Association of Local Government Authorities of Kenya* (ALGAK). Its secretariat is based in Nairobi. ALGAK normally holds its annual general meeting that brings together the following from each local authority: Chairman/Mayor, Chief Executive Officer (Clerk), Treasurer and chairmen of all Council Committees.

The ALGAK's Strategic Plan 2002-2006 (ALGAK, 2002) spells out its vision and mission as follows:

Vision- *ALGAK envisages to be the best all-inclusive and sustainable membership organization of local authorities that promotes efficient, democratic and viable local government systems in Kenya*

Mission- *ALGAK is an all-inclusive membership organization of local authorities that seeks to contribute to local development and good governance through creation of coalitions and partnerships in lobbing, advocacy and policy research to promote efficient service delivery and local socio-economic development.*

ALGAK's strategic priority areas and objectives include: capacity building for local authorities; governance and democratization; information and communication; organizational development; technical services and consultancy; and development innovations. All these facts among others about ALGAK qualified it to be one of the reliable single point where facts and true picture about local authorities in Kenya could be obtained. Therefore an interview, questionnaire and document review was conducted at the ALGAK secretariat. Later, observations and participation in ALGAK's annual general meeting that was held in December 2004 at Kenya School of Monitary Studies, where all the 175 local authorities had gathered, enhanced the data collected from the secretariat.

As a way of validating the data collected from ALGAK, it was important to conduct research at selected individual local authorities to establish the facts on the ground. The criterion for selecting considered selecting local authorities where the investigator could easily command trust, communicate, and could be identified with them. This was necessary to instill a sense of responsibility in the local authorities officers to find it mandatory to participate and give correct data. Therefore, five local authorities in Bungoma District were selected for the survey namely: Municipal Council of Bungoma, Municipal Council of Webuye, Municipal Council of Kimilili, Town Council of Sirisia and the Town Council of Malakisi. Data was collected around topics such as: roles of local authorities, resource management and mobilization, accountability, strategic planning-Local Authorities Service Delivery Action Plan (LASDAP), decision making process, citizen participation, criteria for development project prioritization, ICT usage,

e-government readiness, ICT policy, role of local government in enabling local authorities to adopt ICT, change management plans for migrating from conventional government to e-government.

At the ministry level, it seems that the e-government rollout was being implemented using a top-down approach. Starting at the ministerial headquarters then provincial headquarters with hopes of proceeding along those lines down to the citizens. Given that Ministerial headquarters are all located in Nairobi, it made it realistic to consider investigating all of them. The fact that any initiative that takes place in Kenya has to do so under the cover of at least one ministry, justified and made it necessary to survey all ministries. As we look at a ministry, we not only identify government initiatives but also donor initiatives, community based organization initiatives, civil society initiatives and the private sector initiatives that are operating under those ministries. According to the existing governance structure in Kenya, the ministerial headquarters are the focal point for all activities under those ministries. This is always assumed to be the case. However, the reality on the ground is that not all records are well kept and updated regularly. Therefore full records and track of all existing ICT initiatives in the ministries could not be captured, but those that were identified were sufficient to provide the required sample upon which trends, gaps and overlaps across the country could be established.

The data instruments targeted to gather data on location of ICT initiatives according to sub-sectors such as health, trade, agriculture etc; coverage e.g. national, provincial,

district etc; objectives of initiatives and their future plans; and major challenges facing the ICT initiatives.

Data collected from the government ministries on ICT initiatives was used to test if the draft national ICT policy had any linkages with the ICT initiatives and whether it was necessary or not that they play a role of informing the formulation process.

In view of the fact that Kenya is a member state of the EAC sub-region, it was important that ICT status and scenario at the headquarters be understood in order to address the question of sub-regional integration. Already, the COMESA as a region has put in place an ICT policy and a model bill for its member states of which Kenya is one. Given that the EAC sub-region does not yet have an ICT policy, created demand for a survey to be conducted at its headquarters in Arusha- Tanzania so that relevant proposals could be made towards the sub-regional ICT policy and e-strategies development.

Interviews, questionnaire administration, observations, document review and investigations were conducted at the EAC headquarters and its autonomous institutions namely: Inter-University Council for East Africa (IUCEA), East African Development Bank (EADB), Lake Victoria Fisheries Organization (LVFO), and East African Business Council (EABC). In this case, the headquarters was the focus of the survey, however, its autonomous institutions were also studied just to establish to what extent they were supporting integration when it comes to ICT.

Two unique data instruments were developed and administered to the top ICT officers in the organizations. One was meant for the EAC headquarters and its institutions. It aimed at collecting data on ICT policy; opinion on the values of ICT; ICT planning; Sub-regional ICT budget allocation; information processing and computer use at the EAC secretariat; support system; relations with education, industry, and other regional blocs/initiatives; need for outside assistance; demographics and identification of problem areas. The other data instrument targeted to gather data on the managerial practices and organizational structure of the EAC headquarters.

As the twenty first century is well underway now, Kenya like any other country, must take immediate realistic actions promptly, without being bound by existing systems, practices and interests, in order to create a knowledge-emergent society where everyone can actively utilize information and communication technology (ICT) and fully enjoy its benefits. The ICT revolution, now progressing on a global scale with the rapid advancement of computer and communications technologies, is beginning to bring about a historic transformation of society, much like the Industrial Revolution did from the 18th century in the United Kingdom. Correspondingly, the advancement in information technologies, primarily the Internet, is enhancing the quality of information exchanges and revolutionizing relationships between individuals, between individuals and organizations, and between individuals and society, by drastically reducing the costs and time for information distribution. It is believed that this will result in the rapid transformation to a knowledge-emergent society, where the interaction of knowledge will evolve to create high added value. Europe and Asia, not to mention the United States, are

aggressively developing their ICT infrastructures as part of their national strategies in recognition of the importance of creating a knowledge-emergent environment to secure world competitive leadership in the 21st century (IT Strategy Council, 2003). Kenya seeks to be transformed into a knowledge society, and initiatives that define the path to an information society are necessary. That is why in an effort to attain economic prosperity and raise the quality of life for all people, it appears vital for Kenya to promptly establish a sound national ICT policy and adopt e-applications based on a tested e-strategy model suitable for a new society where information and knowledge are the sources of added value.

The question is, *what kind of ICT policy and e-strategy Model can spur good governance and sustainable development for a developing society such as Kenya and the EAC Sub-region?* In order to answer this question adequately, this thesis articulates the following:

- Comparative studies of COMESA, EAC, EU and OECD ICT indicators trends.
- Why it is vital for Kenya and EAC to develop and establish sound ICT policies, as well as adopt e-applications based on a tested e-strategy model suitable for the information society and capable of supporting fulfillment of millennium development goals (MDG).
- How ICT can facilitate the installation of a polycentric structure of governance for instance, in Kenya through local authorities for purposes of realizing good governance and sustainable development.

- Why does an e-strategy have to be designed in-line with the contemporary bottom-up approach as part of interactive process that supports community-led development with the local authority at the focal point and remain linked to the central government and beyond?

Answers to these questions will facilitate the present inquiry into how a comprehensive e-government framework can be designed with the aim to ensure that e-government projects meet the needs of the business and community functions on time and affordably.

1.1.2 Literature Review

A research study conducted by the American Society for Public Administration (ASPA) and the United Nations Division for Public Administration (UNDPEPA) established a measure (e-index) of utilization of the Internet by UN member states of which Kenya is one of them. The final outcomes of analyzing critical issues to the core areas endemic to national e-government programs yield a measure called e-index. E-index attempts to objectively quantify critical factors and establish a "reference point" for which a country can measure future progress. The e-index is expected to present a more inclusive and less subjective measure of a country's e-readiness. It incorporates a country's official online presence, evaluates its telecommunications infrastructure and assesses its human development capacity. The index identifies, underscores and weighs the importance of the requisite conditions which enable a country to sustain an environment that ensures every segment of its population has unconstrained access to timely, useful and relevant information and services. The results of the e-index tend to reflect a country's economic,

social and democratic level of development (UNPAN, 2003). This is only true if the e-readiness tool used to measure and generate the e-index is generic, neutral and standard. Hence the question on indicators used when computing the e-index needs to be addressed.

Integrated ICT-led socio-economic development policies and plans are broad and assist in the process of moving the economy and society towards a knowledge based information society and economy (United Nation Economic Commission for Africa, 2003). More so, it is visualized that an ideal information society will have the following features:

- *Education:* All will be able to receive the most advanced level of education they require regardless of geographical, physical, economic and other constraints.
- *Arts and science:* All will be able to enjoy and use works of arts and literature, science and technologies regardless of location, and will be able to create and distribute digital content easily.
- *Medical and nursing care:* All, including patents at home requiring emergency care, will be able to receive high-quality medical and nursing care services even in remote places by the secure exchange of information through networks.
- *Work:* Thanks to network connections to offices, all will be able to do the work of their choice, regardless of age and sex, and live in the location of their choice, without having to rely on transportation means.
- *Industry:* All companies, regardless of size, will be able to conduct business transactions with customers throughout the world by making full use of IT. The

promotion of competition and the protection of intellectual property rights will be both achieved in balance and in harmony with other nations policies.

- *Environment:* Tele-working will reduce traffic and the use of networks for economic activities will reduce consumption in resources and energy, thereby significantly lessening the burden on the environment.
- *Living:* Regardless of location and time, all will be able to watch the latest movies, play popular TV games, and freely communicate with friends and family in remote places, not only by voice but also with images, through various information tools.
- *Transportation and traffic:* The introduction of the advanced Intelligent Transport System (ITS) will inform people how to get to their destination via the most appropriate transportation means and via the quickest route and will help them avoid traffic jams and accidents.
- *Social participation:* All will be able to actively transmit information and take part in social activities via networks. In addition, the physically handicapped and the elderly will be able to take part in society more easily, and volunteer or other social activities will be more readily available.
- *Public administration:* Information on public administration will be readily available at home or work, and all will be able to receive one-stop administrative services for address changes in the family register, filing and paying taxes and other such services.

Therefore, what constitutes an integrated ICT-led socio-economic development policy needs to be established and understood for purposes of developing such policies and e-strategies.

National ICT policy formulation process is expected to capture and reflect perception of its citizens. ICT differs from industrial technology. Industrial technologies are brawn. They basically multiply mechanical and physical strength. They simply replace arms, hands, and muscle whereas; ICT replace communication, thinking, and calculation. ICT is complex in its application, use, influence, and effect. Jane E Fountain (2001) observes that the process of enacting ICT basically refers to the tendency of organizational actors to pursue implementation of ICT in ways that reproduce, strengthen, and institutionalize sociostructural mechanisms even when such enactments do not use the technology rationally or optimally. In communities where key elements of organizational structure are institutionalized such as local authorities (Jane, 2001), they are resilient to the much-feared disruptiveness of ICT. Therefore if their information needs were properly identified together with the existing information systems, mainstreaming them in the national ICT Policy would create a robust policy. Above all enactment of information systems that have been conceived in a way that matches the realities of community information needs and of technologies that communities can sustainably afford and maintain guarantees success. In general, for an ICT Policy to be robust, relevant and effective, it needs to take a balance between: monopoly and competition, domestic and foreign, centralized and decentralized controls, and also private and public initiatives (Wilson III and Wong, 2003). This would enable greater exploration of global advantages of ICT. Dzidonu (2003) identified three broad types of ICT policy critical success factors and conditions namely: process, implementation and environment. The examples of the process type include:

- A clear vision, mission and strategies set by top political and economic leaders that are active and championing for success of national ICT policy.
- People's goodwill and support including support from strategic government ministries and the whole government in general.
- Committed policy makers and professionals who ensure a step-by-step approach of adoption as well as facilitation of the whole process in general.
- Dialog among stakeholders and nation-wide consultative effort that involve all stakeholders

Examples of the implementation factors and conditions include:

- Governance and socio-political enabling environment: good governance and rule of law, functioning democracy and democratic institutions, prevailing peace, national unity and national security, sustainable and un-interrupted stability, sub-regional stability and peace, and stable economic policy environment.
- Socio-economic development framework enabling environment: sound socio-economic development policy and priorities setting framework, stable economic liberalization environment, and stable economic investment climate.
- Legal regulatory and institutional environment: relevant legal and legislative provision to support policy and plan implementation, enabling regulatory

environment, institutional structures and arrangements to facilitate and support.

Lastly, the environmental factors and conditions are for instance:

- Well-educated and informed society with skilled human resource available in key fields.
- Modernized and efficient civil and public service with financial and technical resources available.
- Disciplined, motivated and patriotic citizens led by inspired, dedicated, committed and uncorrupt political, economic and social leadership.

Considering these factors and conditions together with the lessons learned from ICT policies comparative studies, a basis for evaluating and critiquing the national ICT policy for Kenya as well as proposing the East African Community sub-regional ICT Policy can be established. People all over the world have high hope that new technologies will improve health, increase social freedom, increase knowledge and productive livelihoods. New technology policies can spur progress of attaining Millennium Development Goals (MDGs) especially having known from history that technology has been a powerful tool for human development and poverty reduction (UNDP, 2001). Technology works well as a powerful tool for human development and poverty alleviation when good and appropriate policies, regulators and a high degree of transparency in its deployment are exhibited. Developing countries lack policies and institutions needed to manage risks associated with technology. Policy and strategy not charity, will determine whether new technologies will become a tool for human development everywhere in the world (UNDP, 2001). It is therefore important that

all nations, particularly the developing countries, come up with ICT policies and e-strategies that support and enable sustainable development, including monitoring and evaluation of poverty alleviation programs. Developing countries came to political independence with governments that had formal structures that were democratic and representative in nature. Their political leaders in their bid to consolidate political power opted for highly centralized modes of governance. This centralized mode of governance in the developing countries is reinforced by a culture of politics of patrimony in which all powers and resources flow from the head of state to the citizens. This pattern of power and resource distribution was strongly supported by both domestic and external actors until the late 1980s. The reasons adduced for adopting this approach included: Rapid economic and social development actualized through centralized planning; unity and national integration; containment of corruption and political stability. A monocentric governance model was adopted and this affected the manner in which decentralization was approached. In monocentric governance model, an administrative decentralization or deconcentration rather than political or democratic approaches was used. Democratic decentralization includes not only the transfer of responsibilities but also of financial and human resources to semi-autonomous entities with their own decision-making powers. In the last decade, however, many countries changed course dramatically. They have abandoned the monocentric political model and sought to replace it with its exact opposite, which is the polycentric governance model (Olowu, 2003). The Polycentric structure of governance accepts the idea of multiple centers of power within a state. This involves devolution to local governance organs that enmesh both state and society institutions at regional and community levels. This thesis argues how ICT can facilitate the installation of a

polycentric structure of governance in Kenya through local authorities for purposes of realizing good governance and sustainable development.

Considering the claimed risks associated with globalization, which are seen as an unavoidable threat to the viability of rural community life and/or a source of opportunity waiting to be captured, the key issue to emerge is how communities should ensure that they benefit from, rather than become casualties of these changes. The contemporary advanced liberal emphasis on 'bottom-up' or community-led development means that the management of these risks is no longer an activity of the state, but the responsibility of rural citizens and their communities (Herbert-Cheshire and Higgins, 2004). Therefore, deliberate attempts must be made to design and develop e-strategies that favour and support community-led development, which makes a study on ICT for local authorities necessary.

We live in an era of shrinking states and expanding markets (Bratton, 2003). Whereas in many countries market liberalization has achieved overall efficiency gains and has often promoted sustainable practices, there is increasing evidence that these benefits have bypassed most rural areas in developing countries (Kuyvenhoven, 2004). This thesis explores and explains how ICT policy and e-strategy can empower the population and create conditions for sustainable development for all parts of a given country.

It has been argued that the government has a dual role in development of Information and Communication Technology (ICT). First, it provides an environment for sustainable development through policy formulation (Abbasi, 2003). Secondly, it makes measurable improvements in its own mission performance and service delivery to the public through strategic application of information and related technologies (Ministry of Finance and

Planning Republic of Kenya, 2001). In relation to this dual role, the Kenya government proposed an IT Act in 2002 entitled "Information Technology Bill 2002". The IT Bill was meant to:

- Recognize the importance of information technology to the future economic and social development of Kenya;
- Facilitate the use of electronic transactions in the country and promote business and community confidence in the use of IT and;
- Enable business and individuals to use electronic communications in their dealings with the government (Republic of Kenya Bills, 2002).

As it stands now, the IT Bill 2002 seems to have been overtaken by events. A new Bill named *The Kenya Information and Communications Bill* 2006 (Republic of Kenya, 2006) has been prepared and when enacted it will repeal the Kenya Communications Act 1998 and establish afresh the Communications Commission of Kenya (CCK). The 2006 Bill is awaiting enactment by parliament. The Bill seeks to establish the following:

- Promote and develop in an orderly manner the carriage and content of communications (including broadcasting, multimedia, telecommunications and postal)
- Establish a commission to regulate all forms of communications and
- Establish an appeals tribunal.

In general, a study conducted by Sihanya and Odek (2005) identified the following ICT related legislation and regulations in Kenya.

- Information Technology Bill, 2002 (not yet published)
- Freedom of Information Act (Bill) 2005
- Electronic Funds Transfer Bill (not yet published)
- Kenya Communications Act, 1998
- Kenya Broadcasting Corporation Act, Cap. 221
- Kenya Communications Regulations, 2001
- Postal Corporation of Kenya Act, 1998
- Films and Stage Plays Act, Cap. 222
- Science and Technology Act, Cap. 250
- Restrictive Trade Practices, Monopolies and Price Control Act, Cap. 504
- Copyright Act, 2001
- Industrial Property Act, 2001
- Trade Marks Act, Cap. 506
- Penal Code, Cap. 63 (e.g. on pornography)
- Defamation Act, Cap. 36
- Evidence Act, Cap. 80 (trying to come to terms with electronic evidence – such as email, e-signatures, e-contracting)
- Entertainments Tax Act, Cap. 479
- Law of Contract Act, Cap. 23
- Contracts in Restraint of Trade Act, Cap. 24
- Sale of Goods Act, Cap. 31
- Environment Management and Coordination Act 1999
- Capital Markets Act Cap 485A

- Central Depository Systems Act, 2000
- Central Bank of Kenya Act Cap. 491

The fact that the government has formulated such pieces of legislation and regulations listed above, demonstrates its interest in creating an enabling environment that would support smooth implementation of national ICT policy and e-strategy. Also, the Kenya government has taken the initiative to lay the foundation for the adoption of e-applications such as e-government by making a strong statement on management of government information systems, that statement states that government ministries shall plan in an integrated manner for managing information throughout its life cycle (Ministry of Finance and Planning Republic of Kenya, 2002). This statement specifically spells out that government ministries shall:

(i) Consider at each stage of the information life cycle the effects of decisions and actions on other stages of the life cycle, particularly those concerning dissemination of information.

(ii) Consider the effect of their actions on the members of the public and ensure consultation with the public as appropriate

(iii) Consider their effect of their action on the government and local authorities and ensure consultation with them as appropriate.

(iv) Seek to satisfy new information needs through inter-departmental or inter-ministerial sharing of information, or through commercial sources, where appropriate, before creating or collecting new information.

(v) Integrate planning for information systems with plans for resource allocation and use, including budgeting, acquisition, and use of information technology

(vi) Train personnel in skills appropriate to management of information.

(vii) Protect government information commensurate with the risk and magnitude of harm that could result from the loss, misuse, or unauthorized access to or modification of such information

(viii) Use government information processing standards and international standards where required

(ix) Consider the effect of their action on the privacy rights of individuals and ensure the appropriate legal and technical safeguards are implemented.

(x) Record, preserve, and make accessible sufficient information to ensure the management and accountability of the government programmes, and to protect the legal and financial rights of the government

(xi) Incorporate records management and archival functions into the design, development, and implementation of information systems

(xii) Provide for public access to records where required or appropriate.

Therefore this action by government is a powerful statement and pointer suggesting the immediate need for the formulation of a national ICT policy and e-strategy. The question is what kind of ICT policy and e-strategy model would support the implementation of the disclosed desire to manage government information systems, among others.

The e-government adoption and implementation process is often a struggle and presents costs and risks, both financial and political (Working Group on e-government in the Developing World, 2002). These risks can be significant. If not well conceived and implemented, e-government initiatives can waste resources, fail in their promise to deliver useful services, and thus increase public frustration with government. Particularly in the developing world, where resources are scarce, e-government must first target areas with high chances for success. Moreover, e-government in the developing world must accommodate certain unique conditions, needs and obstacles. These may include: lack of infrastructure, corruption, weak educational systems and unequal access to technology. Too often, the lack of resources and technology is compounded by a lack of access to expertise and information. E-government is not a shortcut to economic development, budget savings or clean, efficient government; it is a tool for achieving these goals. As part of its strategy towards realization of e-government, Canada, which is ranked at the top in the world, developed and implemented an Enhanced Framework as a guide to its departments during e-government adoption (Chief Information Officer Branch, 1998).

ICT Policy Issues

The successful use of ICT applications requires improved awareness in the public and business sectors, better education and improved literacy rates, user involvement in designing and implementing new services and applications, policies for improved public access to networks, and a readiness on the part of governments and other stakeholders to assume responsibility for selecting and giving priority to a wide range of policy and

practical initiatives (Mansell, 2002). More so, the government needs to be the first to incubate new ICT applications if it expects faster and sustainable adoption of the technology. Frieden (2005) argues that a successful ICT incubation appears to require government involvement, albeit with a light hand that stimulates and rewards investment, reduces unneeded regulatory scrutiny, and promotes global marketplace attractiveness without ‘‘tilting the competitive playing field’’ to favor a specific technology or company. It has been observed that nations as diverse as Canada, Japan and Korea provide insights on how to achieve maximum success in ICT development and what roles governments can effectively assume. These and other nations offer insights on how government-led integration of technology incubation and development can generate ample dividends. These governments readily encourage private enterprise and direct foreign investment in technology ventures. The best practice ICT development observed in most of these nations demonstrates the benefits from long-term involvement by honest, technologically sophisticated government officials that understand the stakes involved and work conscientiously to establish a transparent, efficient, flexible and positive business environment for the long run. Frieden (2005) puts it that governments can enhance ICT development by articulating from the top a broad vision of what ICT can do for a nation and its citizens, while leaving to community champions the flexibility to propose specific, *bottom-up*, projects that aggregate the supply of services needed to support the build out of a telecommunications infrastructure. In line with the *bottom-up* approach, Gillett et al (2004) through research have observed that local governments have become involved in promoting the development of advanced communication services in various ways such as acting as stewards of local economic development

through improvement of efficiency and quality of government service delivery through e-government. With the understanding that a government reach its citizens directly through local government, (Wanjohi, 2003), modeling e-government adoption via local authorities is presumably appropriate. Besides this understanding, Fountain (2001) also observed that in communities that form local authorities where key elements of organizational structure are institutionalized, they are resilient to the much-feared disruptiveness of ICT. Therefore are suitable and flexible to pilot ICT projects.

In Canada, Korea, Netherlands, and Sweden, government institutions for telecommunications, broadcasting, and Internet policy and rules are organized in a variety of ways. In all cases, there is some kind of distinction between the authorities for telecommunications and the authorities for broadcasting. Responsibility for the Internet tends to fall to the telecommunications authority. All the four countries have some rules and designated public authorities with mandates to promote national culture and identity in the media. This is enforced through a variety of quotas for domestic programs and limits on foreign programs that are used in the media (Wu, 2004).

However, this is now bound to change with the onset of ICT convergence. For instance, the convergent trends in telecommunications and broadcasting technologies and markets have called forth a re-examination of universal service provision in the communications sector and presents chances for major reforms (Simpson, 2004). Currently, the Information and Communication Technologies (ICT) sub-sectors such as telecommunications and broadcasting are in a process of technological convergence and

the key determining factors in this process are the liberalization of the telecommunications markets and technological change (Bore´s, Saurina and Torres, 2003).

The research conducted by Gillwald (2005) reports that the international reform agenda on ICT has been very unevenly and expediently applied in many developing countries, usually focusing on privatization at the expense of other reform drivers. The research observed that South Africa's reform agenda in practice, just like many other developing countries, prioritized privatization as the mechanism that would most rapidly redress the imbalances experienced in provision of telecommunications services. In theory, privatization was supposed to reform the incumbent, and to make it operate more effectively, so that connectivity would be improved through low-cost access to an expanding network. But the focus on this one reform lever happened at the expense of the other levers such as competition, needed for the reform machinery to work. The efficiencies brought by competition into the market were therefore not realized forcing prices to remain high for telecommunication users and consumers who had very limited choices.

Such a scenario calls for ICT policy that balances the reform agenda by ensuring that the telecommunications market is structured in a manner that minimizes regulatory complexity, allowing the regulator to focus on measures to induce investment in network roll-out, encourage services innovation, improve consumers' choice and service quality, develop market efficiencies, and effectively target subsidies to those who most need

them. Policy must enable fair competition that will drive down costs, so that services become more widely affordable. The increased demand will give operators the economic incentives to expand the coverage of their networks and services.

Fan (2005) reported in the study on OECD countries that where competition was most advanced, there was highly developed Internet access. The research also observed that the extent to which ISP and telecommunication markets were open was closely connected to allowing foreign investment in infrastructure. Taking a particular case of one of the OECD countries, in this case Australia, suggests strongly that foreign involvement in the telecommunications and Internet sectors is very positive for Internet access expansion (Fan, 2005). This calls for strong policy considerations for enhancing competition through adequate opening up of telecommunications and Internet sectors to spur information infrastructure development. It has been suggested that without appropriate development of information infrastructure, the disparities already experienced by rural and remote communities will be further exacerbated as the reliance of goods and services over computer-mediated networks increases (Bandias and Vemuri, 2005).

In order to avoid such a situation, policy-makers around the globe are putting in place statutes designed to foster knowledge-based economic activity using two broad global strategies namely: Investment in telecommunications systems and bandwidth; and view information as a resource to improve commercial and industrial competitiveness and productivity (Grantham and Tsekouras, 2004). In the case of Africa, it has been demonstrated that wireless ICTs have the unique ability to circumvent the limitations

posed by under-investment in fibre optic networks in less prosperous localities and national territories due to lower infrastructure costs. A number of mobile businesses such as *Paybox* (http://www.paybox.co.uk) have enabled owners of any networked mobile phone— who also has a bank account—to make secure electronic payments to vendors or individuals. The same is not true of wired electronic payments. Developing countries, particularly Sub-Saharan Africa, should develop policies that create incentives to financial institutions and mobile service providers to collaborate and offer such services e.g. payment of water bills, electricity bills, parking bills etc. This could encourage the development of more mobile phone applications including government service applications. This is because, despite the high cost of mobile services compared to the fix services, the convenience and flexibility of pre-paid mobile services seems to have spurred their adoption on a massive scale, especially in Africa (Gillwald, 2005).

Massive scale adoption of any ICT is important because there is a threshold beyond which the deployment and exploitation of the ICT starts to aid the socio-economic development process of a given country. That threshold is synonymous to what is also called *critical mass* of ICT diffusion. The diffusion of any ICT must achieve a *critical mass* in terms of coverage, organizational adaptation and *learning by doing* before widespread productivity gains become observable (Dzidonu, 2003). It is critical that ICT pilot projects are replicable/scalable in order to support socio-economic development. This can be achieved through paying attention to the following: local and community level involvement and ownership of these initiatives especially by local authorities, mobilization of necessary financial and other resources required to implement the

projects, and addressing administrative problems. ICT investments are effective only when coupled with complementary organizational and managerial changes.

In addition, Oyelaran-Oyeyinka Banji and Lal Kaushalesh (2005) argue that, first; countries need to adjust their telecommunication and economic policies to promote public as well as private investments in ICTs that in turn might further boost economic growth and, secondly; governments in developing countries need to encourage the use of PCs through policies that enable soft loans on purchase of computers for individuals and academic institutions. Such policies should not only address PCs, but also mobile phones so as to further broaden and deepen penetration in order to attain the necessary critical mass to spur sustainable development.

In Japan, user needs have driven developments of the mobile Internet such as ‘‘i-mode’’ that is accessed via mobile phones (Kenichi, 2004). Mobile Internet systems allow for a short message service, email, web browsing, and additional advanced services such as picture mail. One of the technological reasons for the extraordinary success of i-mode is that NTT DoCoMo adopted Compact HTML (C-HTML) as the language for i-mode websites, instead of the more standard Wireless Application Protocol (WAP). C-HTML is a compatible subset of HTML for terminals. NTT DoCoMo’s i-mode enables content providers to more easily enter the market than WAP, because it is easier to create i-mode websites in C-HTML than in WAP. Kenichi (2004) explained that the history of the mobile Internet in Japan showed that user needs had promoted the mobile Internet in Japan, rather than technology or policy. The fact that C-HTML the technology for i-mode

was simple and needed users to connect their mobile phones to the Internet only at 28Kbps, made it popular and easy to adopt. The Japanese government policy had emphasized technological development of mobile phone systems such as PHS and IMT-2000 without any regard or attention to user needs, hence missed out i-mode. In the case of i-mode, NTT DoCoMo did not push new technology but focused on services rather than selling technology. Investigations in Japan found that mobile media users were more active in personal communications. The experiences in Japan revealed that neither technological advantages nor telecommunication policy promotes a new type of telecommunication service, it is the user needs. Japanese experience after 1995 demonstrates that user needs have brought about the high penetration rate and unique usage patterns. Kenya and developing countries should emphasize further development and usage of C-HTML and i-mode. This appears appropriate technology for developing countries especially those in Sub-Saharan Africa. In general, ICT policies should strive to articulate the needs of the people and call for appropriate applications to be developed to address the needs.

The future of the Internet has been perceived to be strongly dependant on broadband and hence the industry groups and analysts have stressed the importance of broadband access for continuing the evolution of advanced communication services and overall economic growth (Gillett et al, 2004). It has been noted that broadband development thrives when it becomes a national priority (Frieden, 2005). The question is, under what circumstances does broadband qualify to become a national priority? Different views have been raised in response to this question. Firth and Mellor (2005) argue that broadband has the

potential to offer nations improved quality of education and health services, improved connectedness of government with society, and provision of jobs and prosperity. Most nations showing interests in broadband are doing so on the understanding that broadband will bring social and economic benefits (Firth and Mellor, 2005). However on examining most small and medium enterprises (SME), it is found that they have not made broadband central to their operations. In response to the question about the relationship between broadband, prosperity and jobs: economic and employment growth may not be a universal outcome. The contexts in which organizations prosper due to the Internet are not clear, but it appears that larger business, especially those that participate in business to business (B2B) are the most likely to use broadband as part of a growth strategy. Therefore, Firth and Mellor (2005) are of the opinion that any public policy effort of promoting an infrastructure that provides advantage to the large businesses at the expense of SMEs, needs to be carefully evaluated and if possible avoided. An alternative would be to put in place an ICT policy that is favourable for all stakeholders.

The need for preserving digital information and making it accessible for the present and future is expected to be captured by all nations, however, research has revealed that Sub-Saharan Africa (SSA) countries are ill equipped in this direction, if at all (Ngulube, 2004). In a study carried out in Botswana, Ghana, Kenya, Lesotho, Malawi, Mozambique, Namibia, South Africa, Swaziland, Tanzania, Uganda and Zimbabwe, Ngulube (2004) discovered that the countries did not have the capacity to manage electronic records. Therefore it is evident that most countries in SSA seem not to be seriously addressing the issues relating to the preservation of digital records and archives.

This makes the formulation of policies on the management of electronic records worthy of immediate attention and consideration. In fact, a key policy statement on preservation of digital information is mandatory to all national ICT policies.

Kenya is one of those countries that have recently formulated a national ICT policy completed in November 2005. It was presumed that known factors and conditions that are necessary during the ICT policy formulation process would be addressed, so that the national ICT policy for Kenya formulated would be easily implemented. These factors and conditions include: dialog among stakeholders, governance and socio-political enabling environment, legal regulatory and institutional environment, and committed political, economic and social leadership. Out of these factors, dialog among stakeholders and legal regulatory are not adequately addressed. These factors are likely to pose as obstacles during the implementation of the ICT policy. In general, for an ICT Policy to be robust, Wilson III and Wong (2003) argue that it needs to take a balance between: monopoly and competition, domestic and foreign, centralized and decentralized controls, and also private and public initiatives. This would enable greater exploration of global advantages of ICT.

The East Africa Community Development Strategy 2001 – 2005 is a systematic way of checking on action towards achieving the goals of regional integration in the EAC. The vision for the regional integration is to create wealth in the region and enhance competitiveness through increased production, trade and investments (East Africa Community Secretariat, 2001). According to the East Africa Community Development

Strategy 2001 – 2005, ICT is one of the pillars of regional integration and development, globalization and modernization. Therefore, it is important that both national and sub-regional ICT policies should seek to promote and enable integration, development, globalization and modernization of its people. They should demonstrate this with inclusion of key policy statements on these issues in their bodies.

Challenges

Some of the key challenges identified towards uptake of ICT for sustainable development are as follows:

1. Lack of ICT awareness and skills among policy makers
2. Lack of a coordinated National Planning mechanism
3. High opportunity cost of technology
4. Limited budget allocation for maintenance
5. Shortage of teachers with ICT Skills
6. Brain Drain
7. High unemployment rates
8. Absence of visionary planning and policy implementation
9. Lack of broadband capacity for audio/video streaming
10. Lack of relevant laws in the Information age
11. Poor social and economic infrastructure
12. Poorly managed government services

13. Information gaps for development planning
14. Digital Divide
15. Lack of an integrated and compatible technology platform
16. Concerns about Privacy and Security
17. Uncertainty about Legal Status of Electronic Records
18. Lack of Inter-agency Cooperation and Participation

ICT Strategies

The research conducted by Mansell (2002) revealed that most ICT strategies in developing countries were often developed and publicized mainly to attract external investment to construct new infrastructure or to deliver hardware and software without giving sufficient attention to local concerns and requirements. Applications developed and designed for markets in the industrialized countries were transferred to the developing world with little concern about the need for technical modification or the importance of content, skills and training. Such strategies were often tailored to strengthening domestic ICT production aimed at export markets rather than at building up the capabilities of the majority of citizens, businesses and industrial sectors for using ICTs. Such strategies also failed to build upon existing strengths in the local environment. Hence, there is need for developing ICT strategies that bring marginalized social and economic groups into reach. The user's context in all aspects namely; social, cultural, economic and political are crucial and must be taken into consideration. Ideally, ICT strategies should be designed to permit 'users' to shape the design of ICT systems.

This requires substantially greater attention to education and training, knowledge transfer and sharing, policy coordination, and enabling local groups to determine the nature of their own communicative environments.

Coherent national, sub-regional and regional ICT strategies can provide much needed support for introducing new regulatory frameworks, promoting the selective production and use of ICTs, and harnessing their diffusion especially for marginalized people. The most effective strategies research has revealed are those that actively encourage a *collective development* and have room for initiatives at the local community, municipal, national, sub-regional and regional levels (Mansell, 2002).

It has been established also that regardless of the political and economic philosophy of a country, its government has critical functions to perform in ensuring national ICT development (Frieden, 2005). Such functions include:

- Developing a vision and strategy.
- Promoting digital literacy.
- Investing in infrastructure, aggregating demand and serving as an anchor tenant.
- Fostering facilities-based competition.
- Creating incentives for private investment and disincentives for litigation and other delay tactics.
- Offering electronic government services, including healthcare, education, access to information, and licensing.
- Promoting universal service through subsidies and grants.

- Revising and reforming governmental safeguards to promote a high level of trust, security, privacy and consumer protection in ICT services, including electronic commerce

Countries such as Cananda as part of its ICT strategy, in 2001, through the Canadian government National Broadband Taskforce, specified a strategy for achieving ubiquitous access to broadband networks and services by 2005 (Frieden, 2005). The Task Force identified two funding vehicles for achieving these goals: A top-down infrastructure government support model that creates broadband network and service investment incentives; and a bottom-up *community aggregator model* where government funded pilot programs and the delivery of electronic government services help stimulate the generation of sufficient demand to use existing network capacity and stimulate the construction of new facilities. As part of strategy, Canada after observing an increased failure in governments ICT projects in most countries, its Treasury Board of Canada Secretariat (TBS) developed an enhanced framework that was applied to all ICT projects (Chief Information Officer Branch, 1998) in order to ensure that ICT projects fully met the needs of the business functions they were intended to support, deliverd all expected benefits, and were completed on time, to cost and functionality. Another way of reducing the chances of ICT project failure has been suggested by Heeks (2003), where the design-gap analysis done on seven key dimensions, namely: information, technology, process, objectives and values, staffing and skills, management systems and structures, and other resources. Any detectable design- reality gap is acted upon to remove or minimize it.

That means, changing the design and/or changing the existing reality to match the requirements captured in the design of the e-application.

What is clear with governments such as Canada, Japan and Korea is that they have also articulated their vision of what ICT can do for both public and private sectors. At the macro-level, these nations have enacted laws that created incentives for risk taking and innovation and penalized litigation and strategies to delay making necessary investment in capital-intensive projects. Likewise, at the micro-level, they linked public funding with private initiatives that aggregated demand, generated matching funds and justified the installation of ICT even in geographically unattractive places.

Diffusion studies have been found to be valuable especially in shedding light on success factors, and providing learning points for businesses seeking to launch products or services into an uncertain market (Grantham and Tsekouras, 2005). They also help inform about the adaptability of new foreign technologies. Dunmade (2002) developed a model shown in Fig. 1.1 that when applied, enables selection of new foreign technologies that are presumably sustainable. According to this model, careful evaluation of any proposed foreign technology on the basis of the four key sustainability factors namely: Economic; technical; environmental and socio-political, could help both governments and other foreign technology purchasers ensure that only sustainable technologies are acquired, thereby preventing wastage of scarce foreign earnings and protecting the environment from degradation.

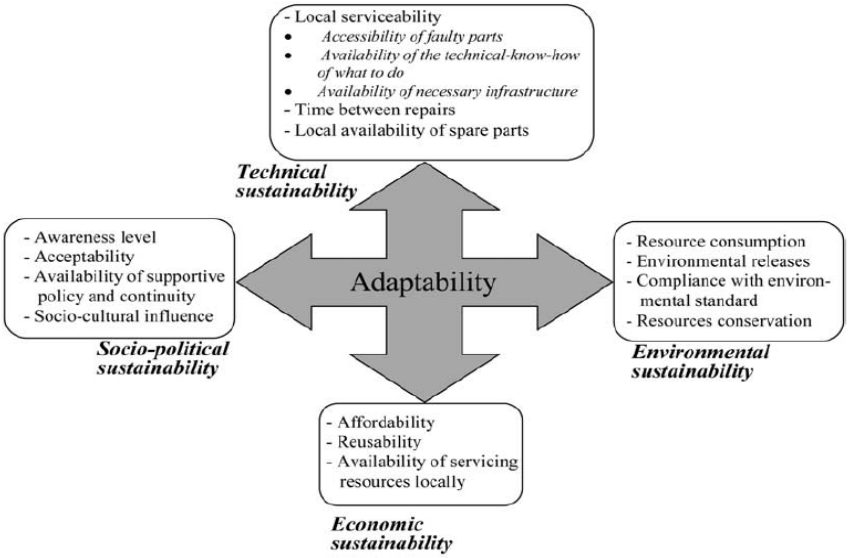


Fig.1.1: Foreign technology sustainability factors (Dunmade, 2002)

Mobile technology, which is a new foreign technology seems to qualify for sustainability in Africa in particular according to Dunmade's model. Use of radio, TV and mobile phones exhaustively should form part of the key statements in African ICT strategy. Deliberate provision for interfacing mobile phones with Internet (PCs) through appropriate applications-mainly social and government service must be made. Community based pilot projects should be emphasized to act as incumbents of such applications so as to enable poor people learn and participate in working themselves out of poverty through information and access to larger markets for their products.

The digital divide seems to be widening according to an Index of Technological Progress (ITP). The average growth rate of ITP in developed countries is 23% while that of poorer countries averaged 18%. What gives rise to substantial growth differentials can be located in the levels of investment in knowledge and physical infrastructure. The OECD

invests about ten times as much of its per capita income on research and development (R&D); it also has 17 times as many technicians and scientists per capita as the countries of sub-Saharan Africa (SSA) (Oyelaran-Oyeyinka Banji and Lal Kaushalesh, 2005). According to the research conducted by Hawkins (2005) on Internet development across 19 Latin American countries between 1990 and 2001, Internet use is strongly associated with economic development and telecommunications infrastructure. Also the Market liberalization and the worldwide spread of the Internet were found to be associated with increased access. The question is, how can Internet usage be increased in regions with low penetration of PCs such as Africa for purposes of economic development? Wareham, Levy and Shi (2004) argue that wireless telecommunications, which are converging into a product segment with mobile computing devices can offer Internet connectivity at a lower price than traditional home PC/modem constructions and therefore promote Internet usage to regions like Africa that have currently significant mobile penetration and therefore contribute directly to the reduction of the digital divide between Africa and the developed countries. They observe that valuable insights from the diffusion of 2G mobile telecommunications can be garnered to inform and guide managerial and public policy regarding the growth and dispersion of advanced mobile communication devices. They also note that the adoption of mobile computing devices may relate less to higher educational levels than has previously been the case in statistics reported concerning traditional Internet inclusion. Since intuitively, telephone devices require less technological proficiency than personal computers to operate, so Internet access through smart phones may, in fact, eliminate some of the adoption barriers typically associated or correlated with lack of education.

The more dramatic and promising technology for wireless broadband is that of spread spectrum wireless, especially the various versions of 802.11 technologies known as *WiFi*. These technologies provide huge bandwidth at low cost over short ranges. In developed countries, the multiplication of *hot spots* (zones of WiFi accessibility) has created a new network model whose impact is only just beginning to be felt. *WiFi* has not yet been widely used in developing countries due to regulatory barriers and/or limitations of human capacity. Pilots on *WiFi* applications need to be encouraged in developing countries. The next generation of wireless technologies such as *WiMax* may offer even more potential for cheap broadband access in the developing world since its capable of providing 72 Mbps speeds with a broadcast range up to about 45 Kilometers. This technology, combined with local content distribution on local *WiFi* networks, could provide very low cost access to schools, clinics, telecenters, and small businesses in developing countries, hence creating new opportunities for broadband applications now beyond consideration (Tipson and Frittelli). In most countries today, the number of cell phone customers is more than triple the country's number of fixed lines customers. Policy-makers should now make the case that the countries' *universal service* objectives could be better applied to the mobile networks, as the networks of choice, than to the fixed network. Liberalizing and deregulating so that mobile and fix lines infrastructure can be integrated, would speed up infrastructure roll out and add value to the almost abandoned fix line infrastructure.

It is now clearly emerging that some groups and regions especially Africa, will follow a different path, such as smart phones and other multimedia devices, to digital inclusion. The conventional PC path may not apply. Adoption and application of new strategies like appropriate price, market, advertising and product differentiation for mobile computing devices can help to decrease the digital divide and increase revenue for manufacturers and service providers. Differences in socially embedded information structures have long been identified as determinants of variance in diffusion rates. Hence, differentiated advertising strategies in this case targets low marginalized groups in order to increase their knowledge of mobile computing devices and hopefully increase their likelihood of adoption.

An understanding of the citizens' and business organizations' incentives to adopt e-Government services is crucial for the success of any e-Government initiative (Rieck and Tung, 2005). So far, little is known about why and under what circumstances citizens and corporations adopt e-government due to perhaps lack of systematic demand-side studies. Sharifi and Zarei (2005) established that the quality of an e-government depends on many factors, critical among these are the government's information policy, the number of users and their educational level, and motivation. They observed that till now, no country has successfully met all the requirements necessary for an ideal form of e-government.

Tipson and Frittelli argue that local culture is, in effect, the operating *software* of any society and the source of the *social capital* that keeps a community together and makes it function, therefore even the finest e-strategy and the deepest pocket can not produce a

modern *information society* if it ignored culture. There is need to build ICT culture in people.

Legal and Regulatory

Another aspect of e-strategy involves law and regulation. World Trade Organization (WTO) formulated principles relevant to the telecommunications sector across many different nations including developing countries. Implementation of these principles in accordance to the national needs has remained a challenge to most developing countries (Henderson, Gentle and Ball, 2005). WTO principles spell out that the regulatory body should be separated from, and not accountable to, any supplier of basic telecommunications services. In line with global trends, and in compliance with World Trade Organisation (WTO) commitments, the South African telecommunications market has been overseen by a sector regulator since 1997—the South African Telecommunications Regulatory Authority (SATRA) until 2000, and then the Independent Communications Authority of South Africa (ICASA).

In purely economic terms, gains have clearly been made in the South Africa's telecommunications sector over the last decade which has grown from about R7billion (US$ 1 billion) in 1992 to around R43billion (US$ 6 billion) in 2001. However, these mask a range of unintended policy outcomes and a series of costly licensing and regulatory disputes. Most significantly the dual national objectives of accelerated sector development and affordable access to communication services have not been met

(Gillwald Alison, 2005). This was attributed to the process for appointing ICASA Councillors and the resultant decision-making structures of ICASA that were viewed as flawed.

The flaws in the institutional design for the sector were compounded by the paucity of policy and regulatory skills within the Ministry and ICASA. Gillwald (2005) notes that several sector observers had pointed out the lack of capacity within the Department of Communication to develop sound forward-looking policy for the sector, and the regulator lacking the skills base necessary to regulate the dynamic and critical sector effectively. What this means is that complying with WTO principles is not enough to enable a nation meet its objectives and needs such as accelerated sector development and affordable access to communication services across the nation. There is need to address the issue of human capacity at both policy and regulatory level especially among developing countries.

Government policies governing the telecommunications service market and promoting information infrastructure have a significant impact on the affordability and availability of Internet access. The most significant factor is the level of competition permitted in the telecommunication sector (Fan, 2005). In Australia for instance, any telecommunication company except Telstra, of which the government is majority owner, can be fully foreign controlled. As a result, many of the world's largest international telecommunication companies such as Cable & Wireless, Optus, Worldcom, AAPT Telecommunication, PanAmSat Asia Carrier Service, Global One and Primus Telecommunications are active

in the Australian market. This enables the smaller ISPs or new entrants to benefit from the flexibility of choice of services offered by international service providers in Australia. On the demand side, for business and end users this means more choice when connecting to the Internet. It has been pointed out that the relaxation of limitations on FDI in telecommunications is very much in line with liberalisation and competition in the telecommunication market, which is lacking in most developing countries, especially Africa. Boateng (2004) observed that through experience, the USA Federal Communications Commission (FCC) recommends good regulatory practices to include:

- Avoidance of automatic imposition of old rules designed for monopolies on new services and entrants
- Application of minimum regulation on nascent applications and technologies and
- Once new applications start competing with existing applications, deregulation of the old applications must be considered.

Table 1.1 gives a comparison of the old and modern ICT world. Though the ICT world has modernized, the laws and regulations governing ICT seems to lag behind in many countries.

Table 1.1:Comparison of the Old and Modern ICT World

Old	Modern
• Market Structure- Balkanized: one network, one service	• Market Structure- Converged: one network, many services
• Consumer-Regulated prices, minimum product differentiation and little innovation	• Consumer-lower bundled prices, maximum product differentiation, more innovation, personalization and customization
• Regulatory- Heavily regulated with strong jurisdictional boundaries	• Regulatory- Less regulated and blurred boundaries
• Competition-Limited	• Competition- open

For the case of Kenya, Sihanya and Odek (2005) argues that the Kenyan laws and regulations relating to ICT are not comprehensive and are therefore inadequate on the basis of the following five key characteristics:

(i). ICT laws are largely sectoral and lack reflection of the technological convergence and integration that dominates the current trend. For instance, the telecommunication and broadcasting laws approach the issues as if they are mutually exclusive.

(ii). Regulatory agencies such as the Communications Commission of Kenya (CCK) do not have sufficient cross-sectoral mandates or experience. There are

insufficient experts or institutional memory or capacity on integrated ICT regulation.

(iii). There are limited remedies to consumers, investors, the Government, and other stakeholders. This is mainly because the relevant institutions, such as CCK, have limited legal and institutional capacity to enforce the law or their decisions.

(iv). Some regulators, including some Board members, have vested interests in the matters. The conflict of interest undermines regulatory efficiency and justice (or equity).

(v). Self-regulatory mechanisms are still non-existent or weak in most sectors of the ICT industry. The trade associations, such as the Computer Society of Kenya (CSK) and the Telecommunications Service Providers Organization of Kenya (TESPOK) have not institutionalized ICT policy, programmes and processes.

The question is, what kind of policy and regulatory regime exists in Kenya and how does it impact on ICT growth and development? Another issue to be addressed is the question of use of ICT in the region.

The United Nations Commission on International Trade Law (UNCITRAL) developed a Model Law with an intention of facilitating the use of modern means of communications and storage of information (United nations Commission on International Trade Law, 2005). It provides standards by which the legal value of electronic messages can be assessed. The Model Law is expected to play a significant role in enhancing the use of paperless communication.

The Model Law targets enhancing legal certainty regarding the use of electronic signatures. Building on the flexible principle contained in article 7 of the UNCITRAL Model Law on Electronic Commerce, it establishes criteria of technical reliability for the equivalence between electronic and hand-written signatures. The Model Law follows a technology-neutral approach and avoids favouring the use of any specific technical product. The Model Law further establishes basic rules of conduct that may serve as guidelines for assessing possible responsibilities and liabilities for the signatory, the relying party and trusted third parties that might intervene in the signature process (United nations Commission on International Trade Law, 2005). Nations need to include and integrate the use of e-signatures in their legislation in order to create an enabling environment for e-applications adoption. They also are required to create an appropriate investment climate and liberalize telecommunication services to allow private sector participation and promotion of public private partnership (Institute of Economic Affairs, 1999). In view of all these facts and the on going convergence of ICT technologies, it is important and in the best interest of regulators that its board members are conversant with ICT.

1.1.3 Theoretical Model

Models are most extensively used as weapons in political and policy warfare, and it is in this use that they make their greatest contribution. Models tend to have three singular and powerful influences on the policy process (King and Kraemer, 2003). The first role of

modeling is its role as a clarifier of issues in debate. Modeling is a systematic and formal process of analysis that requires specification and documentation of assumptions. The second role of modeling is its role in enforcing a discipline of analysis and discourse. The singular power of modeling is consistency. Finally, models do provide an interesting and powerful form of *advice* on what not to do. Models do not prevent or cause any particular policy changes. They simply provide policy makers with an idea of whether the proposed policies are likely to produce results in an *acceptable range*. For that matter, the modeling method has been used to produce shadows of what is expected of an ICT policy and e-strategy.

As one embarks on a search for a suitable model for research on e-government, four major e-government models come to mind namely: Interactive-Service Model, E-Advocacy Model, Comparative Analysis Model, and the Critical-Flow Model (Center for Digital Discourse and Culture, 2003).

The Comparative analysis model seeks to explore information available in the public or private domain and compares the findings with the known information sets. The outcome is strategic leanings and arguments. The model can be used for empowering people by matching cases of bad governance with those of good governance, and then analyzing the different aspects of bad governance and its impact on people. This model, however, is weak when it comes to causal explanations and becomes ineffective in absence of intervening variables such as a strong civil society and public awareness, the two of which are essential to force decision-makers to improve existing governance practices.

The E-Advocacy model is based on setting-up a planned, directed flow of information to build strong virtual allies to complement actions in the real world. The model builds the momentum of a real world processes by adding the options and concerns expressed by virtual communities. This comes close to the game theory in international relations. The strength of this model is in its diversity of the virtual community, and the ideas, expertise and resources accumulated through this virtual form of network. The model is able to mobilize and leverage human resources and information beyond geographical, institutional and bureaucratic barriers, and use it for concerted action. The model enhances the scope of participation of individuals and communities in debates, which affect and help build a global alliance. All the same, it is limited on account of not being able to replicate the real state of human behaviour.

The Critical-Flow model is based on disseminating information of critical value to the targeted audience (such as the media, political opposition parties) or into the wider public domain through the use of ICT and convergent media. The strengths of this model is that ICT makes the concept of ‘distance’ and ‘time’ redundant when information is hosted in a digital network, and this could be used advantageously. The model may not work in the cases where the governance mechanism does not allow public debates and opinions, and censures all information of critical nature (Center for Digital Discourse and Culture, 2003).

The Interactive Service Model (see Fig. 1.2) is a consolidation of the above-mentioned models. It opens up avenues for direct participation of individuals in the government processes. The potential for ICT for governance is fully leveraged in this model, which leads to greater objectivity and transparency in decision-making processes. This model enables establishment of interactive communication channels with key policy makers and members of planning Commissions, conduction of electronic ballots, conduction of public debates, filing of grievances, feedback, reports, decentralization of governance and performance of governance function online. This is the model to be used in this thesis as it seems to be best suited to offer a credible start point towards the search for a functional and appropriate e-government adoption model for Kenya.

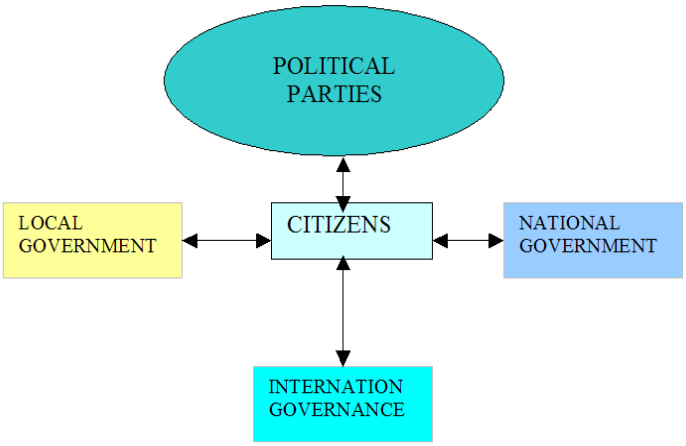


Fig.1.2: Interactive-Service Model (Center for Digital Discourse and Culture, 2003)

Comparative study of e-strategies, policies and incentives for ICT at global level i.e. World Summit on Information Society (WSIS)[1], United Nations Millennium Development Goals (MDGs)[2] and in selected regional blocs and countries such as COMESA, EAC European Union (EU), Organization of Economic Co-operation and Development (OECD)[3], Canada, Singapore, Egypt, South Africa, Malaysia, India, Rwanda, Tanzania and Uganda is one of the methods used to study, recommend and develop models that are used to test and critique the ICT polices and e-strategies. Some of the key parameters for comparison across all countries that are selected include: ICT sector structure and enabling environment, global linkages developed, local capabilities created, ICT social-economic impact, ICT applications adoption and promotion.

1.2 Methodology

1.2.1 Introduction

The research undertaken and reported in this thesis was based on a positivist paradigm where it is believed that reality exists objectively and independently from human experience (WenShin and Hirschheim, 2004). This thesis addresses propositions, model formation, quantifiable measurable measures of variables and inferences drawn from

[1] Access to information and knowledge is a prerequisite to achieving the MDGs. http://www.itu.int/wsis/basic/about.html. Acced July 25, 2005

[2] Countries are tailoring the MDGs to national circumstances, building them into national development strategies and policies, and incorporating them in budgets and ministries' priorities. http://www.undp.org/mdg/ accessed July 25, 2005

[3] The OECD groups 30 member countries (AUSTRALIA, AUSTRIA, BELGIUM, CANADA, CZECH REPUBLIC, DENMARK, FINLAND, FRANCE, GERMANY, GREECE, HUNGARY, ICELAND, IRELAND, ITALY, JAPAN, KOREA, LUXEMBOURG, MEXICO, NETHERLANDS, NEW ZEALAND, NORWAY, POLAND, PORTUGAL, SLOVAK REPUBLIC, SPAIN, SWEDEN, SWITZERLAND, TURKEY, UNITED KINGDOM, UNITED STATES sharing a commitment to democratic government and the market economy. accessed July 25, 2005

samples. Hence, besides regional studies, this thesis is **based on three cross-sectional** research surveys conducted at local authority level: six local authorities in Bungoma district in Kenya and at the headquarters of the Association of Local Government Authorities of Kenya (ALGAK); national level: 21 out of 26 Kenya government ministries; and sub-regional level: the East African Community headquarters.

1.2.2 Data

The research methods used to collect data were: Sampling, Observation, investigation, document reviews, interviews and administration of questionnaires (Sommerville, 2001).

Empirical data was collected from both primary sources and secondary sources. The primary sources were as follows: six local authorities in Bungoma district of Kenya and at the headquarters of the Association of Local Government Authorities of Kenya (ALGAK); 21 out of 26 Kenya government ministries; and the East African Community headquarters in Arusha, Tanzania. The secondary sources were International Telecommunication Union (ITU), Measure DHS and the Central Bureau of Statistics in the Ministry of Planning and National Development.

This data was used to critic the Kenya National ICT policy development process, Kenya e-government strategy and the proposed EAC e-strategy.

1.2.3 Access to Primary Data

In August 2003, the United Nations Economic Commission for Africa (ECA) initiated a unique project aimed at enhancing the role of universities as centres of excellence in research, specifically with respect to the development of innovative ICT solutions to national and regional challenges. The initial pilot project, *Software Research in e-Government and African Languages*, was co-ordinated in East Africa by the Inter-University Council for East Africa (IUCEA). The IUCEA identified key researchers from the University of Nairobi, Makerere University and University of Dar es Salaam to conduct the pilot project. The author of this thesis teamed up with them on this project, which presented a good opportunity to access the EAC headquarters and its autonomous institutions' data. With regard to the Kenyan data, the appointment of the author as a researcher on *ICT initiatives in Kenya* for the Ministry of Planning and National Development, enabled access to valuable data and key government officers in 21 out of 26 government offices. Lastly, at local authority level, the acceptance of a former chief executive officer (CEO) of Bungoma district for twenty years to introduce the researcher and author to the incumbent CEO's of the five local authorities opened doors to timely and greater voluntary participation of the five local authorities officials.

1.2.4 Regional Studies Research Methodology

Quantifiable and measurable ICT indicators such as GDP, mobile phone subscriber numbers, total telephone subscriber numbers, mobile communications revenue figures,

annual telecommunication investment, international bandwidth and the usage of newspapers, radio and television here referred to as mass media usage (MMU), were studied and possible inferences made empirically based on secondary data obtained from ITU and DHS.

Using the ITU data, the annual average per indicator (AAI) for all the regions was calculated by summing the absolute values of all member countries and dividing by their total number. The normalized annual indicators (NAI) were obtained by dividing AAI by the mean population per year for the region. NAI was then multiplied with 100 to obtain the annual average of ICT indicator per 100 inhabitants whose details are given in appendix A. The correlation analysis was done using normalized ICT indicators per 100 inhabitants. For purposes of studying general trends and comparison of ICT indicators, the absolute values of the indicators were plotted, interpreted and validated using relevant literature review on ICT policy, strategy and regulation. DHS data was used to study MMU trends in EAC sub-region using percentage values of selected indicators.

1.2.5 Local Authorities and ALGAK Research Methodology

A cross-sectional research survey was conducted at ALGAK and Bungoma district's local authorities to establish how much of ICT and e-government is packaged in the local government reforms they are currently undertaking. The research also attempted to establish the degree of involvement of local authorities in both the national ICT policy formulation process and the e-government strategy. The five local authorities that

participated in the research were the Municipal Council of Bungoma, the Municipal Council of Webuye, the Municipal Council of Kimilili, the Town Council of Sirisia, and the Town Council of Malakisi.

The surveys entailed interviewing chief executive officers and having them fill questionnaires to enable adequate data capture that was analyzed using SAS version 8.

1.2.6 ICT Initiatives in Kenya Research Methodology

The research population for this thesis comprised all ICT initiatives that had been implemented or were being implemented in Kenya by the government of Kenya, Donor communities, Non-governmental Organizations, Civil Societies, Community Based Organizations and the Private Sector by April 2005.

Since every ICT initiative must fall under one or more ministries, our research sample population was drawn from the existing 26 Kenya government ministries. Key government agencies on the forefront in ICT are namely: Communication Commission of Kenya (CCK), Kenya Revenue Authority (KRA) and Central Bureau of Statistics (CBS) were included in the sample. The ICT Initiatives of Donor communities, Non-governmental Organizations, Civil Societies, Community Based Organizations and Private Sector were captured through the interviews, questionnaires (see Appendix B) and document reviews that were conducted at the ministries where they are officially recognized. Also questionnaires were sent via e-mail to donor communities, Non-

governmental Organizations, Civil Societies, Community Based Organizations and Private Sector especially those that had an Internet presence. This was done as a means of double-checking where possible the data collected from the ministries. The analysis of questionnaires was done using SAS version 8.

1.2.7 EAC Headquarters and its Autonomous Institutions Research Methodology

A cross-sectional research survey was conducted in the year 2003 at the EAC headquarters and its autonomous institutions with an aim of evaluating the ICT policy status. Interviews and questionnaires (see Appendix F and G) were administered at the EAC headquarter and its autonomous institutions namely: Inter-University Council for East Africa (IUCEA), East African Development Bank (EADB), Lake Victoria Fisheries Organization (LVFO), and East African Business Council (EABC). The survey targeted the heads of ICT that sit in the top decision boards of those organizations. The analysis of the data collected was done using SAS software v8, where applicable.

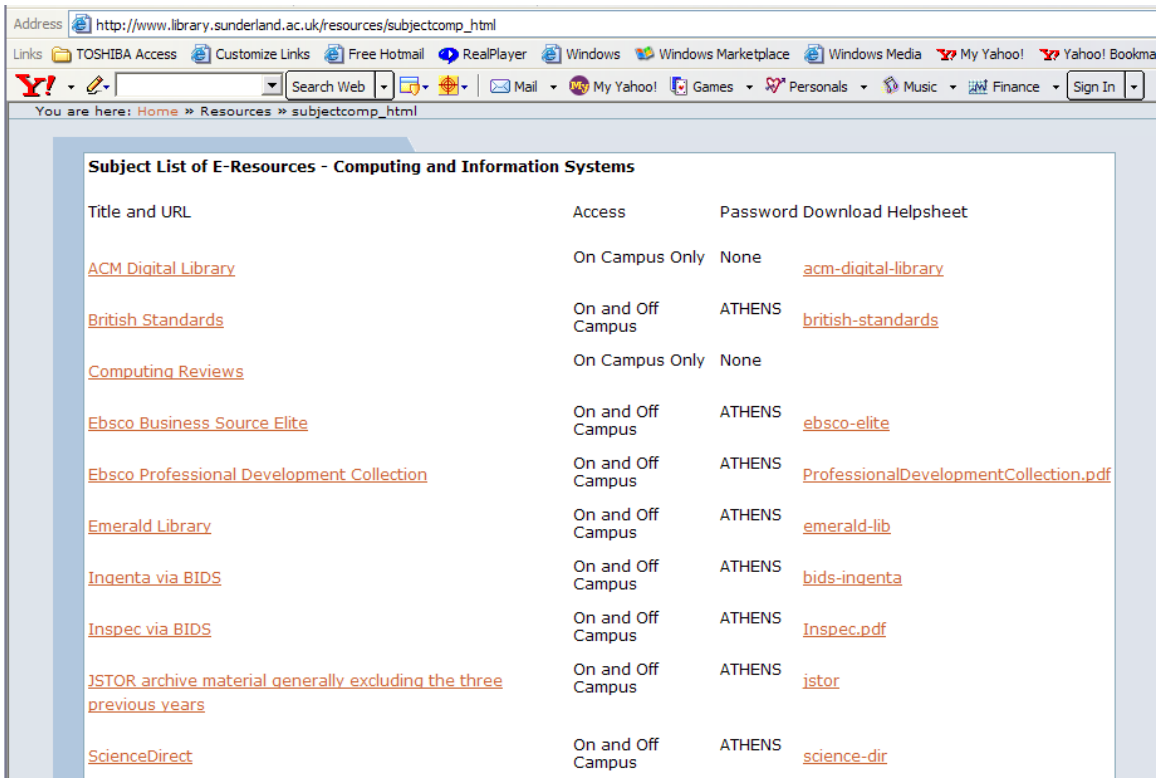
1.2.8 Legal and regulatory Regime Research Methodology

Comparative studies as well as document review approach was used to study legal and regulatory regime in Kenya. The Kenya Communications Act, 1998 (Republic of Kenya, 1998) in particular has been studied due to the fundamental role it is expected to play in relation to ICT. The study was also extended to The Kenya Communication Regulations 2001 (Government of Kenya, 2001). The study was carried out with an intention of

making recommendations on where reform are necessary in order to promote ICT development and national economic development.

1.2.9 Literature Review and Secondary Data Sources

Subscribing to online electronic databases such as the one provided through collaboration of JKUAT and the University of Sunderland (see Fig.1.3), enabled access to current journals and publications in the fields for instance: Computing and Information Systems; Humanities and Social Sciences; Law; Science and Engineering among others. Also by subscribing and accessing the ITU data on the website at http://www.itu.int/ITU-D/ict/publications/world/world.html, which hosts The World Telecommunication Indicators Database containing time series data for the years 1960, 1965, 1970 and annually from 1975-2003 for around 80 sets of telecommunication statistics (updated annually) covering telephone network size and dimension, mobile services, quality of service, traffic, staff, tariffs, revenue and investment. ITU avails data for over 200 economies collected using an annual questionnaire sent out by the Telecommunication Development Bureau (BDT) of the ITU.



Address http://www.library.sunderland.ac.uk/resources/subjectcomp_html

You are here: Home » Resources » subjectcomp_html

Subject List of E-Resources - Computing and Information Systems

Title and URL	Access	Password	Download Helpsheet
ACM Digital Library	On Campus Only	None	acm-digital-library
British Standards	On and Off Campus	ATHENS	british-standards
Computing Reviews	On Campus Only	None	
Ebsco Business Source Elite	On and Off Campus	ATHENS	ebsco-elite
Ebsco Professional Development Collection	On and Off Campus	ATHENS	ProfessionalDevelopmentCollection.pdf
Emerald Library	On and Off Campus	ATHENS	emerald-lib
Ingenta via BIDS	On and Off Campus	ATHENS	bids-ingenta
Inspec via BIDS	On and Off Campus	ATHENS	Inspec.pdf
JSTOR archive material generally excluding the three previous years	On and Off Campus	ATHENS	jstor
ScienceDirect	On and Off Campus	ATHENS	science-dir

Fig.1.3: A snap shot of some links to electronic databases

1.3 Thesis Overview

Having discussed the research question, literature review and methodology in this chapter, Chapter 2 argues how a solution to a perennial decision-making problem of policy-makers and Chief Executive Officers (CEOs) with respect to ICT investments could be found, Consequently; by presenting the developed option based ICT investment decision index (IDI). IDI is designed to mask the technical details from policy-makers and CEOs and at the same time providing a simple and reproducible ground upon which decisions can be based, instead of relying on instinct and gut feelings. Chapter 2 also discusses and presents the development of a Community Development Index (CDI). The

belief that there is a technological silver bullet that can ‘solve’ illiteracy, ill health or economic failure reflects scant understanding of real poverty. It is on this basis that this chapter argues why new indicators based on sources of poverty in our society need to be developed to help understand poverty from a bottom-up/community-led approach.

Chapter 3 discusses the proposed generic Multi-Layered and Networked Framework. It states the proposed principles upon which the framework is based and proceeds to outline the key objectives of the framework. The chapter describes and argues in detail the layered structure of the framework along its three key layers namely: Governance Layer, Organizational Layer and the ICT Layer.

Chapter 4 presents regional ICT studies on trends in ICT indicators of COMESA, EAC, EU and OECD. An eye was kept on issues relating to ICT policy, e-strategy, ICT implementation and adoption approaches and the general ICT trends. The chapter also identifies and presents lessons (some of which are applied in models developed in this thesis) through fusion or redesigning in accordance with the new insights unfolded by this research.

Chapter 5 discusses the EAC sub-regional ICT policy and e-strategy. ICT data of EAC headquarters and its autonomous institutions is analyzed and discussed. A demonstration on how IDI works is presented. Finally, the generic Muti-Layered and Networked framework’s ICT Architecture Layer presented in chapter 3 is also tested against the MCDS.

Chapter 6 presents the Kenya ICT regulatory regime, ICT policy, ICT initiatives and the e-government strategy. Here, the derived ICT policy statements are used to critique both the COMESA and the draft Kenya ICT policies. This chapter also attempts to establish whether there was any linkage between ICT initiatives in Kenya and the draft Kenya national ICT policy and makes recommendations. It also critiques the Kenya e-government Strategy. A bottom-up approach for rolling out e-government is argued in this chapter that it yields better results of good governance and sustainable development. The chapter explains and argues how involvement of local authorities in e-strategy development and implementation can help achieve the necessary critical mass for e-government in order to have a positive impact on local resources mobilization, good governance and sustainable development. It discusses what constitutes an enabling environment for the adoption of e-government and how to enhance the ICT institutional framework.

Chapter 7 gives the conclusion and suggestions for further work.

CHAPTER 2

2.0 CONCEPTUAL DECISION SUPPORT MODELS

2.1 Introduction

This chapter presents in details two conceptual decision support models namely: Option-based ICT Investment Decision Index (IDI) and the Community Development Index (CDI) that are components of the broader and comprehensive model discussed in Chapter 3.

2.2 Real Option Analysis

The conventional valuation methods, such as Return On Investment (ROI) and Net Present Value (NPV), estimate cost and benefit using a number of established techniques that yield a dollar value. However, many of the benefits generated by ICT project are intangible. Using conventional valuation method will result in an underestimation of the intangible benefits associated with an information system project. Therefore, using a strict dollar value measurement will not be suitable for a good valuation in ICT project. ROI is simply a measure of benefit versus cost. Expressed as a percentage, ROI is determined by total net present benefits divided by total net present costs. The basic rule of thumb is that projects with an ROI of less than 100 percent should not be undertaken.

The Net Present Value (NPV) is an amount that expresses how much value an investment will result in. This is done by measuring all cash flows over time back towards the

current point in present time. If the Net Present Value method results in a positive amount, the project should be undertaken.

Unlike in net present value (NPV) analysis, Real Option Analysis (ROA) compute the value of an investment as:

active-NPV = *passive*-NPV + value of managerial flexibility afforded by embedded real options

The *passive*-NPV of an investment is the present value of net direct cash flows from the investment. Since the value of managerial flexibility is not a tangible cash-flow, it does not enter *passive*-NPV. Therefore, ROA compute this value separately and add it to *passive*-NPV. The *active-NPV*, thus recognizes that real options enable management to flexibly change traits of the investment in order to add value. In this light, it should be clear that an evaluation based on *active*-NPV could sometimes accept investments that an evaluation based on *passive*-NPV might reject.

The costs associated with an IT project fall into a number of categories. These categories include: procurement costs associated with the equipment; start-up costs; project related costs; and ongoing costs. The benefits can also be placed into a number of categories. Some of the benefits provided are concrete such as a reduction in processing errors; strategic advantage; decreased time; improved effectiveness; or reduction in the amount of labor to perform tasks. Other benefits are abstract such as improved asset utilization, improved resource control, improved organizational planning, improved organizational

flexibility, more timely information, increased organizational learning, legal requirements attained, enhanced employee goodwill, increased job satisfaction, improved decision-making, improved operations, higher client satisfaction, better corporate image, and "flexibility".

Real option analysis (ROA) means applying the wisdom of stock option theory to business strategies and corporate finance (Mairav Udi, 2000). ROA as a calculative tool translates real options into quantitative value. Black Scholes formula is used in ROA to pricing an option. Before this formula is used in ROA, it is important to identify project characteristics that map onto the five option parameters of the Black-Scholes formula shown in Table 2.1.

Table 2.1: Black Scholes formula's five parameters

Real Option	**Asset (Project) option**
1.Present value of cash flows	Asset Price (S)
2.Launch Costs	Exercise Price (K)
3.Time until decision must be made	Time to expiration (G)
4.Discount rate	Risk free rate (r)
5.Risk-probability distribution	Cumulative volatility (Q)

2.2.1 Real Options Decision Criterion

Aleman James *et al* (2005) developed an investment criterion incorporating real options. Therefore decisions to invest can be based on this criterion shown in Table 2.2.

Table 2.2: Combined Decision Criterion

Condition	Action
$D^{\mu} < d$	**Invest**
$0 < d < D^{\mu}$	**Invest Carefully**
$- D^{\mu} < d < 0$	**Wait and Watch**
$- D^{\mu} > d$	**Do not invest**

When the assets current value *(S)*, time to expiration *(G)*, exercise price *(K)*, volatility *(Q)* and the risk free rate *(r)* are known, the Investment Decision Index *(IDI)* ***d*** can be computed as follows:

Given $D^{\mu} = 0.276$

Let $I = K(r + 1)^{-G}$

Let $H = SQG^{0.5}$

Then, the Investment Decision Index *(IDI)*

$$d = (S-I)/H$$

Hence, knowing ***S, K*** and ***Q*** can provide enough information to make sophisticated decisions taking into consideration foreseeable uncertainties expressed in the form of a decision-making index ***d***. This index would suggest a specific action according to the

combined decision criterion shown in table 2.2. Therefore this can be very useful to policy-makers and managers as an indicator for basing on their investment decisions.

2.2.2 Interpretation of d and Dμ

d can be seen as NPV divided by its standard deviation. In other words, ***d*** is the ratio of NPV to its uncertainty. Because *d* does not depend on the size of the project, it can be called uncertainty-adjusted NPV" or "risk-normalized NPV." We can easily compare several risky projects of which the sizes are different.

The value of ***D*** when NPV=ROV is referred to as $\boldsymbol{D^{\mu}}$. It is the break-even point of expectation of NPV and its real option value.

The value of ***d*** should be higher than 1.28 if expected loss is less that 10%. Fig.2.1 shows Tradeoffs of Losses.

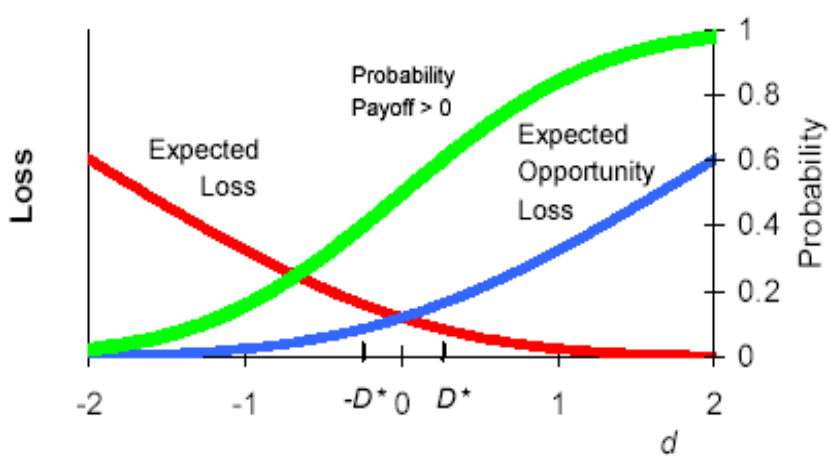


Fig. 2.1: Tradeoffs of Losses (Alleman J et al, 2005)

2.3 Option-based ICT Investment Decision Index (IDI)

After carefully studying the research conducted by Benaroch (2002) on the option-based methodology for managing IT investment risk, and that of Alleman J *et al* (2005) who developed an investment criterion incorporating real options, it became clear that when the two are fused in a special arrangement, a solution to a perennial decision-making problem of policy-makers and Chief Executive Officers (CEOs) with respect to ICT investments could be found. Consequently, an option based ICT investment decision index (IDI) has been developed. IDI is designed to mask the technical details from policy-makers and CEOs and at the same time providing a simple and reproducible ground upon which decisions can be based, instead of relying on instinct and gut feelings (see Fig. 2.2). A decision is arrived at after going through five steps. The first three steps ensure that risks associated with all identifiable investments are known and understood. Step IV computes IDI for each investment. Step V applies the decision criterion to provide and interpret IDI to the policy-makers and CEOs in the form of a simple *Do not Invest*, or *Wait and Watch*, or *Invest carefully*, or *Invest*. *Do not invest* decision means forfeit that option, perhaps due to numerous risks, lacks sufficient benefits if any, and unsustainable. *Invest* decision means there is great future, necessary capacity is available and risks associated with investment are identified, understood and can be handled. *Wait and Watch* decision should be execute if the investor has no competitor envisioned. The *Invest carefully* decision has different roadmap that implements it, which are stated and explained in Table 2.2.

Table 2.3: Invest Carefully Decision

Decision	Roadmap	Basic Conditions Required
Invest Carefully	Develop in Stages	• Modular and stepwise development approach possible • Development steps have varying risks levels • No requirement on order of development of modules
	Pilot/Prototype	• Reduced scope of investment possible • There is need to study certain risks
	Outsource	• Investment does not involve core business processing and capabilities of the organization • Need to concentrate on the core business of the organization • Skilled human resource is lacking
	Lease	• If investment resources can be leased.

As long as adequate information on the cost of different aspects of ICT adaptation and utilization exist, applying real option theory (Mairav, 2000a), the assets current value *(S)*, time to expiration *(G)*, exercise price *(K)*, volatility *(Q)* and the risk free rate *(r)* could be identified; thus the Investment Decision Index *(IDI) d* can then be computed. Hence, knowing *S*, *K* and *Q* could provide enough information to make sophisticated decisions under uncertainty once expressed in the form of a decision-making index *d*. Therefore this can be very useful to policy-makers and chief executive officers (CEOs) as an indicator for basing on their investment decisions.

Policy-makers Option Based ICT Investment Decision Index (IDI)

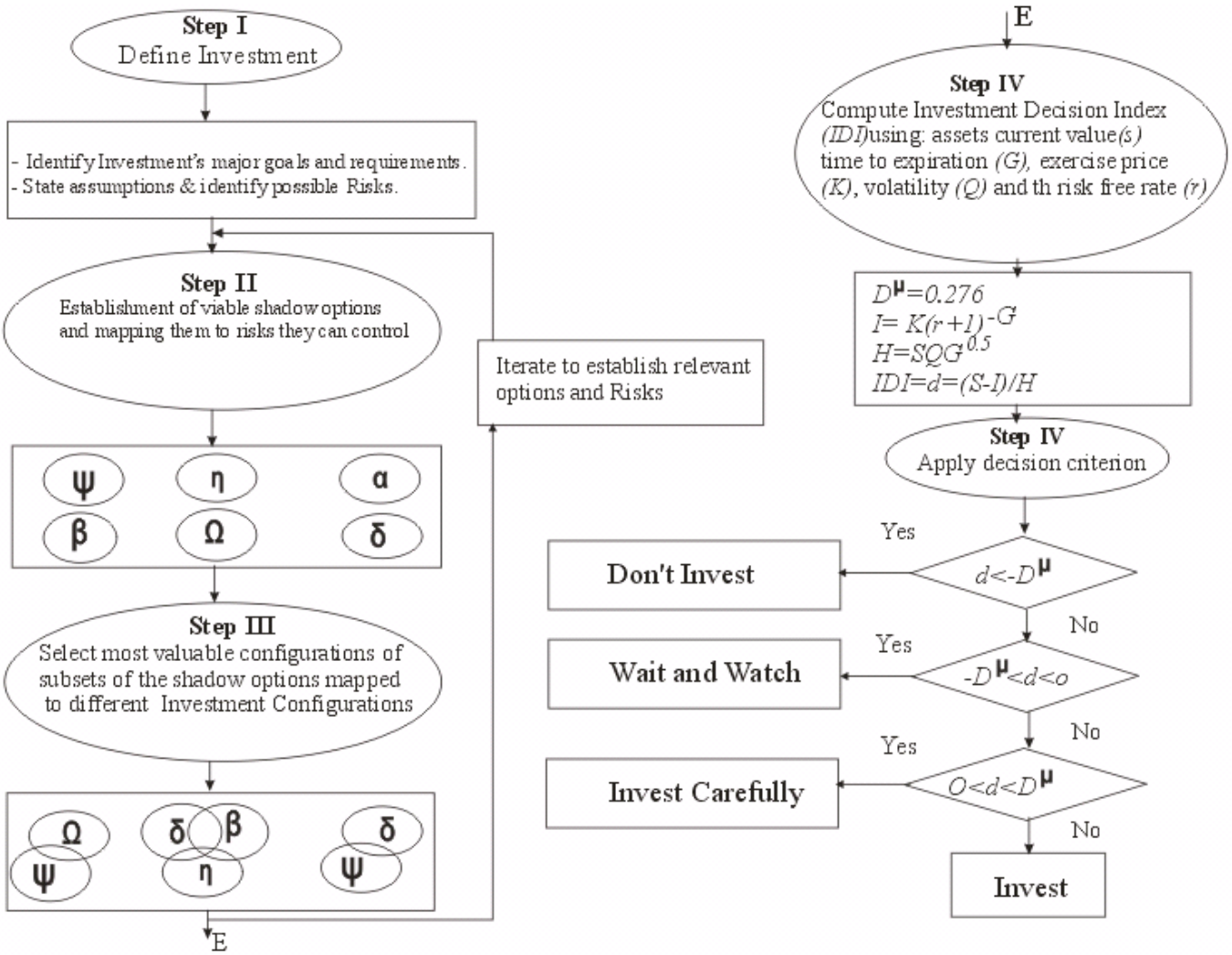


Fig.2.2: IDI index for policy-makers

In general, IDI can contribute in enabling:

- Financial institutions make decisions to support ICT initiatives
- Policy-makers and CEOs to commit themselves and institutions on ICT initiatives

- Attraction of FDI in ICT initiatives
- Exploitation of integrated market
- Promotion of development through facilitating good decision-making
- Indirect promotion of access to ICT services.
- Promotion of adoption of new technologies

2.4 Community Development Index (CDI)

2.4.1 Community Development

Sustainable development requires appropriate philosophy besides appropriate technology. Community-led rural development is widely regarded in the US, Europe and Australia as the key to improving the sustainability of disadvantaged regions and providing local people with the capacities to respond positively to change. While at face value such development increases local autonomy and control, a number of scholars have recently located community-led development as part of a broader shift from government to governance (Herbert-Cheshire Lynda and Higgins Vaughan, 2004). Here, new institutional and administrative arrangements and actors extending beyond formal state authorities play an increasingly significant role in ensuring that communities have the capacities to take a more active role in their development. This shift to governance implies that in order for communities to successfully take charge of their own development, they must first become enmeshed in a network of relations that assists them in acquiring the capacities to govern themselves responsibly.

The emergence of *'the community'* as an object of knowledge in public policy, formal political discourse and development initiatives is indicative of a fundamental shift in the spatialisation of government. Unlike previous forms of government that sought to achieve national security through state-based socialised forms of intervention and responsibility, this is a new type of ruling —governance through community. Such governing through community is advanced liberal in that it seeks to desocialise and individualise risk, with subjects encouraged to *'shape their lives according to a moral code of individual responsibility and community obligation'* (Herbert-Cheshire Lynda and Higgins Vaughan, 2004). That is to say, instead of citizenship constituted in terms of social obligations and collectivised risk, it becomes individualised based on one's capacities to conduct oneself in an entrepreneurial and responsible manner. Such entrepreneurialism forms the basis for governing through community. As part of the shift from society to the community as the object of rule, expertise knowledge becomes crucial in empowering people to manage their lives and adopting a prudent and calculative approach to self-governance through appropriate social decision making. This expertise translates the political concerns of the people into outputs in form of government for instance: efficiency; industrial productivity; law and order; accountability of political leadership and political stability among others. Armed with techniques that promise improved financial management, a better lifestyle, efficient work practices or, in the case of rural population, empowerment to improve community economic well-being, these expert knowledge is directed at enhancing self-regulatory capacities, thereby aligning political objectives with broader community goals. An expertise is considered to be crucial on account of neutrality and mechanism for enabling community members to be aware of

their capabilities and develop positive entrepreneurial attitudes through which they can build their community and leadership capacities, reduce their dependency on the government and create sustainable development in the form of technological enhancement, wealth creation and rising standards of living.

The contemporary advanced liberal emphasis on 'bottom-up' or community-led development is indicative of the fact that the management of resources and the attendant risks are no longer an activity of the state alone, but the responsibility of citizens and their communities wherever they may be (Herbert-Cheshire Lynda and Higgins Vaughan. (2004).

In general, ICT has a big role to play in promoting good governance (Odendaal, 2003).

2.4.2 CDI Importance

The belief that there is a technological silver bullet that can 'solve' illiteracy, ill health or economic failure reflects scant understanding of real poverty. It is on this basis that new indicators based on sources of poverty in our society need to be developed to help understand poverty from a bottom-up/community-led approach, so as to have a preventive approach rather that a curative approach that so far has failed in helping alleviate poverty. Poverty is complex, and without identifying uniquely what are its sources whose compound effect lead to a state called poverty, and destroy them, poverty will continue to exist in different forms. It is reasonable to postulate that there exist a

direct relationship between poverty sources and sustainable development: as sources of poverty increases, sustainable development capacity decreases. By monitoring sources of poverty indicators, a community, government or development partner can be able tell whether it is on the right track of alleviating poverty or applying appropriate strategies.

CDI supports self-reliance development model that enables communities to be confident enough to base their development on their own thinking and value systems without being defensive or apologetic. CDI is intended to enable communities become agents and not just beneficiaries of development. Self-reliance enables nations or regions to assume fuller responsibility for their own development within a framework of enlarged political and economic independence. It builds development around individuals and groups rather than people around development and it attempts to achieve this through the deployment of local resources and indigenous efforts. It mobilizes the creative energies of the people themselves. This contributes directly to the formulation of new values systems, to the direct attack of poverty, alienation and frustration, and to the more creative utilization of the productive factors. Self-reliant development, with its reliance on local rather than imported institutions and technologies, is a means whereby a nation can reduce its vulnerability to the decisions and events which fall outside its control: a self-reliant community will be more resilient in times of crisis. This self-reliance model has been partly adopted in the Economic Recovery Strategy (Government of Kenya, 2003) and Poverty Reduction Strategy Paper (Ministry of Finance and Planning, 2001) of Kenya. It has been known to solve to a good extent the unemployment problem as observed in China (McGinis, 1979). There are two methods that are commonly used to eliminate

absolute poverty. The first one is by government enabling creation of jobs with incomes that are sufficient to meet basic needs to those who suffer from poverty. The second one is by the government forcefully through taxation, redistributing the income or corresponding real resources from those who have jobs and incomes to those who do not have jobs or income. Any combination of them is acceptable and possible (Howard and Gunner). However, in Kenya, the taxation option cannot solve the poverty problem since the ratio of those working to those without jobs is too small. Already Kenyans are among the most highly taxed people in the world. The option left is to create jobs and this is where ICT comes in handy particularly in the service industry.

Donor case studies undertaken by OECD highlight the fact that identification and targeting of the poor is often broad-brush, and an assessment of European aid to Zambia showed that few, if any, donors came close to having the insights needed (Hjorth, 2003). There was neither much systematic analysis of the causes to poverty nor any in-depth discussion/identification of poor groups. Also a study in Zambia showed a distressing lack of knowledge about what aid does, particularly in terms of its poverty reduction effects. Adoption and use of ICT can enable better monitoring of parameters shown in Fig 2.3 and the understanding of poverty at its roots. A web-based application computing and displaying CDI for the targeted communities, would act as mirror to the communities, government and their development partners.

Policy, economic and technical factors initiated the development and deployment of the Internet. Government policies like the national information infrastructure (NII) initiative

in the US played a pivotal role in Internet's widespread diffusion as did a great deal of educational and research activities related to and utilizing the Internet. Such explanatory frameworks miss fundamental historical, social and cultural contexts associated with the diffusion of the Internet (Kim Pyungho, 2003). Supply-side variables alone cannot achieve a rapid and widespread diffusion of the Internet. In other words, there are certain economic, social and cultural conditions that intrigue people to enthusiastically embrace the Internet. An analogy can be drawn from this case for sustainable development. Most donors and governments have mostly emphasized the supply (push) side of development and ignored the demand (recipient) side of it. The development of the CDI would present more information on the demand side.

Radio and television have served as a social and cultural regulator to standardize our life by inculcating homogenized, mass consumer culture so that they become an effective means of 'control and coordination of production, distribution and consumption' in the industrialized modern society. This technology has not been used exhaustively in the developing countries. More so in the area of passing relevant information to communities in the form and languages they understand. By choosing to limit this technology, communities have been denied the opportunity to coordinate the production, distribution and consumption of what they produce. Although few, entrepreneurs have always been there but due to political reasons and fear, they are in most cases not allowed to provide these services freely, especially in Africa, where people live in communities within the context of mass cultures. The poor countries have lost on the opportunity to use radio and TV or any technology targeting masses in helping to alleviate poverty through provision

of appropriate, timely and relevant information (see Fig.2.2). Most parts of Africa currently have access to radios, but do not use these tools of communication to drive development effectively.

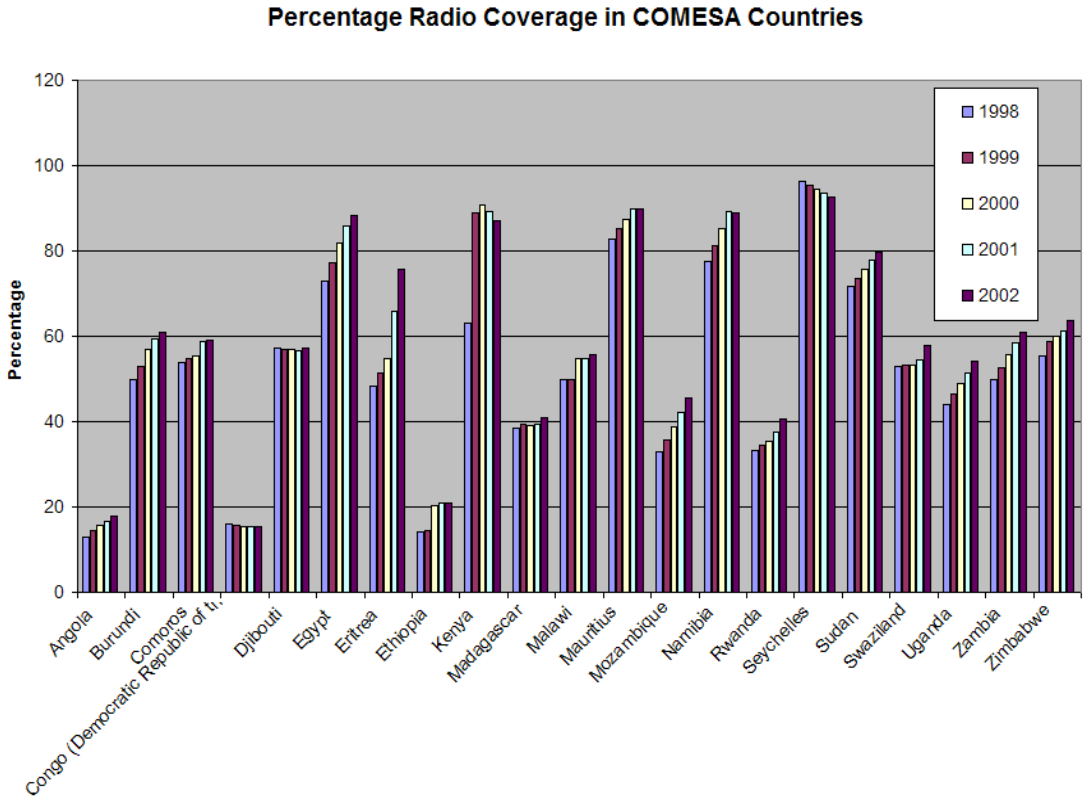


Fig.2.3: Radio Coverage in COMESA countries

We live in an era of shrinking states and expanding markets (Bratton, 2003). Whereas in many countries market liberalization has achieved overall efficiency gains and has often promoted sustainable practices, there is increasing evidence that these benefits have bypassed most rural areas in developing countries (Kuyvenhoven, 2004). In many remote

areas, the disappearance of marketing boards and parastatals for Input provision have not been followed by private-sector initiatives to provide market services, and many farmers are further from the market than before. New, low-cost communication technologies (ICT) can play a major role in speeding-up the process of information diffusion and improving market efficiency, especially in the fields of input provision and marketing outlets.

As part of modernization on local government and support of reform agenda for a strong local government, the development of CDI would promote:

- Effective decision-making based on status of local communities with respect to capacity to sustain development
- Preservation of local value systems
- Empowerment of citizens at local level

This is expected to ease the Local Government's current constrains imposed by the central government, provincial administration as well as the parliamentary constituencies (Association of Local Government Authorities of Kenya, 2004).

2.4.3 CDI for Local Communities and their Authorities

There is an emerging consensus that poverty reduction is what development is about, and poverty reduction is by now a major priority of the international development aid community. A recent poverty assessment shows that results are mixed, with many

countries falling behind on reducing malnourishment and infant mortality and on increasing primary school enrolment and access to safe drinking water (Hjorth, 2003). The idealistic impulse to improve the standard of living of the poor is noble, but it is for the people to do what it takes to make change sustainable. But unless the actual policy solutions are well grounded in a deep understanding of the causes of poverty and how those causes have been, and can be, effectively addressed, they could end up with worse results than in the past. That is to say, in spite of best intentions, policies based on inadequate knowledge are likely to increase rather than reduce poverty. That is why there is need to develop indicators and compute an index that can help understand poverty from its roots. Effective poverty alleviation will require significant change in current structures, attitudes, and behaviour by people and their leaders alike. CDI is meant to capture this and help provide an in-depth understanding of the sources of poverty and block them.

2.4.4 CDI and the Local Authorities

Social scientists have looked at poverty from three broad definitional ways namely: absolute, relative and subjective poverty (Odhiambo, Omiti and Muthaka, 2005). Absolute poverty refers to subsistence poverty, based on assessment of minimum subsistence requirements, involving a judgment on basic human needs and measured in terms of resources required to maintain health and physical efficiency. These basic life necessities are then priced and the total figure constitutes the poverty line. Relative poverty refers to the use of relative standards in both time and place in the assessment of

poverty. Therefore the notion of relative poverty is elastic and receptive to conventional and rapid changes. Lastly, subjective poverty is closely related to relative poverty in the sense that subjective poverty has to do with whether or not the individuals or groups actually feel poor. Absolute poverty is the type CDI is seeking to tackle.

Human Poverty Index for developing countries HPI-1 is based on measured effects of poverty using four indicators. These are namely: Probability at birth of not surviving to age 40; adults illiteracy rate; percentage of population without sustainable access to an improved water source; and percentage of children under weight for age (UNDP, 2004). It is important to realize that absolute poverty has continued to increase despite concerted effort to increase donor funding. This calls for a radical change in approach, particularly when it comes to information for policy makers as well as monitoring and evaluation of sustenance of community development projects by government, donors and the community itself.

Poverty alleviation strategies succeed when they emphasize on means of eliminating sources and causes of poverty. This can be done via identification of the causes and stopping them. Basically, an anti-poverty mechanism can be developed, with indicators build into a computer system for monitoring and evaluation so as to boost investment, good use of time and resources, prevent wastage, and help in wealth creation.

In the case of Kenya, funds directed at poverty alleviation such as Local Authority Transfer Fund (LATF) and the Constituency Development Fund (CDF) may be used to

mobilize local human resources for productive purposes and activate new economic activities such as infrastructure building-roads, houses, bricks, plantations, transport, hotels, stone cutting, sand collection, export processing zones, irrigation projects and dams. Local authorities for example, may encourage the citizens to improve agricultural production: cattle, goat, sheep, poultry, fish, bee keeping, etc. Products from these projects should be sold to markets established by the local authorities. The local people may establish agro-based industries to process their farm produce, engage in activities such as candle making, skin-leather industry, production of bio-gas from cow-dung, making compost manure for organic farming, among others. Local authorities, for example, may establish wealth creation department to implement all its anti-poverty programs and activities. As a faster means, local authorities can then explore the global market through Internet and other ICT technologies with a view to enable their communities obtain the equipment and inputs from around the world as well as sell their products regionally and globally.

Majority of the poor and people languishing in poverty tend to be idling and doing nothing even with the little resource available. In the case of Africa, to ensure that such people are mobilized, local authorities should pass anti-poverty by-laws requiring citizens to engage in gainful socio-economic activities.

For instance, get people to register the activities they are engaged in every time they seek public service, especially if and when they are not formally employed. Once anti-poverty by-laws are in place, local authorities can enforce them with assistance of the provincial administration, the church etc. It would then be easy to identify and isolate idlers who

engage in crime, robbery and other activities that are frustrating investment, savings, and accumulation.

With such ICT-based CDI, leaders and citizens alike will be able to measure their own strengths and weaknesses, as well as recognize their opportunities. In order for communities to manage their own risks in a sustainable and responsible manner, it is imperative that they should subject themselves to technologies of self-examination and self-reflection so as to understand themselves, the risks they face, and their ability to manage those risks appropriately. Therefore the development of CDI and its availability and access, would serve the purpose of providing a mirror for communities to self-examine themselves. CDI may help create a distinction between communities that are unsustainable or 'at risk' and those that are comprised of 'active' and entrepreneurial citizens who manage their own risks in a 'healthy', 'responsible' or 'sustainable' way. Figure 2.4 shows the suggested different parameters and indicators that were combined to create CDI.

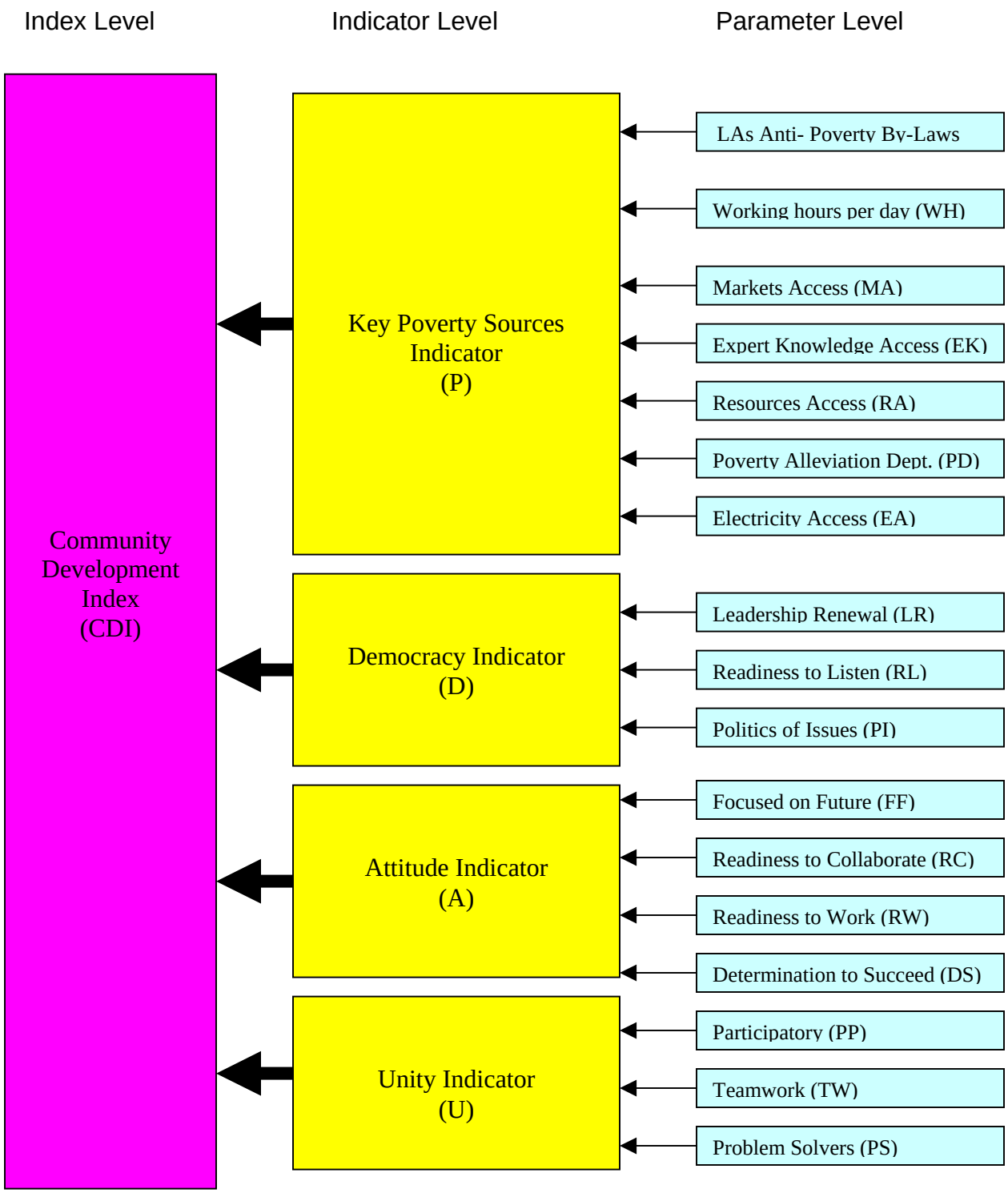


Fig. 2.4: Diagram to show an overview of the construction of the Community Development Index (CDI).

2.4.5 CDI Computation

According to the Human Development Report 2004 (UNDP, 2004), the formula used to compute HPI-1 was as follows:

$$HPI\text{-}1=[1/3(P_1^q+P_2^q+P_3^q)]^{1/q}$$

Where:

P_1=Probability at birth of not surviving to age 40 (times 100)

P_2=Adult illiteracy rate

P_3=Unweighted average of population without sustainable access to an improved water sources and children under weight for age

Where $q=\{1,2\ldots\propto\}$

<u>Note</u>: the values of q have an important impact on the values of the HPI-1. If q=1, the HPI-1 is the average of its dimensions. As q rises, greater weight is given to the dimension in which there is the most deprivation. Thus as q increases towards infinity, the HPI-1 will tend towards the values of the dimension in which deprivation is greatest.

If $P_1 < P_2 < P_3$

As $q \rightarrow \propto$, HPI-1$\rightarrow$ P_3

The same concept used to generate HPI-1 formula was applied in the formulation of the Community Development Index (CDI) as follows:

$$CDI= [0.25(P^{\psi}+D^{\psi}+A^{\psi}+U^{\psi})]^{1/\psi}$$

Where $\psi=\{1,2,\ldots, \propto\}$ and P is the weighted Key Poverty Sources[+] Indicator, D is the weighted Democracy Indicator, A is the weighted Attitude Indicator and U is the weighted Unity[*] indicator. The weights per indicator are as follows:

$$P_w=1/3,\ D_w=2/9,\ A_w=2/9,\ U_w=2/9$$

Weighted Key Poverty Sources Indicator (P) is calculated as follows:

P = weighted average of key Poverty sources parameter (in percentage form)

$$P = P_w\,[1/7(BL+WH+MA+EK+RA+PD+EA)]$$

$$P =0.0476(BL+WH+MA+EK+RA+PD+EA)$$

Weighted Democracy Indicator (D) is calculated as follows:

$$D = D_w\,[1/3(LR+RL+PS)]$$

[+] Key Poverty Sources: LAs Anti-poverty By-laws, working hours per day, markets access, expert knowledge access, resources access, poverty alleviation department, electricity access etc.
[*] Unity could mean teamwork, cooperation, collective responsibility, collective investment, mutual support for each other's efforts etc.

$D = 0.0741(LR+RL+PS)$

Weighted Attitude Indicator (*A)* is calculated as follows*:*

$A = A_w\,[1/4(FF+RC+RW+DS)]$

$A = 0.741(FF+RC+RW)$

Weighted Unity Indicator (*U)* is calculated as follows:

$U = U_w\,[1/3(PP+TW+PS)]$

$U = 0741(PP+TW+PS)$

2.5 Conclusion

ROA can enable abstract benefits such as improved asset utilization, improved resource control, improved organizational planning, improved organizational flexibility, and more timely information to be measured and assigned a value. Evaluation based on ROA could sometimes accept investments that an evaluation based on NPV might reject. Use of ROA in combination with an appropriate decision criterion can assist in computing the probability of expected loss as well as expected opportunity loss as shown in Fig.2.1. This combined with the interpretation of IDI to the policy-makers and CEOs in the form of a simple *Do not Invest*, or *Wait and Watch*, or *Invest Carefully*, or *Invest* provide a strong decision support mechanism.

The emergence of *'the community'* as an object of knowledge in public policy, formal political discourse and development initiatives is indicative of a fundamental shift in the spatialisation of government. Hence governing through community seeks to desocialise and individualise risk where individuals are encouraged to shape their lives according to their moral code and the community obligations. With the shift from society to the community as the object of rule, expertise knowledge becomes crucial in empowering people to manage their lives and adopting a prudent and calculative approach to self-governance through appropriate decision making. CDI aims at enabling communities become agents and not just beneficiaries of development through building development around individuals and groups rather than people around development. CDI proposes to achieve this through the deployment of local resources and indigenous efforts. The development of the CDI is also intended to enable capture the information on the demand side of development in order to inform the supply side of development.

Most parts of Africa currently have access to radios, but do not use these tools of communication to drive development effectively. Besides that, both new and old low-cost communication technologies (ICT) can play a major role in speeding-up the process of information diffusion and improving market efficiency, especially in the fields of input provision and marketing outlets.

Effective poverty alleviation will require significant change in current structures, attitudes, and behaviour by people and their leaders alike. CDI is meant to capture this

and help provide an in-depth understanding of the sources of poverty and block them. The ICT-based CDI is designed such that leaders and citizens alike will be able to measure their own strengths and weaknesses, as well as recognize their opportunities.

IDI can be a strategic tool for use in Governance and Organization layers of the MuL_Net framework as discussed in section 3.2.1.3 and 3.2.2.2 of Chapter 3, particularly in relation to supporting ICT investment decisions. IDI offers the necessary analysis that can ensure that risks involved are quantified and understood, hence enabling most national and international financial institutions to fulfill their development roles.

Likewise, in section 3.2.1.1 of Chapter 3, CDI is proposed for use to inform leaders and their people on the existing scenario in relation to development issues at community level. CDI is designed in such a way that it can provide an effective means of use of information and communication in economic and social pursuits. It can help leaders in taking strategic direction in shaping local culture towards supporting sustainable development. Section 3.2.2.5 of Chapter 3 discusses cultural issues and suggests use of CDI as a new culture that would benefit leaders and their people.

CHAPTER 3

3.0 MULTI-LAYERED AND NETWORKED (MUL_NET) CONCEPTUAL FRAMEWORK

3.1 Introduction

The MuL_Net conceptual framework was informed substantially by the following literature surveyed: Interactive Service Model (CDDC 2003), Enhanced Framework (Treasury Board of Canada, 1998), Value Chain (Heuerman, 2004), Technology Selection Model (Dunmade, 2002), Design-Reality Gap Analysis (Heeks, 2003) and ICT Trends in COMESA, EAC, EU and OECD. The Interactive Service Model shown in Fig.1.2 provided a credible start point and basic structure of key actors that have now been addressed through a layered structure. This model does not address technology involved, integration, convergence and other social aspects such as culture, public private partnership, legal and regulatory issues. The MuLNet Framework tacked this gaps and presents a novel holistic framework.

Ideal national and sub-regional ICT policies aim at articulating intention to harness ICT for sustainable socio-economic development. To realize such intents, MuL_Net framework made of three key layers has been developed. This e-strategy framework attempts to build a need-based and development-oriented strategy, where people are enabled to create, access, utilize and share information and knowledge they need for their

own wealth creation and development. Thus enabling individuals, communities and peoples to achieve their full potential in creating their own and sustainable development, and improving their quality of life.

For Africa, the deployment of ICT would be beneficial if directed at enhancing our capability in all aspects of our daily life. MuL_Net framework attempts to recognize and support successful adoption of e-applications in a way that would contribute to sustainable production and consumption patterns, and reduction of traditional barriers. MuL_Net framework enables opportunities in a more equitable manner as well as promote ICT investment.

The extent to which the benefits of ICT revolution are realized largely depends on the approach taken to adopt ICT. The MuL_Net framework takes an integrated approach, which is rated the best according to Heeks (2003). This is because the integrated approach puts information in the hands of the people and their decision makers, and lets ICT to play the role of an enabler. The MuL_Net framework also recognizes and stresses the importance of having certain minimum technological capabilities in order to adopt and harness ICT effectively (Kumar and Siddharrthan, 1997).

According to MuL_Net framework, borders do not limit ICT, hence it is designed to support national e-strategies to talk to both sub-regional and national e-strategies. This in itself enables simultaneous addressing of frequent problems of financing and regulatory issues at international level, in a way that promotes harmonization and standardization.

The MuL_Net framework aims at overcoming the observed limitations in most national e-strategies such as (Currie, 2004):

- Dealing adequately with the reality of the sectoral reforms of the telecoms and broadcasting industries of the 1990s that created legacy systems that are still dominant.
- Over-emphasizing the technical deployment of ICT infrastructure over the social dynamics of development, ICT policy issues and human capacity.
- Addressing the importance of all levels of ICT co-operation.

3.1.1 MuL_Net Framework Building Principles

The MuL_Net framework is based on the following principles:

1. Establishment of good governance and organizational structures.
2. Development of a regulatory environment that enables and supports convergence of ICT.
3. Capacity building for enabling creation and customization of services and applications due to increased diversity and choices of information, sources, products and services.
4. Outsourcing of non-core businesses to lessen unnecessary competition.

5. Development of easy, user friendly and intelligent applications to mask technologies difficult to master and manage.
6. Creation of enabling environment for the success of ICT initiatives.
7. Application of a top-down ICT infrastructure government support model that creates broadband network and service investment incentives; and a bottom-up *community aggregator model* where government funded pilot programs on delivery of electronic government services help stimulate the generation of sufficient demand to use existing network capacity and construction of new facilities (Frieden, 2005).

3.1.2 MuL_Net Framework Objectives

The major objectives of the MuL_Net framework are as follows:

General

- Identification and description of fundamentals and key components that form the framework.
- Development of all necessary architectures of ICT layer components.
- Development of the SIP framework for the organizational layer.

Governance Layer

1. Encourage adoption of ICT Investments based on an evaluation that takes into consideration all risk factors and apply the best option.

2. Facilitate implementation of technologically neutral and predictable policies and regulatory frameworks that reflect needs of the time.
3. Enhance use of ICT as an important enabler of growth through efficiency gains and increased productivity at local, national and international levels.

Organizational Layer

4. Encourage public private partnership in provision of affordable universal access.
5. Encourage Intellectual Property protection in order to promote innovation and creativity.
6. Enhance ICT usage at all levels.

ICT Layer

7. Enhancement of connectivity and access to ICT services
8. Enable development of e-applications and e-content
9. Ensure that the benefits of ICT are easily and appropriately harnessed.
10. Build capacity of nations to implement the principles and practices of democracy through increased participation.
11. Demonstrate need for use of proven conceptual e-applications models.
12. Enable synchronization of ICT infrastructure.
13. Facilitate wide dissemination, diffusion, and sharing of knowledge so as to encourage innovation and creativity.
14. Enable Integration of ICT-related efforts and applications with national and regional development strategies

15. Encourage the development and use of open, interoperable, non-discriminatory and demand-driven standards that take into account needs of users and consumers as a basic element for the development and greater diffusion of ICT.

3.2 MuL_Net Framework Structure

3.2.0 Introduction

The MuL_Net framework marks a shift from the old vertical sectoral e-strategy model that was based on the distinct communication sectors, to a new three Muti-Layered and Networked framework for ICT shown in Fig.3.1 in which the role of all these sectors is conceptualized in an integrated and holistic approach as a result of the growth of the Internet, convergence and digitalization.

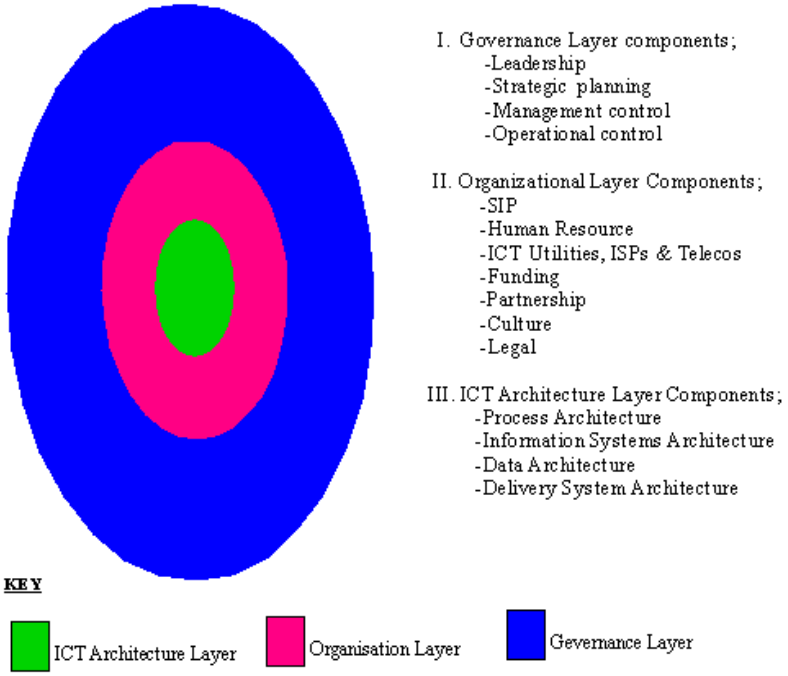


Fig.3.1: Basic Representation of the Muti-Layered and Networked Framework (MuL_Net)

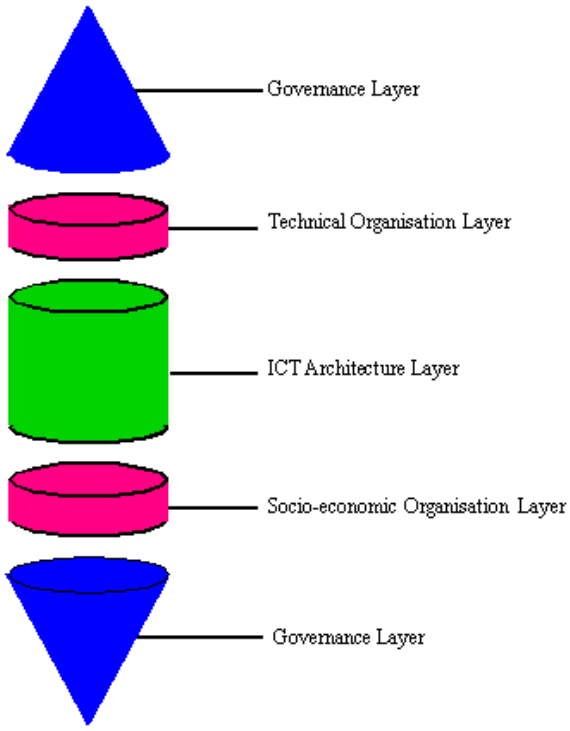


Fig.3.2: Functional Arrangement of Layers of the MuL_Net Framework

The three layers are arranged such that the *ICT layer* is at the core. The *Organization layer* is the immediate next. The organization layer forms the interface between the outer *Governance layer* and the *ICT layer*. The three layer arrangement is shown in Fig.3.1. Figure 3.2 shows the functional representation of the three layers of Fig.3.1. It can be seen from Fig. 3.2 that *Governance layer* and the *Organization layer* are mirrored about the *ICT Layer*. Good governance needs centralized leadership. For this reason, the *Governance layer* has been represented with an apex at its top to suggest the preferred structure. Experts in different disciplines, who form the bulk of the *Organization Layer*, collect and process the data using the technology and present it as information to leaders for implementing strategic plans for their organizations or countries.

Figure 3.3 below shows a cross-section of every layer of Fig.3.2.

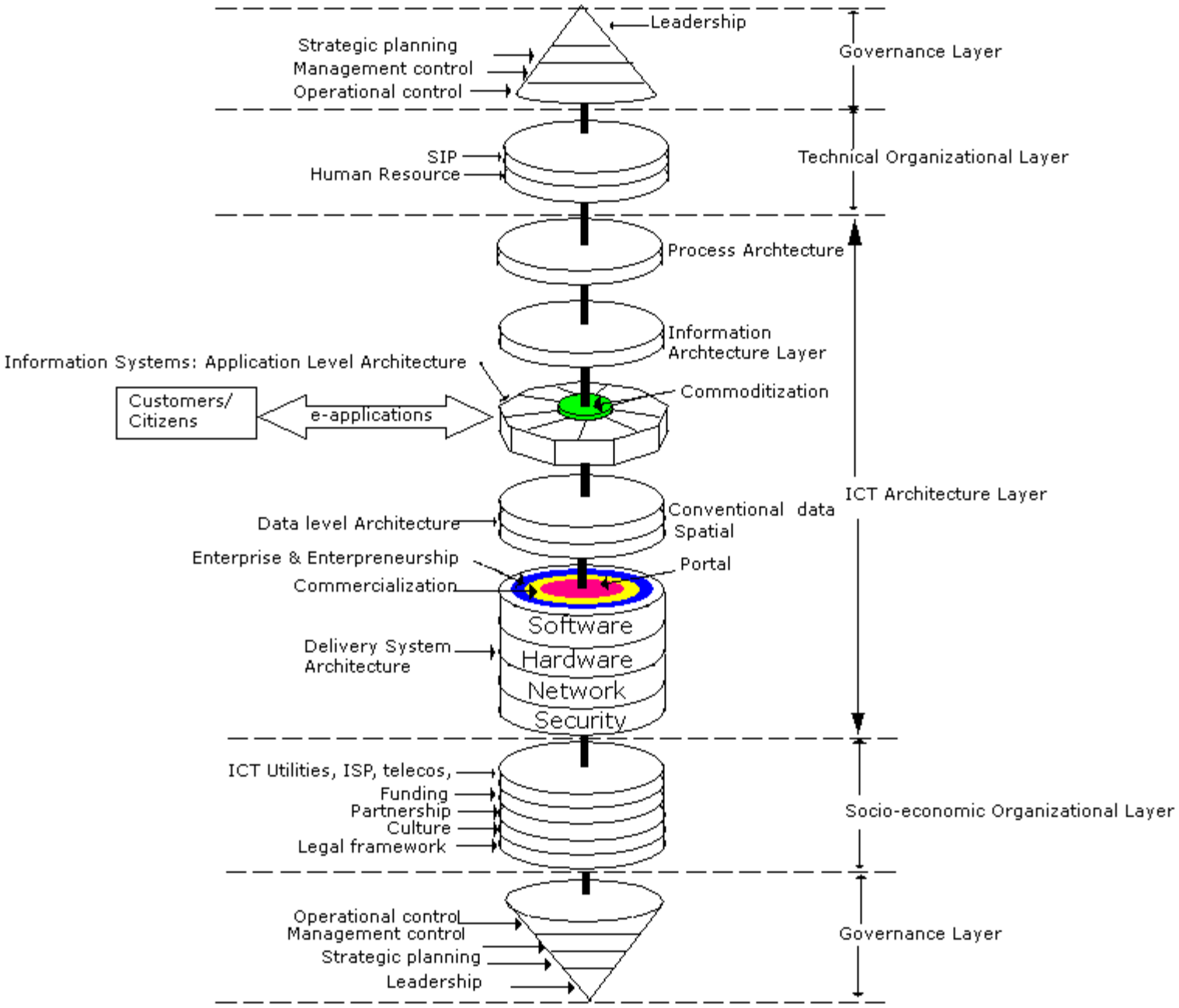


Fig.3.4: Overall MuL_Net Framework Structure

The MuL_Net framework aims at achieving increases in *productivity*, but also broad *cultural changes* in the way information and communications are used in general. It also makes clearer the allowance for local differences in culture- *social capital* and institutional capacity, and supports the need for *real access* to infrastructure and local content. MuL_Net framework clearly shows that the availability of equipment or networks is not enough to derive economic benefits from ICT. Other factors, such as the regulatory environment, the availability of appropriate skills, the ability to change organizational set-ups, as well as the strength of accompanying innovations in ICT applications, affect the ability to seize the benefits of ICT. The in-depth explanations of the framework are given per framework layer and its components under section 3.2.1, 3.2.2 and 3.2.3.

3.2.1 Governance Layer

3.2.1.1 Leadership

Leadership involves use of mostly intelligence; initiative, self-assurance, imagination, courage, decisiveness and energy to influence others take a strategic direction and action. Leaders must plan what is to be done in future, how it will be done, when it will be done and who will do it (Lucey, 1997).

Some leaders especially in developing countries, rather than see available though lower technologies such as radio, as an opportunity to be exploited, they ignore what is at hand

in preference for what seems more advanced or more exciting. Donors, vendors and consultants frequently press politicians in this direction, taking advantage of their sensitivity to criticism that they are otherwise missing the *state-of-the-art*. This has coused enormous opportunities to be lost in the developing world from failure to capitalize on what is available in anticipation of what is elusive (Tipson and Frittelli). Lalkaka (2004) argue that from a development standpoint, distinctions between high or low technology are irrelevant; what is important is that the product or service is useful; friendly to society and the environment; contributes to the overall priorities of economic growth; social justice; and employment. Technology is conditioned by context and culture.

ICT initiatives in poor countries are often driven by the simple assumption that more infrastructure is always better—even where limited resources might be better spent on other dimensions of the development equation. Network switches, Internet routers and computer terminals have the solid aura of reality and serious purpose that provide politicians and senior executives with evidence of permanent accomplishment. But numbers can also be deceptive. The “highest tech” application is not necessarily the “highest return” approach. If development is truly about increasing the productivity of enterprises of all kinds, then the capabilities of infrastructure must relate to the needs of those who can get access to it, at a price they can afford, and for the purposes that will make them successful. The fact that a key capability can be provided by means of a certain technology does not mean that in a given national setting it will be effectively

exploited or that it is even the most cost effective choice among the technologies available.

For that matter, use of CDI described in details in Chapter 2, can help capture the scenario on the ground that can be used to inform leaders to take strategic directions when addressing development issues at community level.

3.2.1.2 Strategic Planning

Lloyd and Emmanuel (2006) argue that before any organization or nation for that matter embarks on planning efforts, it should conduct a self-evaluation and that of its environmental contingencies prior to the start of the process. In addition, where a background of failures in planning efforts exists, a critical evaluation of the context of planning may provide useful insights and explanations for the observed failures. Further, given the difficulties that executives, managers, and organizations appear to face on planning initiation, training programs should incorporate a broader conceptualization of the planning process that reflects not only the critical importance of plan generation and implementation but also the crucial phase of planning initiation as the most tangible evidence of strategic thinking.

Involvement of the Chief Information Officer (CIO) directly in business planning, promotes understanding of business objectives and allows the CIO to contribute to the formulation of business strategies that reflect knowledge of Information Systems (IS)

opportunities. Involvement is essential in order that business processes and management theories become a part of the CIO vocabulary and knowledge set. This further ensures that ICT is properly associated with business needs and that the Information Systems (IS) plan is built around the direction of the business.

When the top management is educated about ICT and the accompanying opportunities, it leads to greater leveraging of IS investments via the creation of managerial IS knowledge. As a result, there is more likeliness of effective use of information resources as they become assimilated into the organizational cognitive processes. Such awareness will also improve top management's perception of the IS function and motivate the Chief Executive Officer (CEO) to become further involved in Strategic Information Systems Planning (SISP).

Integration of the Information Systems Plans (ISP) and Business Plans (BP) ensures that business and IS strategies are created simultaneously with a reciprocal understanding of organizational objectives and technological opportunities. Because such alignment produces more realistic strategies that fully reflect the IS capabilities, implementation of these strategies are likely to be more successful.

There is also need for seeking organizational agreement on the competitive use of IS. Such consensus improves selection of applications, increases returns on IS investments, and promotes matching of business strategies with IS capabilities.

Figure 3.5 shows a full integration whereby both BP-ISP and ISP-BP alignments coexist.

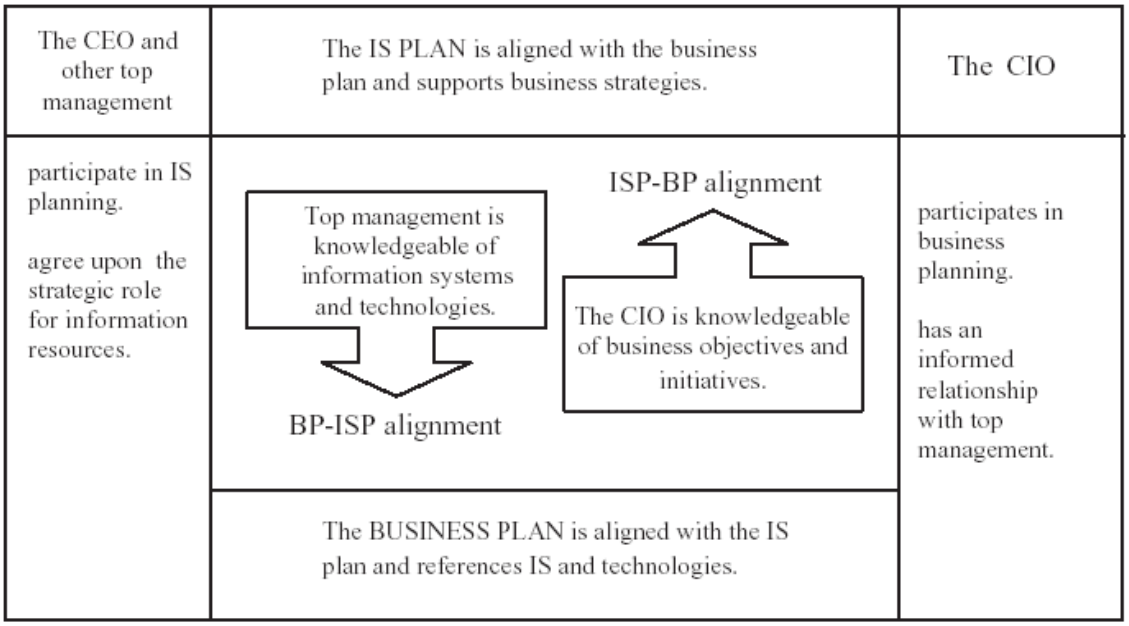


Fig. 3.5: Integration of the Information Systems Plans (ISP) and Business Process plans BP. (Grover, 2006)

The knowledge of the top management, in terms of their understanding of the strategic potential and benefits of the ICT has been highlighted as a critical factor affecting IS performance. The IS knowledge of the top management directly influenced the extent of ICT assimilation in organizations. The top management's understanding and knowledge of the strategic potential of IS, their direct participation in IS management processes in terms of their attendance and contribution to the IS-related committees, task forces and meetings, and their commitment in terms of resource allocation pertaining to IS are important determinants of successful IS performance in an organization.

Therefore, in order to promote a healthy relationship between CIO and CEO, it is important to use certain structural mechanisms such as direct reporting relationship, appropriate position or rank and an enhanced role for the top IS executive. Ranganathana and Kannabiranb (2004) noted that the success of IS implementation and IS diffusion were contingent upon the rank and role of the senior IS executive, and their relationship with the CEO. Their argument was supported by the fact that the proximity between the CEO and CIO greatly enhances the availability of resources, introduction of new systems and support for organizational changes necessary for successful IS performance.

According to Gary Homes (2001) many demands face managers/CEOs in modern organizations, particularly following the effects of downsizing and flattened organizational structures, hence managers have to be concerned with product and/or service quality; financial planning and accountability; organizational change; risk and project management; efficient use of resources (especially human resources); teamwork and leadership; stress and counseling. Today's businesses demand managers to be more business aware, to have: financial acumen; excellent communication skills; analytical expertise; design creativity; organizational ability and management expertise; technical knowledge; and vertical skills. The ability to be a hybrid manager is about displaying the appropriate skills and attitude for the situation and environment you find yourself in, as no one can be expected to be doing all of these things all of the time. By reflecting the situation and the environment in their behaviour and use of competencies, the manager will be less threatening to those around them and will be more likely to survive the many challenges they face.

Most hybrid managers combine specialist activity and managerial responsibility. However, W. David Rees (1996) argues that unless the process of converting specialists into hybrid managers is carefully planned, management responsibilities may be neglected in favour of specialist activity. The main remedies identified include careful role definition, selection, management development and monitoring of managerial performance. In this digital era, a hybrid manager ought to be an individual with an understanding of not only core business of an organization but also ICT. Gerry O'Connor and Clive Smallman.(1995) observe that such hybrid managers can bring a number of benefits such as: improved internal communications; bridging of cultural and political gaps within the organization; promotion of a better understanding of and more effective use of systems; and encouragement for a proactive attitude to change. This type of change is not without cost. Organizations looking to develop hybrids must adopt a long-term view that encourages the hybrid to learn and develop into the role. Information needs to be considered as a strategic resource – in the same way that finance and personnel are.

3.2.1.3 Management Control

The management control consists of three elements namely:

- Business case
- Project charter and the gating and
- Gating, reviews and approval process.

The business case puts the investment decision in a strategic context and positions the business objectives and options that will affect both the decision and the investment itself. It provides the information necessary to make a decision about whether a project should proceed. It provides an analysis of all the costs, benefits and risks associated with a proposed investment and with the reasonable alternatives to the proposed investment with the support of IDI described in Chapter 2. The project charter in this case is a signed agreement between all stakeholders that defines the objectives, roles, responsibilities and level of participation of each stakeholder. The gating, reviews and approval process establishes in the project charter the project review gates. The review gates are the major decision points of a project. For each gate, the deliverables for that review, the stakeholders responsible for reviewing each deliverable and the appropriate approval authorities are defined.

3.2.1.4 Operational Control

The operational control mainly deals with logistics that is separately explained in section 3.2.1.5, and data management for all specified processes under the management control.

Data storage and management function is mandatory in order to meet the information needs of all stakeholders (O'Brien, 2004). The operational control also has a duty of ensuring that digital information is preserved and made accessible for the present and future. In the case of governments, this is where the policy on management of

government information systems is implemented. The database and delivery system architecture for this purpose proposed by MuL_Net framework is described in section 3.3.2.

3.2.1.5 Logistics

Organizations today and particularly in Africa, face great challenges because any successful provision of goods and services requires effective integration of logistics (Chapman, Soasay and Kandampully, 2002). In the past, organizations could choose to be low-cost or high-quality producers, but not both. In contrast, the new competitive pressures, force organizations to compete on the basis of more than one dimension. In this section it is argued that logistics provides a way for organizations to achieve simultaneously the necessary level of performance on multiple competitive dimensions. Moreover, logistics also serves as a mechanism of integrating and coordinating all distributed functional elements of the organization (Stock, Greis and Kasarda, 1999). Therefore, in this new competitive environment, logistics must be accorded a high strategic priority. This can be achieved according to Razzaque and Sheng (1998), when an organization handles its logistics activities effectively and efficiently through considering the following options:

- Providing the logistics function in-house.
- Owning logistics subsidiaries through setting up or buying a logistics firm.

- Outsourcing the function and buying the service. Among the many factors that may act as driving forces behind outsourcing, globalization of business has been viewed by many as the most prominent. Also the increasing popularity of just-in-time (JIT) principles is another major factor promoting outsourcing.

3.2.2 Organizational Layer

3.2.2.1 Sustainable Integrated Process-based Framework (SIP)

SIP has been developed by modifying and improving some of the sections of the Enhanced Framework of Canada (Chief Information Officer Branch, 1998). The development of SIP was necessitated by the need to ensure observance of technical standards and professionalism in order to guarantee e-application projects' success.

SIP Key Pillars

SIP defined three key pillars that set the broad parameters within which e-applications projects such as e-health, e-government and e-commerce can be implemented and managed successfully. These are as follows:

First Pillar: Alignment of e-applications with business directions on condition that projects are compatible with both the business and information system plans of a

department, comprehensive business-case analysis has been done, and stakeholders are fully involved in all phases of the project.

Second Pillar: Creation of accountabilities and responsibility for all stakeholders, leaders and project managers.

Third Pillar: Use of skilled and professional project managers capable of managing risks.

Once the above three pillars of SIP are in place, the roadmap to a successful adoption of e-applications shown in Fig.3.6 and described is applied. The roadmap has four levels namely: Level 0- Baseline, Level 1- Project Target, Level 2- Product Target and Level 3- Organizational Target. At Level 3, the roadmap provides an avenue for lessons and best practices packaged as *process solutions* to be availed and applied to e-applications at the Level 0.

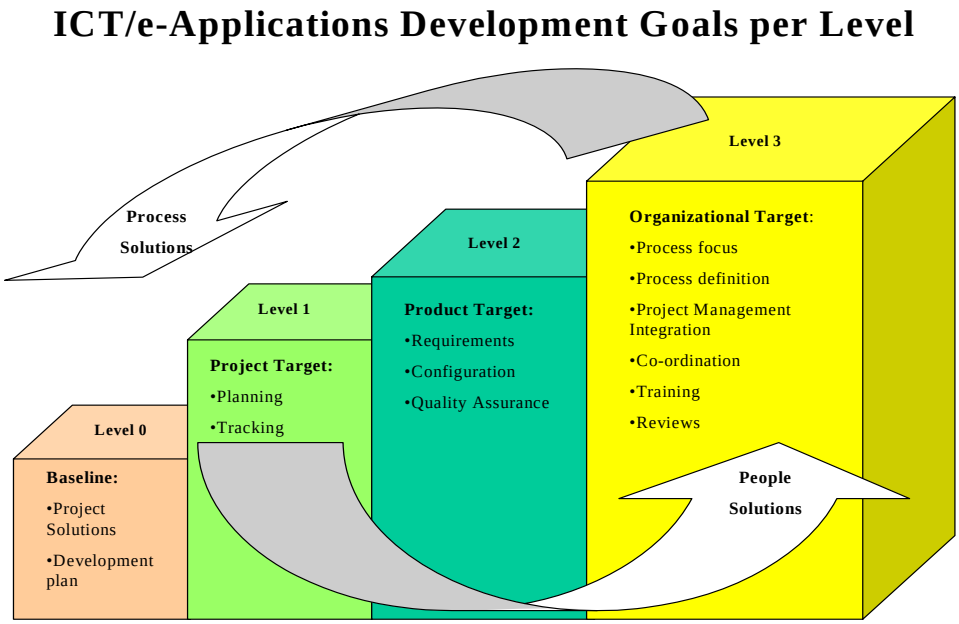


Fig.3.6: E-applications adoption Roadmap

Level 0: Baseline

At this level a clear and explicit business case, an ICT procurement strategy, a project charter, a gating and review process, a project planning and control mechanism and a risk management approach must be realized together with a plan for moving to Level 1. This is accompanied with a mechanism of monitoring and evaluation.

Level 1: Project Target

This level requires documentation of the project estimates, activities and commitments for purposes of planning and tracking the project. Actual results and performances are tracked against the plans and corrective actions taken where necessary.

Level 2: Product Target

At this level, the system requirements are captured accurately to ensure that the products and activities are kept consistent with the system requirements with an aim of ensuring that if the design captures the system requirements correctly, it reflects the reality. It is important at this level also that configuration and quality assurance management activities are envisioned and planned.

Level 3: Organizational Target

This is the final level, which ensures that the best practices implemented in one project are captured and can be reproduced in another project. It comprises of procedures that are designed to ensure proper planning and implementation. These procedures can be summarized as follows:

a) Organization-level process development and improvement activities are planned.

b) Participation in the organization's process improvement activities is planned

c) Quantitative process management activities are planned.

d) Continuous process improvement is planned.

e) The project's quality management activities are planned.

f) Incorporation of technology changes is planned.

g) Review activities are planned.

h) Measurable goals for product quality and their priorities are defined.

i) Training for the development of the skills and knowledge needed to perform both software and hardware management and technical roles is provided.

j) The organization's standard process and the projects' defined processes are improved continuously.

k) Standards for the organization are developed and maintained.

l) Process performances of the project's defined processes are controlled quantitatively.

m) Actual progress towards achieving the quality goals for the products is quantitatively managed.

n) New technologies are evaluated to determine their sustainability, effect on quality and productivity.

o) Appropriate new technologies that are sustainable are transferred into normal practice across the organization.

p) The design- gap analysis (Heeks, 2003) done on seven key dimensions, namely: information, technology, process, objectives and values, staffing and skills, management systems and structures, and financial resources. Any

detectable design- reality gap is acted upon to remove or minimize it. That means, changing the design and/or changing the existing reality to match the requirements captured in the design of the e-application.

3.2.2.2 Funding

The governing body is always the custodian of all available resources of an organization or country. It is also charged with the responsibility of sourcing for funds should the available funds be inadequate for the approved development plans. Before any expenditure is made, it needs to be justifiable. In the case of technologies and especially new foreign technologies, Dunmade (2002) developed a model described in chapter 1 and shown in Fig.1.1, that enables selection of new foreign technologies including ICT that are presumably sustainable, hence preventing wastage of scarce resources and protection of the environment from degradation. After selection of sustainable ICT, in order for governments, private sector and financial institutions to support ICT initiatives and projects investments, they need to have been analyzed. Consequently; the use of IDI described in Chapter 2 section 2.1 would offer the necessary analysis to ensure to a greater extend that risks involved are quantified and understood.

Application of IDI enhances the selection of viable, feasible and sustainable ICT initiatives. Use of IDI would enable most national and international financial institutions to fulfill their development roles. Once financial institutions appreciate the use of IDI as a decision support method that takes into consideration possible risk factors that are

quantified and understood, application of IDI in identifying feasible ICT initiatives would convince financial institutions and development partners to fund such initiatives. This is because, the possible risks would have been identified in advance, understood, and the best option selected, before any financial request and commitment is made. Therefore, the perennial problems of financial limitations are expected to reduce.

3.2.2.3 Partnership

Governments should not be expected to build ICT infrastructure single handedly. They should partner with private sector. The involvement of private sector is critical to operation and brings a better sense of running projects as businesses with a real probability of return on investment.

The WSIS Plan of Action suggests that the private sector is expected to drive ICT access whether by way of universal service incentives or obligations to rollout ICT infrastructure beyond the limits of market viability (Currie, 2004). This strategy emphasizes the importance of *Public-Private Partnerships* as a tool for bringing the skills and resources of the business and NGO sectors into strategic collaboration and alignment for realization of sustainable development and in agreement with remarks made by Tipson and Frittelli. Figure 3.7 shows in details the ICT Architecture Layer of Fig.3.4. Once there are policies and regulations that support public private partnership the investment and development of ICT infrastructure, in this case, the delivery system can be done by any or both partners. The private sector is particularly motivated to participate in this development by profits,

that is, when it knows that there is great need from citizens for services enabled by such development. Especially if they can commercialize and create commodities that can be tapped through e-applications such as e-government, e-commerce, e-entertainment among others. Thus quality electronic service delivery can be sustained since competition is encouraged and tendency to ensure return on investment is high.

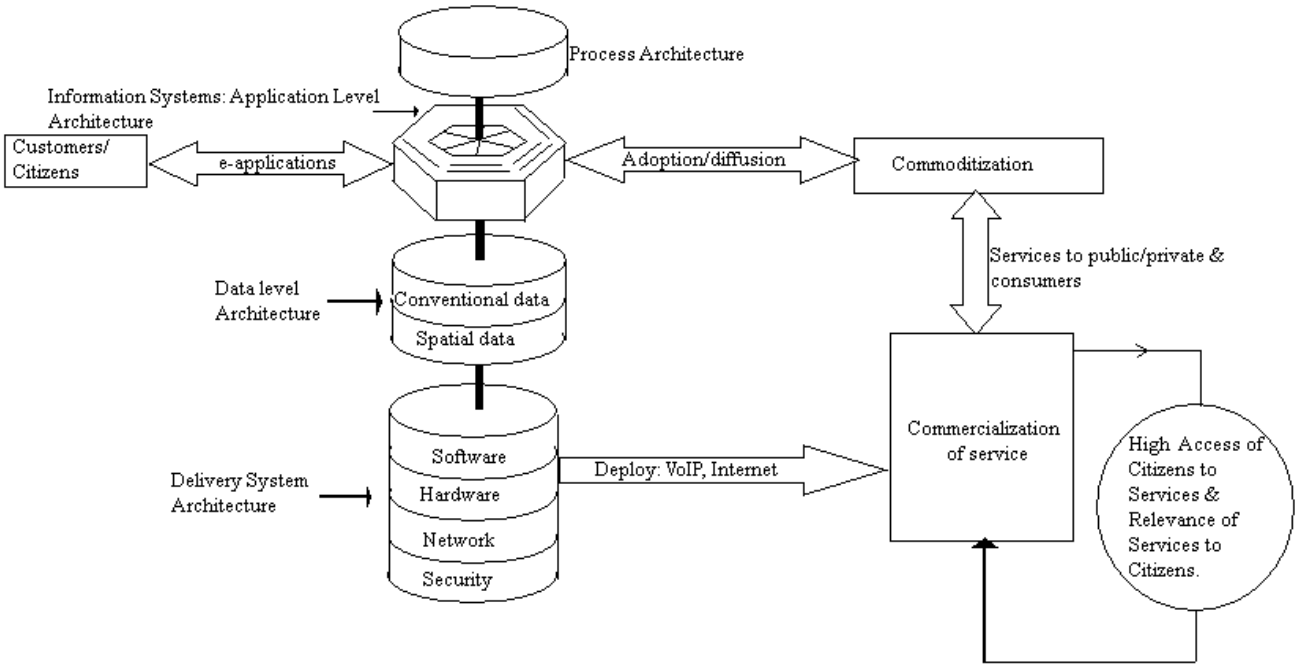


Fig.3.7: Public Private Partnership in support of Commercialization and Commoditization

3.2.2.4 ICT Utilities, ISP and Telecos

Today, most electricity carrier operators are seizing the opportunity created by Fibre Optic Technology in relation to existing power grid transmission networks. This is

prompting many power utility companies worldwide to invest in the telecommunications sector by obtaining licenses as Bandwidth Bulk Carriers based on Fibre Optic Technology. This action has great potential of accelerating the universal service and access rollout. Internet Service Providers (ISPs) are some of the major promoters of data networks due to considerable changes in the dynamics of operations in the telecommunications industry over the past decade or so. However, ISPs avoid satisfying traditional telecommunications regulatory requirements of having to pay access charges and contributions to universal service funding (Frieden, 2002).

Since the telecommunications and Internet worlds have merged, MuL_Net framework suggests that ISPs particularly when they offer services functionally equivalent to what their telecommunication counterparts offer; telecommunications regulations should apply in the absence of new ISP regulations. Such regulatory challenges demand for regulating services as opposed to technologies.

3.2.2.5 Culture

Local culture is, in effect, the operating "software" of any society and the source of the "social capital" that keeps a community together and makes it function (Tipson and Frittelli). This is where shared beliefs and values are address. The finest e-strategy and the deepest pocket will not produce a modern "information society" if citizens are not able to capitalize on the options created. The challenge for all countries is to promote "cultures" of ICT capability—local, provincial and national capacity to use technology

effectively. Like the strong relationships and values that social scientists refer to as "social capital," establishing stronger conditions for the effective use of information and communications in economic and social pursuits involves a holistic change in "lifestyle" and attitudes in order to facilitate the kind of collaboration these technologies make possible. Yet changing culture in this fundamental manner is a daunting assignment that suggests the kind of "social engineering" more characteristic of authoritarian societies (Tipson and Frittelli). The majority of the world's population is still traditional and depends on the traditional knowledge of its flora and fauna for food and medicine. This knowledge has to be preserved and supplemented by modern technology. Rural people have a shrewd sense of what helps or hurts them, but governments as well as international businesses and their agencies have ignored this knowledge and instead focused on power and money. The MuL_Net framework captures and strengthens the cultural aspect as a significant ingredient in using ICT to boost the pace of development.

A culture of networking, information sharing and risk-taking should be promoted. According to the Human Development Report (2004), if the world is to reach the MDGs successfully, it needs to accommodate the cultural diversity first, and focus on empowering the poor solve their problems and satisfy their needs.

3.2.2.6 Legal and Regulatory Framework

A legal and regulatory framework must be established to protect the interests of both the investors and the public. To mainstream ICT in order to contribute to balanced development:

i) ICT regulatory authorities in countries need to be centralized in order to consolidate jurisdictions that had otherwise been dispersed across various agencies, hence simplifying telecommunication regulations, and as a result, effectively enforcing the desired liberalization.

ii) Regulatory bodies must restructure along functional lines since ICT industry boundaries are disappearing due to convergence of technology.

iii) Regulators, legislators and judges need to guard against instances where the unregulated Internet provides a loop-hole or arbitrage opportunity to evade regulatory responsibilities (Rob Frieden 2002).

iv) Regulatory bodies should be separated from, and not accountable to, any supplier of basic telecommunications services in accordance with WTO (Henderson, Gentle and Ball, 2005).

v) Allow high level of competition in ICT

vi) Regulation must support liberalization and competition in the telecommunication market in order to attract FDI in ICT.

vii) The United Nations Commission on International Trade Law developed a Model Law to facilitate the use of modern means of communications and storage of information (United Nations Commission on International Trade Law, 2005). The Model Law if integrated in national legislations and regulations, it enhances legal certainty regarding the use of electronic signatures. Nations need to include and integrate the use of e-signatures in their legislation in order to create an enabling environment for e-applications adoption.

viii) Removal of licensing restrictions on the technological type of networks an operator may deploy (Currie, 2004).

ix) The regulations need to enable a market that encourages significant innovation, experimentation and learning activities in ICT. This promotes investment in the learning by both suppliers and users as a foundation for the rollout of information infrastructure facilities and services (Molody, 2003). For organization of all sizes and particularly individual end users, there often needs to be a significant degree of experimentation and learning to discover beneficial applications of new services, and to find a match between demand and supply. If regulations can

foster an environment for widespread experimental applications by end users and intermediaries, this would help stimulate the growth of effective demand.

Recommended regulatory practices that takes into cognition ICT convergence include (Boateng, 2004):

- Avoidance of automatic imposition of old rules designed for monopolies on new services and entrants
- Application of minimum regulation on nascent applications and technologies
- Once new applications start competing with existing applications, deregulation of the old applications must be considered.

3.2.2.7 Human Resources

Human and intellectual capital is the most important resource in the quest for sustainable social and economic development of any organization or country. ICTs are now a focal point for national development in many countries. Therefore, there is need to have highly qualified and skilled manpower in the ICT sector to take full advantage of opportunities presented by the new global information-based economy.

Proficiency in ICT skills is now regarded as important as basic reading and writing skills. In order to achieve computer literacy among the entire population, it is critical to incorporate ICT into both the formal and informal education system of a nation.

However, it must be noted that this process does not begin and end with putting computers in schools. They must be used in order to generate the required value or benefit the country or organization. For such benefits to be realized, some corresponding changes are necessary in the teacher training, curriculum development, content development and education management/administration system.

3.2.3 ICT Layer

3.2.3.1 Process Architecture

Once the CEOs and CIOs have identified the processes that need to be automated, suitable process architecture has to be applied if efficiency is to be attained in the organization. Karsten and Maria (2004) argue that interconnecting business processes across systems and organizations provides significant benefits such as greater process transparency, higher degrees of integration, facilitation of communication, and consequently higher throughput in a given time interval. Therefore, the inclusion of workflows and workflow management systems in process architecture has become fundamental.

Workflow is the automation of a business process, in whole or part, during which documents, information or tasks are passed from one participant to another for action, according to a set of procedural rules (Minder , Dongsong and Lina, 2005). It has now been adopted as a way to implement the cross organization management needed to carry

out businesses. Conventionally, business processes were implemented by hard-coding business process related aspects, such as control and data flow, into the organization's software systems. This leads, however, to inflexible systems that were hard to modify and maintain. Work-flow is a technology that addresses such problems by separating and abstracting business processes from the software systems. A workflow management system (WfMS) (Jianxun , Shensheng and Jinming, 2005) is used to define, create, and manage the execution of workflows through the use of software running on one or more workflow engine. The engines can interpret the process definition, interact with workflow participants, and, where required, invoke the use of IT tools and applications.

Several XML-based information interchange standards such as Wf-XML and XML Process Definition Language (XPDL) have been developed to support integration of workflow systems (Minder , Dongsong and Lina, 2005). The conventional BPM solutions often lacked the capability to integrate external applications due to their limited support for interoperability. However, the emerging of Web services as an enabling technology for BPM, offers effective and standard-based means of improving interoperability among different software applications over Internet protocols.

Current organizations need a continuous and dynamic reorganization of their processes to allow them to be more efficient. The principal aim of business process reengineering (BPR) is to design techniques that allow, simulation and checking of different sets of processes in order to improve organizations. This task can be accomplished manually or by using modeling tools. Currently there are many sophisticated modeling tools that help

organizations make their processes more efficient through graphically designing process models and simulating them. Ricardo et al (2002) observed that several tools for modeling, simulating and optimizing business processes existed and had characteristics that included: offering an interface for process modeling, simulating processes, and exporting processes to workflow process description language (WPDL). Therefore it is important that an appropriate tool is selected if an organization is to implement efficient processes.

3.2.3.2 Information Architecture

Once the governance layer and the organizational layers are put in place in accordance with section 3.2.1 and 3.2.2 respectively, it follows that the first thing that should happen is to identify information needs of the organization that will help achieve the aims of the organization. The kind of information needs will determine the role of ICT and specify the accompanying information systems for that organization or country. The information needs of an organization normally fall into four categories, namely: automation, optimization, reengineering and transformation (Heeks, 2003). Therefore when a suitable information architecture is in place, it ensures efficient, timely and optimum utilization of information as a resource.

3.2.3.3 Information Systems Architecture

In order to relate the processes identified in the above section with their relevant information efficiently, appropriate information systems architecture has to be in place.

The information system sub-layer consists of e-applications such as e-education and training, e-health, e-government, e-industry, e-commerce and e-business among others. At this sub-layer is where the required information to accomplish the aims of the organization is identified and the information systems that can deliver it appropriately are designed and implemented.

The organization usually has a certain change it wishes to effect. The kind of change pursued dictates the category and phase in which its information needs belong.

The automation phase involves changing from manual operations to ICT operated via deployment of information systems. As a result the same things are done but with greater efficiency, faster and cheaper.

The optimization phase involves changing applications by rationalizing data structures and weak processes. The information system cost and personnel are closely controlled to ensure better ways of doing the same things.

The reengineering phase is where redesigning data structures and work processes changes the organization. Information Systems are coordinated in such a way that the same things can be done in radically different and better ways.

The transformation phase implies changing the organization by completely transforming data structures and work processes so as to produce new things. Even if and organization or nation evaluates itself and finds that it ultimately needs to transform its operations, its better for it to try and avoid skipping any of these phases. This is because; skipping introduces a big sudden change, which exerts a lot of pressure on members. Integrated approach supports incremental objectives from automation to transformation. This is where the results of a given change are the basis for the next change.

3.2.3.4 Data and Delivery System

E-applications that are web-based are easier to adopt and ensure high access and availability to their clients. Figure 3.8 shows database architecture together with the delivery system suggested for implementation by the MuL_Net Framework.

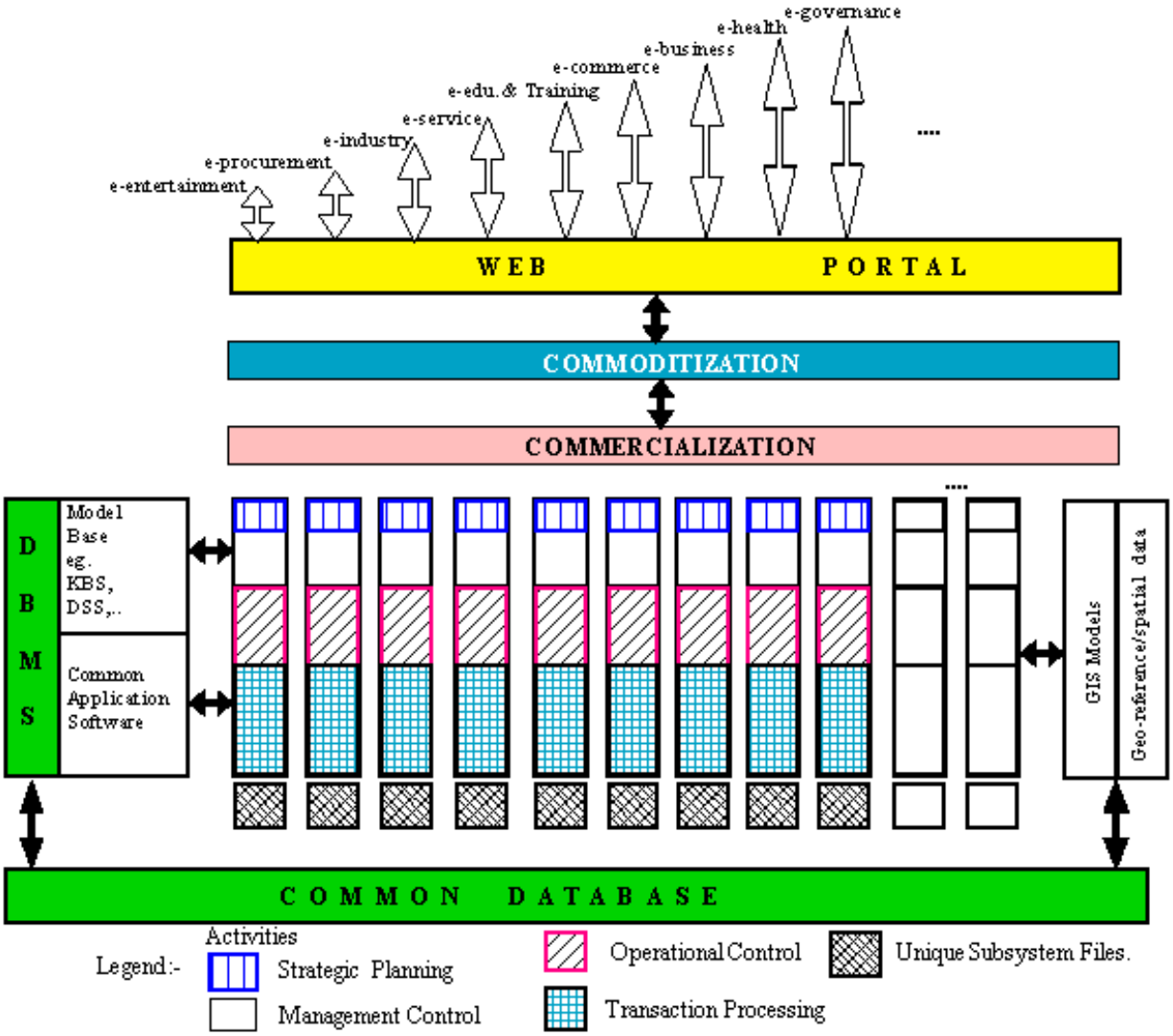


Fig.3.8: Generic Databases and Delivery System for E-applications Deployment

The transaction processing in this architecture takes care of the automation phase where manual processes are now ICT operated hence speeding them up and achieving greater efficiency.

The operational control basically targets optimization. This can only be achieved when data structures and work processes are rationalized. Here information systems and their personnel are controlled for purposes or realizing better ways of doing the same things.

The management control coordinates information systems in such a way that the same things can be done in a different way. That means that there is need to reengineer. Reengineering demands that data structures and work processes are redesigned.

Strategic planning activities of any organization include exploring ways of producing new products and adding value to already existing ones. This in most cases requires transforming data structures and work processes. The strategic planning activities determine which product or information can be commercialized and be made available to the public as commodities. These commodities can then be availed via a web portal (Internet) in support of different e-applications such as e-commerce, e-heath, e-governance etc. These commodities could also be provided in form of CD-Rom of specific national data sets, information, analysis and reports.

This data architecture enforces the following:

- Integration of data from a number of sources, thus enabling the memory of organizations to be vastly magnified

- Enhancement of the organizational intelligence, by enabling new ways of integrating or matching data that will yield much more information about its external environment as well as internal processes.
- Flexibility in arranging who may access and exploit information resources, and how information-dependent processes are undertaken
- New types of interactive communications within and between organizations and applications.

The generic databases and delivery system for e-applications deployment architecture takes into consideration section 3.1.1 on MuL_Net framework building principles. It is designed to support ICT initiatives, achieve focus and specialization in conformity to a layer-based value chain (Heuermann, 2004) shown in Fig.3.9.

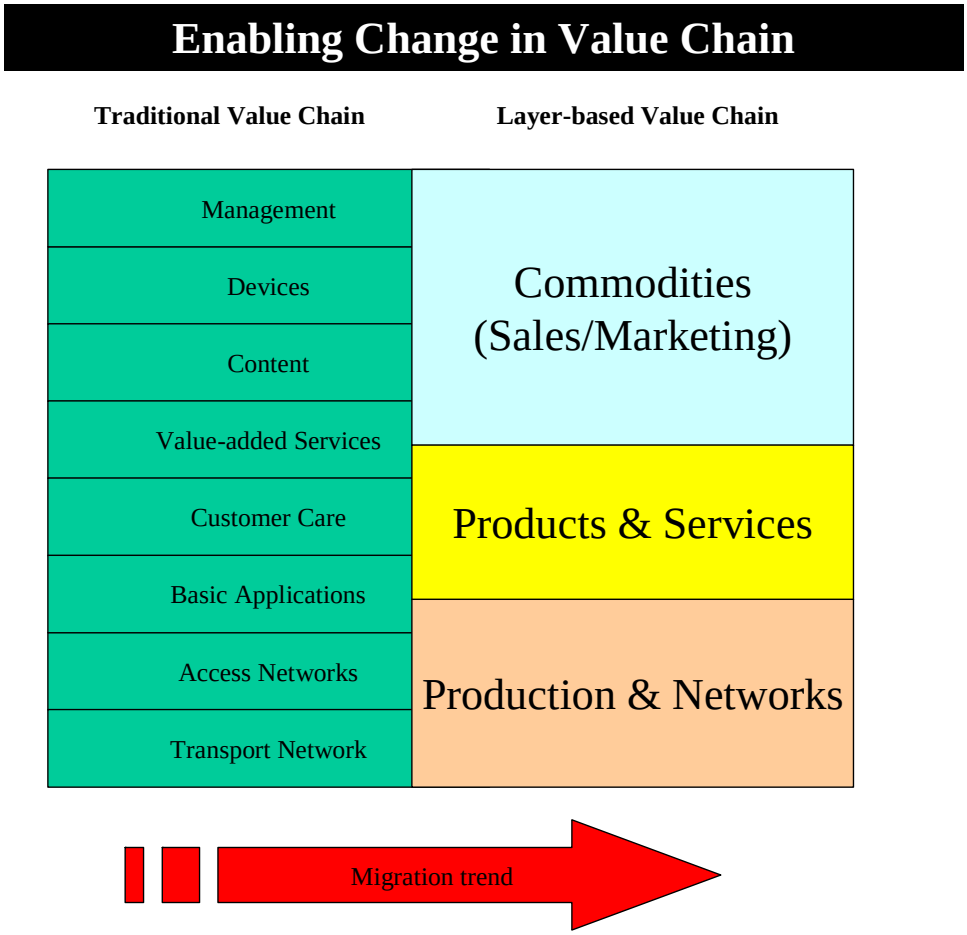


Fig. 3.9 Evolved Value Chain

General functions of each value chain layer (VCL) are as follows:

Production and Networks VCL

- Management of assets and bandwidth
- Deal with carrier alliances and outsourcing
- Automate processes

- Enable convergence of fixed and mobile (FiMo) networks
- Specialize in wholesale
- Create economies of scale
- Focus on cost and operational efficiencies

Products and Services VCL

- Enforcement of management of innovations
- Avail multi-functional commodities
- Promote partnership
- Align product portfolio with market requirements
- Specialize in product development
- Develop products and innovations that are customer-centred and with a convergent portfolio
- Develop intuitive, universal and personalized user interfaces for all applications and devices
- Implement adequate security on authentication and authorization
- Implementation of multi-access service platform
- Enable modularization and diversification of services portfolio
- Implementation of FiMo networks convergent broadband services

Commodities VCL

- Produce commodities that are lifestyle and needs oriented
- Prepare for broadcasting, telecommunications and Internet convergence
- Contract management
- Partnership promotion
- Specialization in marketing

In each layer, horizontal integration is encouraged. For instance, in the production and networks VCL, horizontal integration involving data, mobile and fixed networks can be achieved as demonstrated in Fig 3.10.

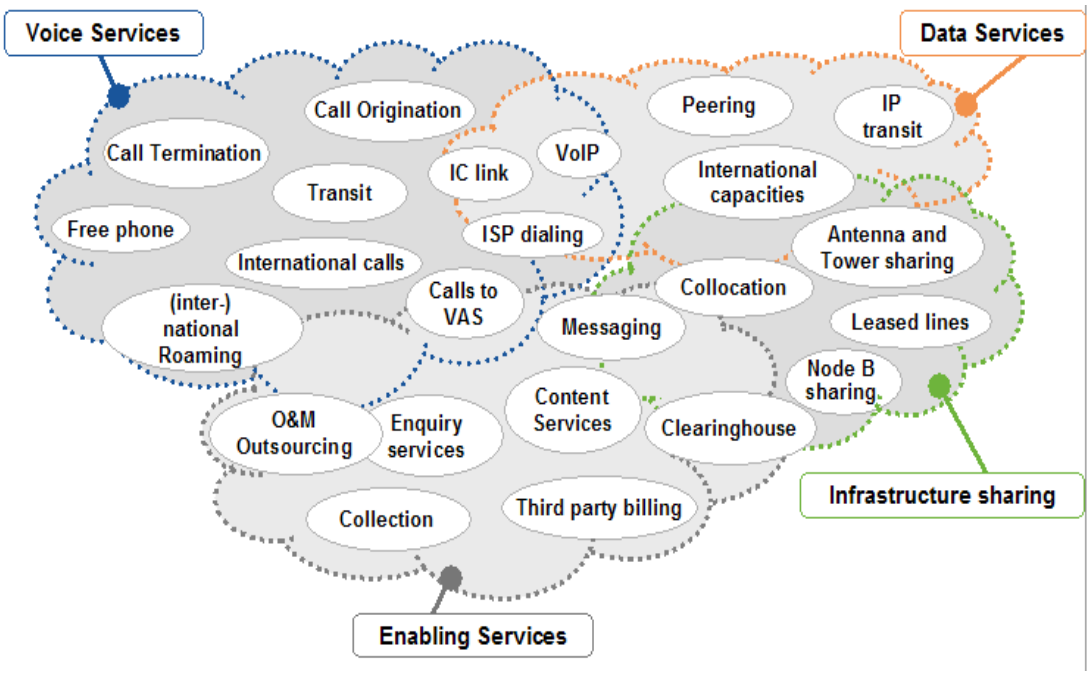


Fig. 3.10: Production and Networks VCL (Heuermann, 2004)

The generic databases and delivery system for E-applications deployment is also designed to support all the four phases of information needs explained in section 3.2.3.2.

3.3 MuL_Net Framework Connectivity

The layers of the MuL_Net framework do not work in isolation that is why a spindle connecting two adjacent layers has been included. Fig.3.11 shows how this model extends connectivity to its environs and stakeholders such as Civil Societies, Non Governmental Ognizations (NGOs), Public and Private. The inner circle represents the MuL_Net framework applied at national level. The borderline of this circle represents the point of connectivity for all entities and in this case marked Internet and satellite. Therefore a nation that has implemented this MuL_Net framework would be connected to other nations, regions and the entire globe.

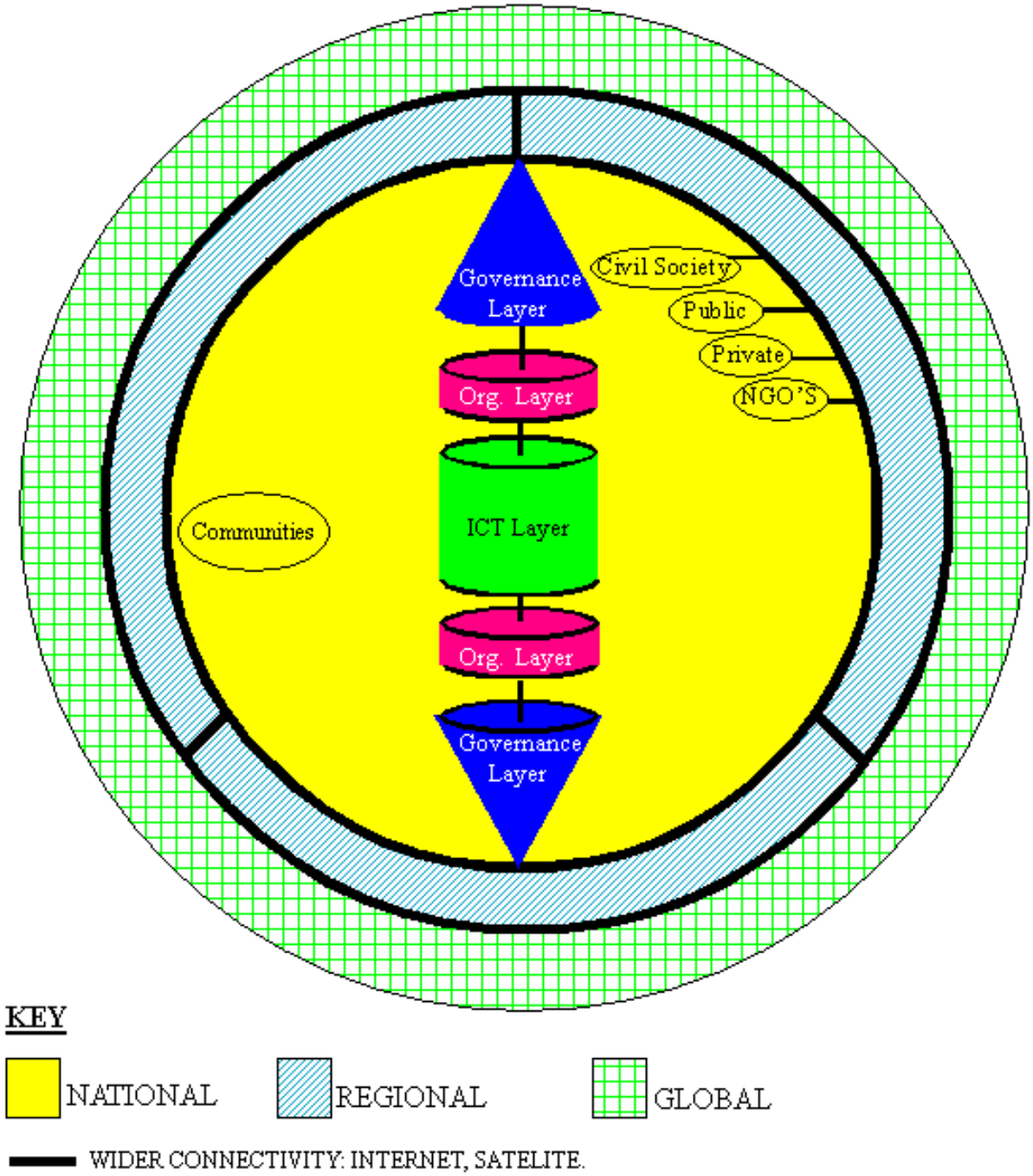


Fig.3.11: MuL_Net Framework Connectivity to external Entities

3.4 Challenges

Barriers that most models face or experience include political, structural and cultural barriers. Political barriers arise when having information means having power. Therefore sharing information means sharing power. Once this is perceived that way, then information flow is blocked as away of concentrating power. The greater the importance of information to the organization, the more constricted the information flows. Simply because, when the information is the primary unit of the organizational currency, we should not expect its owners to give it away without a serious debate.

There is lack of sufficient effort to develop interdisciplinary or hybrid managers with Information Technology and Information Systems skills. These are the kind of managers required by governments and modern organizations. Deliberate efforts must be made to develop such managers if e-strategies like MuL_Net framework are to be adopted successful and harnessed fully.

3.5 Conclusion

MuL_Net framework builds a need-based and development-oriented strategy. It recognizes and supports successful adoption of e-applications in a way that would contribute to sustainable production and consumption patterns, and reduction of traditional barriers. The MuL_Net framework marks a shift from the old vertical sectoral e-strategy model that was based on the distinct communication sectors, to a new three Muti-Layered and Networked framework for ICT shown in Fig.3.1 in which the role of

all these sectors is conceptualized in an integrated and holistic approach as a result of the growth of the Internet, convergence and digitalization.

When the top management is educated about ICT and the accompanying opportunities, it leads to greater leveraging of IS investments via the creation of managerial IS knowledge. The IS knowledge of the top management directly influenced the extent of ICT assimilation in organizations. Its preferable if such top managers have characteristics of hybrid managers. Hybrid managers can bring a number of benefits such as: improved internal communications; bridging of cultural and political gaps within the organization; promotion of a better understanding of and more effective use of systems; and encouragement for a proactive attitude to change.

MuL_Net framework emphasizes the importance of *Public-Private Partnerships* as a tool for bringing the skills and resources of the business and NGO sectors into strategic collaboration and alignment for realization of sustainable development. Telecommunications and Internet worlds have merged, hence MuL_Net framework suggests that ISPs particularly when they offer services functionally equivalent to what their telecommunication counterparts offer; telecommunications regulations should apply in the absence of new ISP regulations. Such regulatory challenges demand for regulating services as opposed to technologies.

All nations have a challenge of promoting a culture of building ICT capability. MuL_Net framework captures and strengthens the cultural aspect as a significant ingredient in using ICT to boost the pace of development such as networking and information sharing.

The MuL_Net framework is an integrated, need-based and development-oriented framework that is designed to recognize and support all e-applications.

CHAPTER 4

4.0 REGIONAL TRENDS IN ICT

4.1 Introduction

The Economic and social transformation of nations has been brought about by technology among other things. Both policy analysts and academic researchers have been interested in understanding and articulating these phenomena especially, when governments constantly need information about the performance of their own country relative to other countries. Several methods are currently in use including e-readiness indices. However, the criteria of generating the e-readiness indices are not uniform. For one to produce an e-readiness index, at least two indicators have to be summed, subtracted, multiplied or divided yet research has shown that as of now there are no meaningful theories that justify such algorithms (Achibugi and Coco, 2005). To make it worse, the selection of the ingredients of the e-readiness index depends heavily on the value judgment of the scholars as well as on the availability of the data.

As it stands now, one of the best options for informing policy makers and governments is to use indicators. This section discusses trends and analysis of ICT indicators such as mobile phone subscribers, mobile communications revenue, annual telecommunication investment, international bandwidth and mass media usage (MMU) in relation to ICT policy, e-strategy and enabling environment for COMESA, EAC, EU and OECD based

on the 2005 ITU and DHS databases. Correlation analysis among indicators was done in attempt to establish emerging commonalities and differences among these regions and the accompanying lessons noted.

In general this section discusses trends of ICT indicators with a view of informing sub-regional and regional ICT policy. A period of ten years starting from 1993 to 2002 was studied for COMESA, EAC, EU and OECD. In some cases the full range could not be covered due to lack of data for some years, however, it was sufficient in helping propose meaningful and significant regional policy aims.

4.2 ICT Indicators Trend Informing Policy, Strategy and Regulation

The trend in bandwidth with time for COMESA and OECD countries indicates that bandwidth was growing with time as shown in Fig.4.1. This confirms the remarks made by Grandtham and Tsekouras (2004) that most developed countries are strategizing for knowledge-based economy through investing in telecommunications systems and bandwidth. In the OECD countries the broadband Internet service is defined as 256 kbps downstream and 64 kbps upstream (Wu, 2004). Therefore all the OECD countries have sufficient broadband that enable innovation and evolution of advanced communication services and overall economic growth in accordance with the school of though of Gillet et al (2004). For such a trend to be observed, it means OECD countries have made broadband a priority (Frieden, 2005) so as to guarantee the future of Internet in those countries. Broadband has been known to have great potential of improving quality of

education and heath services; connectedness of government with society; and provision of jobs and prosperity (Firth and Mellor, 2005).

The future of the Internet has been perceived to be strongly dependant on broadband and hence the industry groups and analysts have stressed the importance of broadband access for continuing the evolution of advanced communication services and overall economic growth (Gillett et al, 2004). Though on average, COMESA countries have broadband as shown in Fig.4.1, there is need for it to be given national priority in order for it to develop enough to support national services and economic growth. It has been noted that broadband development thrives when it becomes a national priority (Frieden, 2005).

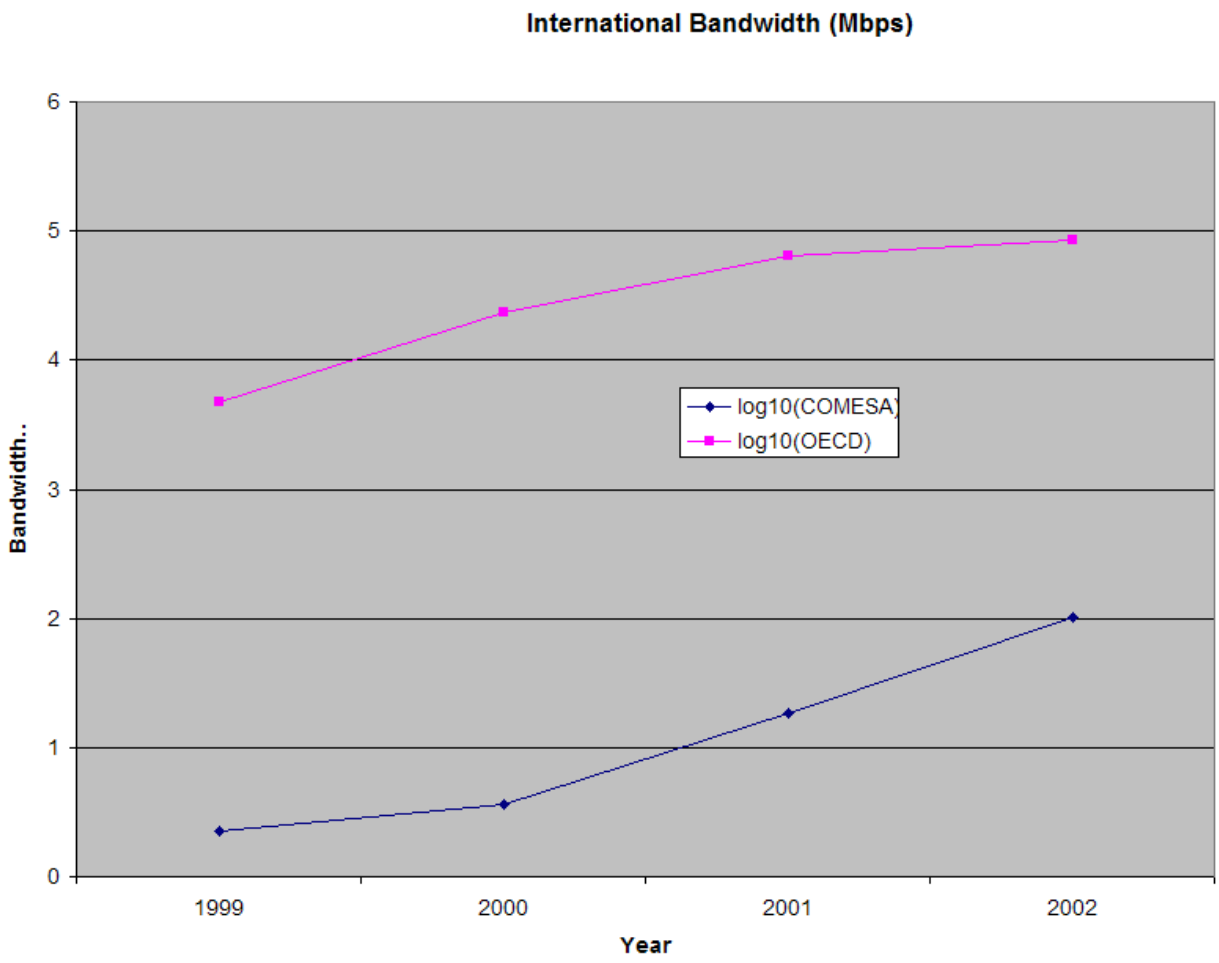


Fig.4.1: Trends in COMESA and OECD Countries Average International Bandwidth. Data points Source: ITU. (2005). World Telecommunications Indicators Database. 8th Edition.

It is worthy noting that OECD countries have allowed competition to advance, which could be responsible for the high development of Internet access (Fan, 2005). For instance, Australia has a policy that allows direct foreign investment and involvement in telecommunications and Internet. This has had a very positive effect on Internet access development.

Therefore, one way of realizing sufficient broadband in COMESA region that can support e-applications including those identified and recommended by COMESA such as ASYCUDA, CPIS and REPSS, is to pursue a strong policy considerations for enhancing competition through adequate opening up of telecommunications and Internet sectors to spur information infrastructure development. Without appropriate development of information infrastructure, the disparities already experienced by rural and remote communities will be further exacerbated as the reliance of goods and services over computer-mediated networks increases (Bandias and Vemuri, 2005). In fact, policy-makers around the globe are encouraging investing in telecommunications systems and bandwidth as a major strategy towards building a knowledge-based economy (Grantham and Tsekouras, 2004).

How do we explain for some similarity in the trends of some indicators of COMESA and OECD when we know that most COMESA countries do not have even a national ICT policy and/or the regulators lack capacity to perform as expected? It is true that the OECD countries are reaping the benefits of good ICT policies and strategies combined with a suitable enabling environment that facilitates sell of their goods and services globally. Nevertheless, the case of most COMESA countries can be explained using the Japanese experience with the i-mode for mobile Internet (Kenichi, 2004). This experience revealed that neither technological advantages nor ICT policy is strong enough to initiate a new type of telecommunication service but the user needs can do. Among the COMESA countries, mobile services are expensive as compared to fixed services yet

because of need, convenience and flexibility it has been adopted on a massive scale (Gillwald, 2005). Which means, the need comes first then policy and technology can follow for effective and sustasinable adoption and application of ICT for development.

Just as is argued in the case for OECD countries, the mobile phone adoption in COMESA countries is not dependant on GDP. Better results could be achieved if COMESA countries articulated to the public and private sector ICT policies that are founded on the needs of their people. Especially coherent national and sub-regional ICT policies and strategies would support the introduction of new regulatory frameworks that promote production and use of ICT by the entire population including the marginalized people. The idea of adoption of a common ICT policy in COMESA is necessary in order to support the creation of an enabling environment through harmonization and integration of regulatory regimes and adoption of a holistic e-strategy. Critically speaking, it is not necessarily the lack of harmonization of regional ICT policy framework that is limiting the ability of the region to attract investment in regional and national ICT operations as stated in the ICT policies for COMESA document, but also the legal and regulatory framework could be contributing.

Introduction of wireless telecommunications that are converging with mobile computing devices would offer Internet Connectivity and access to most COMESA countries than through the traditional PC/modem, hence promoting Internet usage in COMESA countries. This argument is supported by the trend observed of increase in mobile phone subscribers (see Fig. 4.2). Though the number of personal Computers shown in Fig. 4.2 also suggests an increasing trend, it is not rapid enough as that of mobile subscribers. In

1998, most countries had on average 20,000 mobile subscribers and the number of PCs on average was about 65, 000. By the year 2002, the number of mobile subscribers was about 420,000 while that of PCs was about 140,000 which, meant a ratio of mobile subscribers to PC of 6:1. This further confirms that in Africa wireless ICTs have the unique ability to circumvent the limitations posed by under-investment in wired networks.

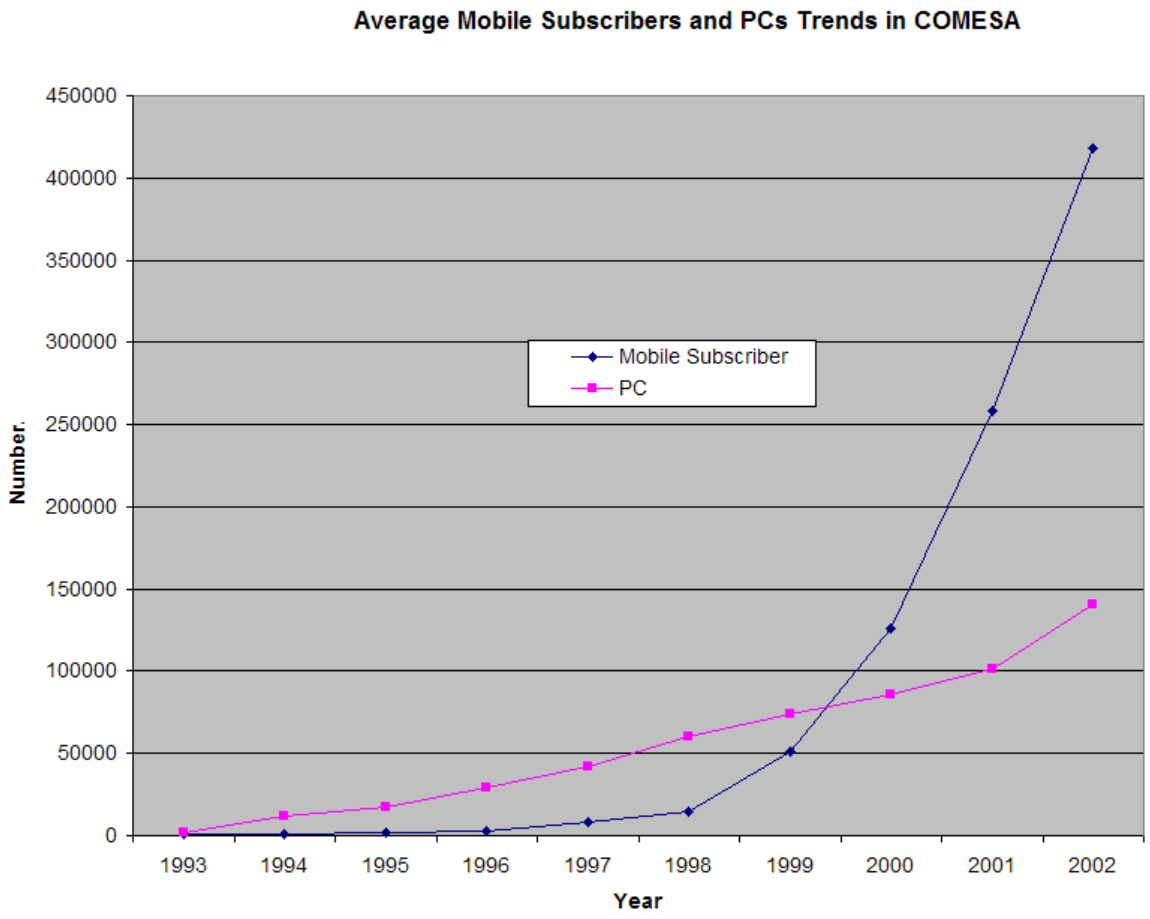


Fig.4.2: Trend Average Mobile Subscribers and Number of PCs in COMESA Countries. Data points Source: ITU. (2005). World Telecommunications Indicators Database. 8th Edition.

Levi (1998) identified the telephone as the future channel of communication in Africa on the basis of the fact that the central element of the African mode of communication was oral. In Africa, telephone can be used to promote oral communication as well as sustain kinship relationships. In view of this observation and the onset of new technologies, EAC sub-region in Africa has been selected to study the trends in mass media usage in order to suggest how it can inform ICT policy. Kuyvenhoven (2004) argues that new and low-cost communication technologies (ICT) can play a major role in speeding-up the process of information diffusion and improving market efficiency, especially in the fields of input provision and marketing outlets. It has also been observed that rapid changes in information and communication technologies have lowered costs and opened up new opportunities in print media, Internet, radio and television. The impact of these rapid changes need to be harnessed in relation to their ability to shape political, economic, and social landscapes (Andriantsoa, 2005).

4.3 EAC case of Mass Media Usage (MMU)

According to data obtained from ITU (2005), the percentage households with televisions in EAC countries by the year 2002 was on average approximately 10%, whereas that of radios over the same period was on average approximately 60%.

Considering a ten year period (1993-2003), the trend observed using DHS data (2005) show that the urban MMU and the rural MMU in Kenya by the year 2003, more than 80% of both urban and rural Kenyans were reading newspapers and watching television.

Listening to radio seemed to have been on decline so that by the year 2003, less than 50% of the people were listening to the radio weekly. A declining trend in use of radio noted could be attributed to the increased affordability of TVs, which are a better channel of communication since they appeal to both visual and audio.

Basing on DHS data (2005) MMU in Tanzania was observed to be generally poor. The urban area recorded an average of about 30% of its people using mass media. This case was worse off in the rural areas where approximate MMU fell to 15% of the population.

In the case of Uganda, the DHS data (2005) revealed that less than 50% of Ugandans were reading newspapers and watching TV over the period ranging 1995 to 2000/01. Only the radio had more than 70% of the population using it. The situation is worse in the rural areas where approximately 10% of the population was using mass media.

Andriantsoa (2005) argues that in order to have a vibrant and competitive media establishment several important public investments are needed such as:

- A legislative framework favoring and protecting responsible free speech
- A system for allocating broadcast rights and transmission bands for radio and television in order to ensure both order and quality of transmission over the airwaves and
- Investments in training and professional development for journalists.

Though there is pressure and need to embrace new technologies, it is important to realize that even the old technologies such as radio and TV have not been exhaustively used as seen in the case of EAC. For instance, AM radio is one medium that can be a carrier of information and knowledge to the people over a wider region and can help in the preservation and exchange of local knowledge (Rodrigues and Wafula, 2004). Such technology has not been used exhaustively in COMESA and EAC. More so in the area of passing relevant development information to communities in the form and languages they understand. By choosing to limit such technologies, communities have been denied the opportunity to coordinate the production, distribution and consumption of what they produce. Entrepreneurs have always been there but due to political reasons and fear, they have not fully provided these services. Particularly in Africa, people live in communities with already established mass cultures. Therefore ICT policies and strategies should enable radio and TV or any technology targeting masses to take advantage of this and effectively help in alleviating poverty through provision of timely and relevant development information.

Fears have been registered in relation to difficulties experienced in controlling mass media and preservation of culture with the advent of new technologies. For that matter, a culture runs the risk of losing its footing in the surging flood of information sweeping the world if an effort is not made to place its products in the global market. Georgette (1997) defines culture as a continuously evolving entity that closely interacts with its environment. Therefore there is need for ICT policies to support development of culture-based products as a way of preserving and sharing it.

4.4 GDP and ICT Indicators

4.4.1 Correlation Analysis Results

Correlation analysis was done between averaged values of selected indicators in COMESA, EAC and EU blocs to establish their level of interdependence. The selected results applied are as shown in Table 4.1 below. The details of how the correlations were arrived at are given in appendix A.

Table4.1: Correlation between averaged values of selected ICT Indicators normalized per 100 Inhabitants

	GDP US$	INTERNET HOSTS	TOTAL TELEPHONE SUBSCRIBERS	MOBILE SUBSCRIBERS	PERSONAL COMPUTERS	INTERNET USERS
EU-GDP (US$)	1	0.367	0.281	0.245	0.410	0.288
COMESA-GDP (US$)	1	-0.544	-0.497	-0.330	-	-
EAC-GDP (US$)	1	0.501	0.423	0.380	-	-

4.4.2 Correlation Results Interpretation and Validation

According to the correlation analysis done using SAS Software v8 and tabulated in Tables 4.1 above, GDP generally appear to have a weak relation with ICT Indicators such as Internet Users, Mobile Subscribers, Internet Hosts, Total Telephone Subscribers and Personal Computers. In all these cases, a maximum and minimum value of correlation of

0.501 and –0.544 respectively were obtained. Therefore the observed changes in these indicators need to be attributed to other factors other than GDP.

The trends in the annual mean GDP across COMESA, EAC, EU and OECD shown in Fig.4.3 suggest negligible changes in GDP with time over a ten year period. The sudden change in mean GDP in COMESA between 1994 and 1995 was due to enormous drop in GDP of Angola. It can be observed from Fig.4.3 that the mean GDP of EU and OECD are close and way above that of COMESA and EAC by magnitudes of the order 10^3. The trends are parallel with little hope of COMESA and EAC approaching GDP of EU and OECD. Given the EU and OECD are advanced in ICT adoption and usage, it remains to be seen if the strong GDP position is a key factor. Norris (2000) observes for instance that, once a country rises above the US$ 9000 per capita GDP mark, the online population expands exponentially. According to this rule, Fig.4.4 clearly shows that COMESA and EAC fall below this threshold while EU and OECD are way above it. However, this may not necessarily be the case for all regions, therefore other contributing factors need to be identified.

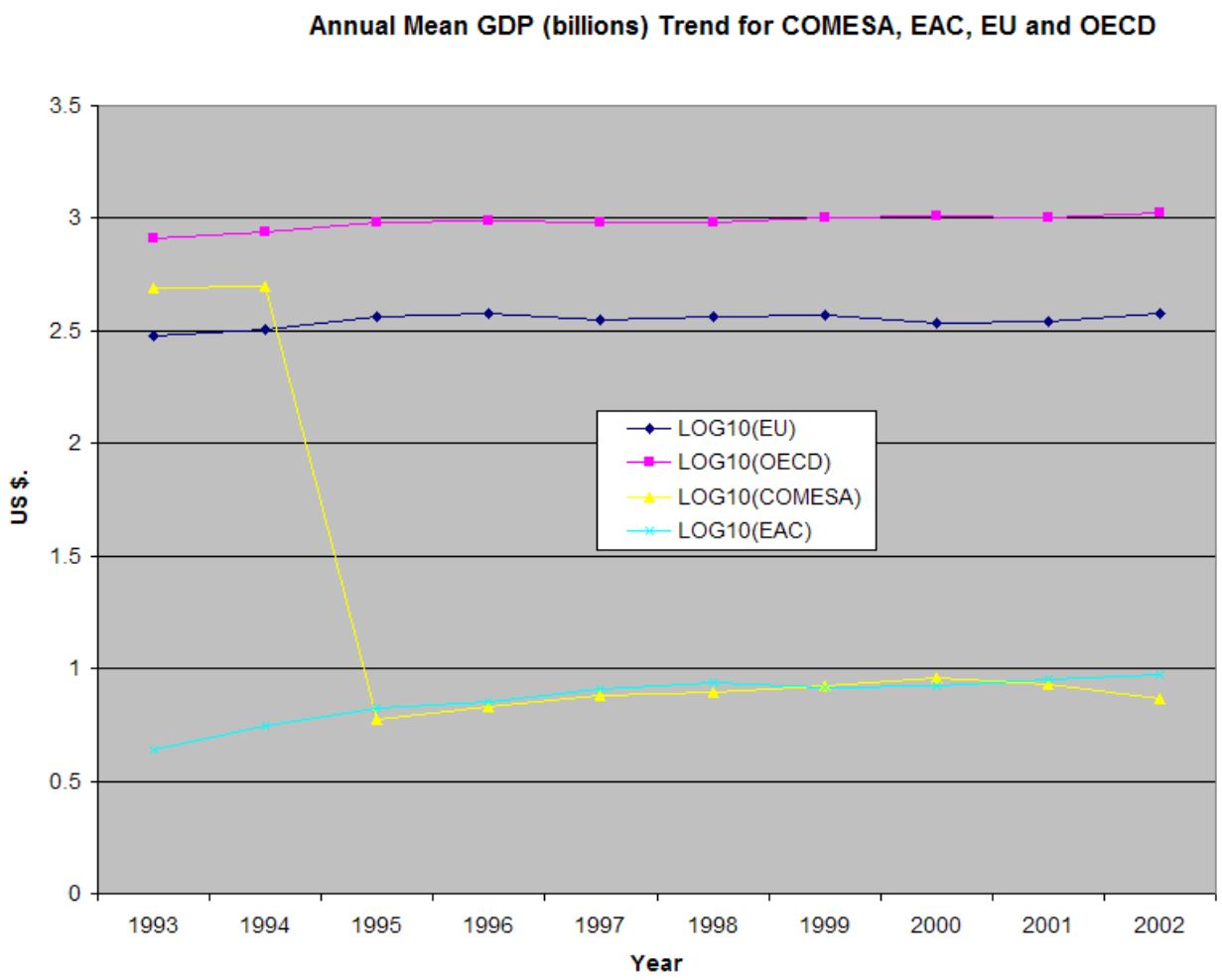


Fig.4.3: Trends in annual mean GDP for COMESA, EAC, EU and OECD regions.

Data points Source: ITU. (2005). World Telecommunications Indicators Database. 8th Edition.

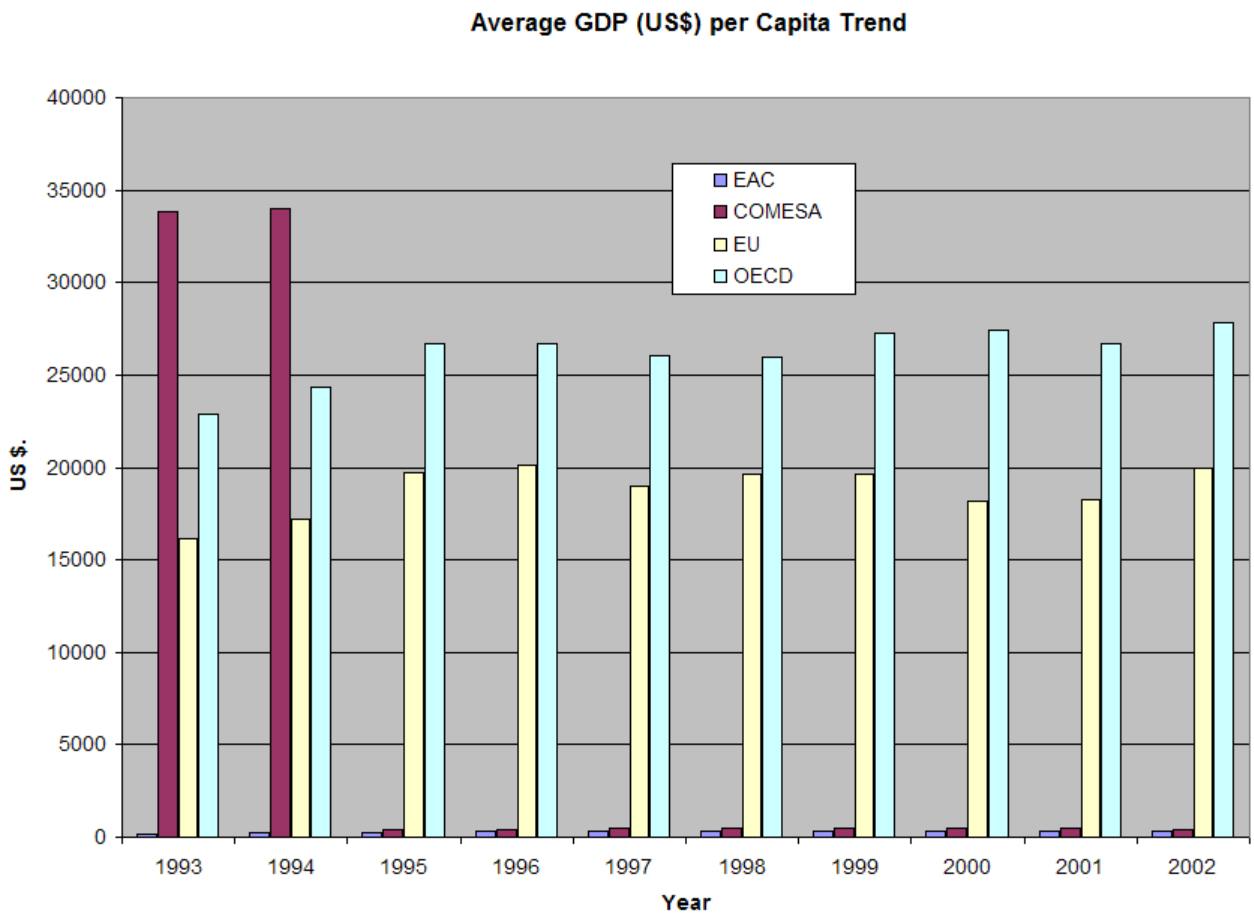


Fig.4.4: Average GDP per capita trend in COMESA, EAC, EU and OECD

In the case of the mean total telephone subscribers (TTS) per 100 inhabitants, an increasing trend is observed (see Fig.4.5). This trend suggests that the TTS per 100 inhabitants was not dependant on GDP. According to Norris (2000), this observation cannot be explained on the basis of GDP per capita for COMESA and EAC. This is confirmed by the correlation value of -0.497 and 0.423 observed between GDP and TTS (see Table 4.1) for COMESA and EAC respectively.

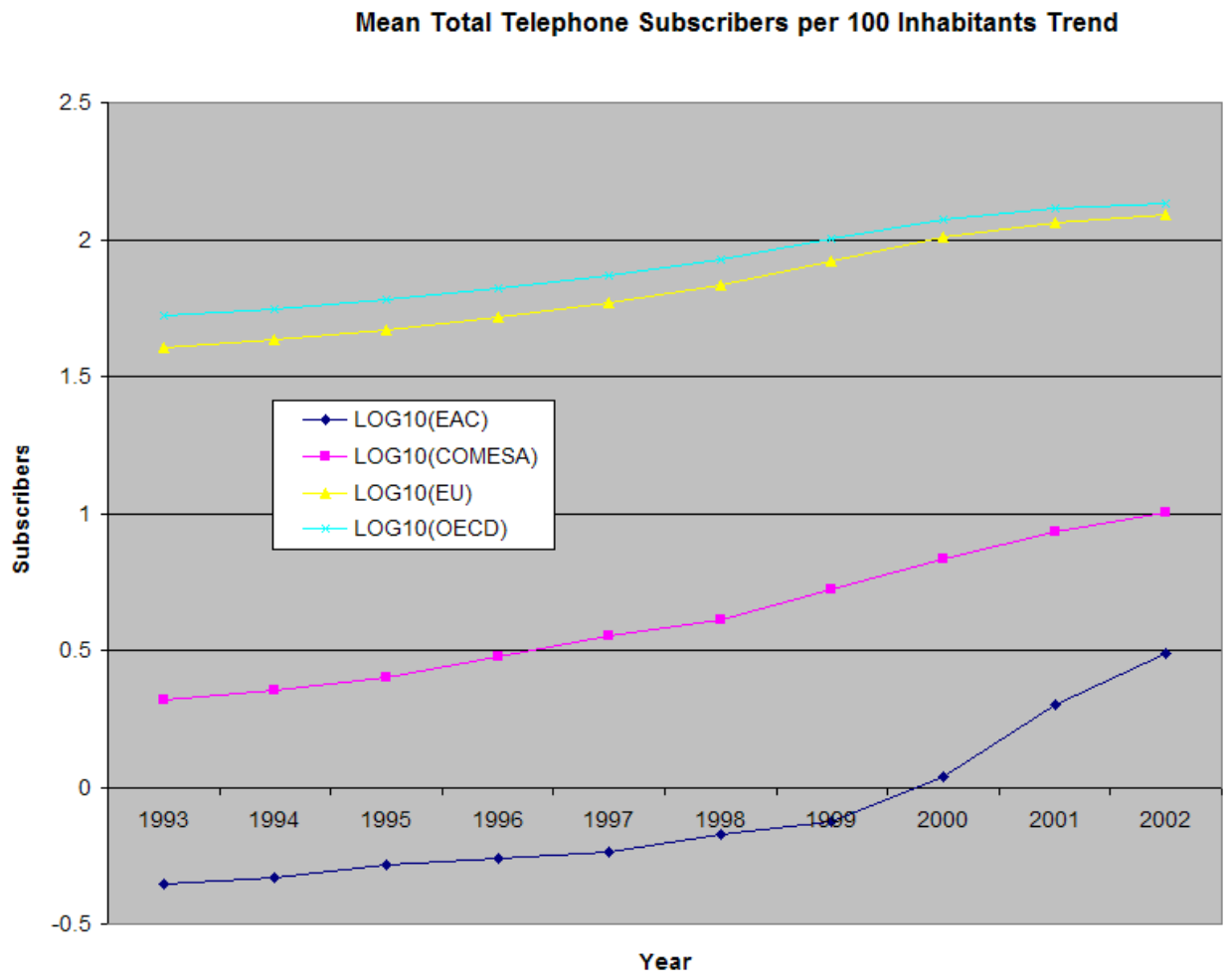


Fig.4.5 :Mean Total telephone Subscribers per 100 Inhabitants trends in COMESA EAC, EU and OECD. Data points Source: ITU. (2005). World Telecommunications Indicators Database. 8th Edition.

Despite the prediction by Norris (2003) that countries with GDP per capita of less than US$ 9000 are not expected to adopt ICT at high rate, Fig.4.5 shows that COMESA and EAC are doing so and at a higher rate than EU and OECD. This observation can be largely attributed to communication needs that for too long had not been met due to poor infrastructure development. With the advent of new technology, remote and rural access

has been made possible. This further gives room for ICT policy, strategies and regulations to enhance and hasten towards meeting such needs. This is something COMESA and EAC have the potential to implement within a short time, which can in-turn cause the GDP per capita to grow against the hypothesis of Norris (2000). Figure 4.6 shows a significant growth rate in the average total telecommunication service revenue in COMESA and EAC as compared to EU and OECD, which is a good indicator in support of this view.

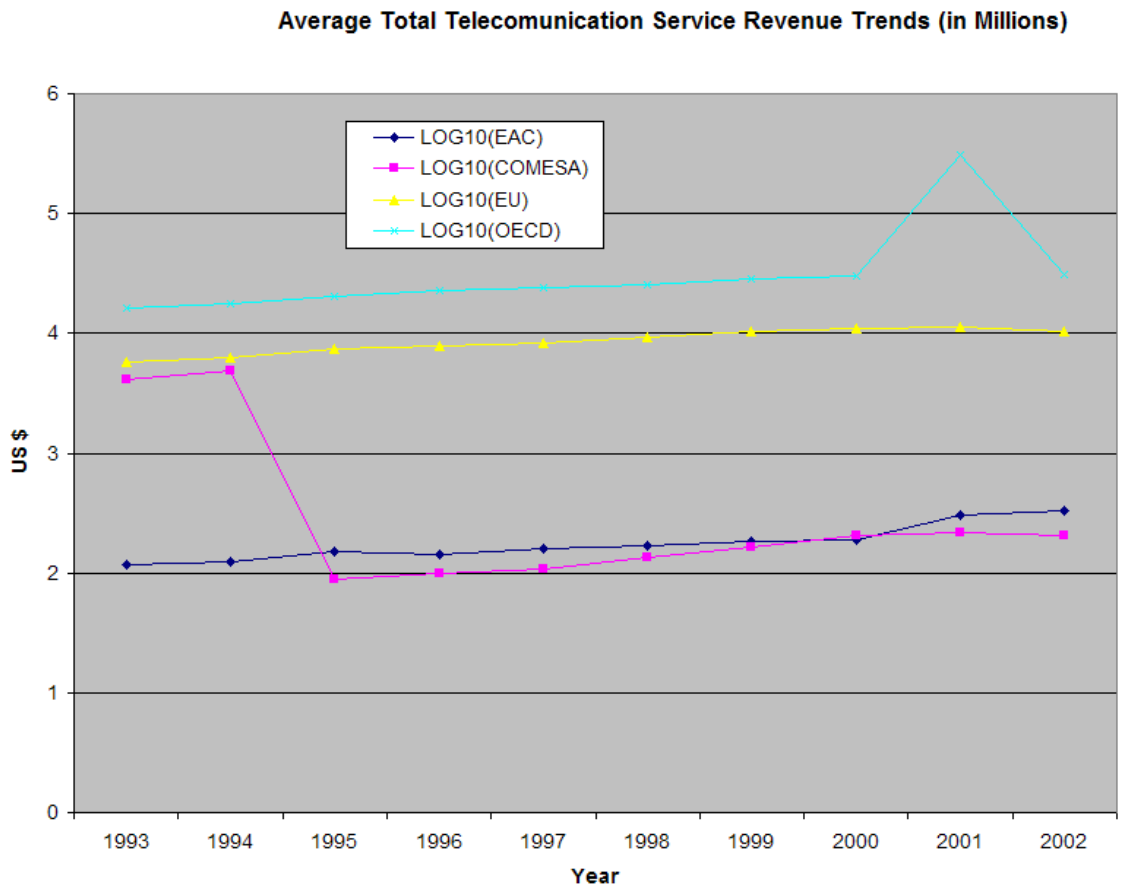


Fig.4.6: Average Total Telecommunication Service Revenue Trends. Data points Source: ITU. (2005). World Telecommunications Indicators Database. 8th Edition.

4.5 Emerging Need for Regional Policy Aims

The observed trends in ICT indicators of COMESA, EAC, EU and OECD articulated in this section shed new light regarding the kind of regional ICT policy aims that may be required for effective ICT programme. These regional ICT policy aims can be grouped into nine categories as follows:

I. Strategic ICT leadership

1. Encourage participation in regional and global governance of ICT
2. Encourage use of ICT to mainstream gender and other empowerment issues
3. Encourage collaboration with other countries on regional projects
4. Support enhancement of capacity for research and development in ICT
5. Encourage government leadership in incubation of new ICT applications.
6. Encourage government leadership in articulation of ICT vision to the nation and its citizen
7. Support government encouragement of communities to propose specific bottom up projects that aggregates the supply of services needed through local government in order to create a demand for information infrastructure development.
8. Encourage CBOs and local authorities to own ICT initiatives so as to attain the necessary critical mass needed to spur socio-economic development.

II. Human Capital

1. Promote Mainstreaming of ICT in the education system.
2. Encourage development of enumeration and incentive packages for skilled ICT personnel in order to minimize high turnover.
3. Support enhancement of capacity for research and development in ICT.
4. Encourage institutions of higher learning to undertake R&D activities in collaboration with telecommunications service providers and manufacturers.

III. Institutional Framework

1. Stimulate ICT innovation.
2. Support the development of appropriate mechanism for coordination and implementation of ICT policy.
3. Promote institutional rationalization for purposes of co-coordinating ICT policy implementation.

IV. Legal and Regulatory Framework

1. Promote balanced telecommunication reforms in privatization and liberalization through creation of simple and explicit regulatory systems
2. Encourage open competition in order to attract Foreign Direct Investment (FDI).
3. Promote establishment of technologically neutral framework for ICT licensing.
4. Encourage national organizations that have rights of way to contribute in the development of the national information infrastructure.

5. Promote duty free zones to attract ICT investment.

V. Information

1. Support the public to obtain access to information possessed by government, public bodies and specified private bodies, to the greatest extent possible, consistent with the public interest and the right to privacy.
2. Encourage promotion of national culture and identity in media.
3. Encourage stakeholders and development partners to support creation of local content in order to preserve the knowledge and culture of traditional communities.
4. Promote sharing of information and data through provision of timely and quality statistics.

VI. Information Technology Services

1. Encourage adoption of E-applications.
2. Support preservation of digital records and archives for future referencing and posterity.
3. Encourage public and private sectors to develop and deploy Open Source software.
4. Offer incentives for individuals to own PCs and mobile phones.
5. Encourage development of e-applications that are a shared vision among all stakeholders.

6. Develop e-applications that address social, economic, political and cultural needs of the time.

VII. Telecommunications Services

1. Encourage investing in telecommunication systems and broad bandwidth.
2. Promote utilization of all installed ICT infrastructure to be optimally utilized and synchronized.
3. Promote direct interconnectivity between mobile cellular service providers and other service providers including sharing of infrastructure.
4. Encourage development of National Geospatial Data Infrastructure.

VIII. Broadcasting

1. Promote development of broadcasting legislation that cover policy advisory and dispute resolution for the sector as well as take into consideration the overlaps due to technological convergence and integration.
2. Encourage broadcasters to play a crucial role in providing a level playing field in the electronic media for all political actors so as to promote diversity, good governance, human rights and democracy.

IX. Universal Access

1. Encourage establishment of a Universal Service Fund.
2. Encourage ICT operators to have social obligations.

4.6 Mapping of ICT Policy to Mul-Net Framework

All the policy aims emerging out of this regional ICT studies can be mapped through their categories onto the MuL_Net framework described in Chapter 3 as shown in Table 4.2. The mapping has been made possible through the identified relation between the individual aims and components of MuL_Net framework indicated in Fig 3.1. For instance, All the Strategic ICT Leadership Policy aims address the Leadership and Strategic Planning components of the Governance Layer, while the Institutional Framework policy aims target the Management Control and Operational Control components of the same layer. Human Capital policy aims support the Human Resource Component hence mapped to Organizational Layer. Likewise, Information Technology Services, Telecommunication Services and Broadcasting policy aims found there natural mapping onto the ICT Architecture Layer. By relating policy aims and components of MuL-Net, a mapping function was established.

Regions and nations seeking to adopt ICT for good governance and sustainable development must seek to apply a comprehensive framework such as MuL_Net accompanied with suitable ICT policies aims in the identified nine categories of section 4.5.

Table 4.2: Mapping ICT Policy Aims Categories onto the MuL_Net Framework

MUL_NET FRAMEWORK	ICT POLICY AIMS CATEGORIES
Governance Layer	Strategic ICT leadership Institutional Framework
Organizational Layer	Human Capital Legal and Regulatory Framework Information Universal Access
ICT Architecture Layer	Information Technology Services Telecommunications Services Broadcasting

4.7 Conclusion

The OECD countries have allowed competition in ICT sector to advance and possibly caused the high development of Internet access observed. OECD countries are able to sell goods and services globally as a benefit of good ICT policies and strategies combined with suitable enabling environment.

AM radio technology has not been used exhaustively in COMESA and EAC. More so in the area of passing relevant development information to communities in the form and languages they understand. By choosing to limit such technologies, communities have been denied the opportunity to coordinate the production, distribution and consumption of what they produce. Entrepreneurs have always been there but due to political reasons

and fear, they have not fully provided these services. Particularly in Africa, people live in communities with already established mass cultures.

Despite the prediction by Norris (2003) that countries with GDP per capita of less than US$ 9000 are not expected to adopt ICT at high rate, Fig.4.5 shows that COMESA and EAC are doing so and at a higher rate than EU and OECD. This observation can be largely attributed to culture and communication needs that for too long had not been met due to poor infrastructure development.

Therefore, one way of realizing sufficient broadband in COMESA region that can support e-applications including those identified and recommended by COMESA such as ASYCUDA, CPIS and REPSS, is to pursue a strong policy considerations for enhancing competition through adequate opening up of telecommunications and Internet sectors to spur information infrastructure development.In fact, policy-makers around the globe are encouraging investing in telecommunications systems and bandwidth as a major strategy towards building a knowledge-based economy.

This chapter informs Chapter 5 and 6 on generic ICT policies and strategies from which specific recommendations have been made at both sub-regional (EAC) and national (Kenya) level.

CHAPTER 5

5.0 SUB-REGIONAL ICT POLICY AND E-STRATEGY: CASE OF EAST AFRICA COMMUNITY

5.1 Introduction

The East African Community is the sub-regional organization of the Republics of Kenya, Uganda and Tanzania, with its headquarters located in Arusha, Tanzania. The East African Heads of State signed the Treaty for the Establishment of the East African Community in Arusha on 30th November 1999. The EAC aims at enhancing co-operation among partner states by establishing a Customs Union, a Common Market, Monetary Union and ultimately a Political Federation. The three East African countries cover an area of 1.8 million square kilometres and have a population of 82 million who share a common history, language, culture and infrastructure. These advantages provide the Partner States with a unique framework for regional co-operation and integration. Indeed modern ICT provides both the opportunity and the means to realize co-operation and integration through shared resources i.e. applications, data, and infrastructure, underpinned by careful planning and design strategies.

Among EAC sub-region member states, Uganda and Tanzania had published their national ICT policies much earlier than Kenya, which published its draft ICT policy in September 2004. That made the formulation process for what could be the EAC sub-regional ICT policy difficult despite provisions such as that in the Treaty for the

Establishment of the East African Community, Article 99, which spells out cooperation latitudes in the sub sector. The Treaty specifically provides for, among other things, that Partner States shall take steps to develop harmonized policies and regulatory frameworks in the sector and improve communications links and establish new ones as a means of furthering the physical cohesion of the Partner States and to facilitating and promoting communications within the community (Yonazi, 2004).

The delay in publication of the draft National ICT Policy may have contributed to the limited progress reported by the EAC Secretariat and the Regulatory Authorities on their studies such as *Harmonisation of Regional Communications Regulatory Strategy*, which focuses on various sub-regional issues including harmonisation of national ICT Policies, and the development of a *Harmonised ICT Policy Framework for East Africa* where a Task Force consisting of key senior policy experts was constituted by the EAC Sectoral Council for Transport, Communications and Meteorology (TCM) in November 2003.

Now that there is a COMESA ICT Policy on the one hand and National ICT Policies for EAC member states on the other hand, the need for the EAC sub-regional ICT policy and e-strategy has clearly emerged, which this Chapter targets to analyze and come up with recommendations.

Some of the possible EAC Sub-Regional ICT policy aims have been deduced from some of the generic ICT policy aims recommended in Chapter 4. Others have been derived from the analysis of the COMESA Model ICT policy; the EAC member states national

ICT policies; and the overview of ICT policies and plans of EAC headquarters and its autonomous institutions namely: Inter-University Council for East Africa (IUCEA), East African Development Bank (EADB), Lake Victoria Fisheries Organization (LVFO), and East African Business Council (EABC). The draft EAC e-Government strategy has been tested against the developed MuL_Net framework described in Chapter 3 and discussed.

There is a threshold beyond which the deployment and exploitation of ICT could speed up or aid the socio-economic development process of a given country, sub-region or region. That threshold is synonymous with what is also called 'critical mass' of ICT diffusion. The diffusion of ICT must achieve a 'critical mass' in terms of coverage, organizational adaptation and 'learning by doing' before widespread productivity gains become observable (Dzidonu C.K., 2003). Dzidonu argues that ICT pilot projects must be replicable and scalable for them to support socio-economic development through giving attention to the following: local and community level involvement and ownership of these initiatives, mobilization of necessary financial and other resources required to implement the project, and addressing administrative problems.

A suitable sub-regional ICT policy for EAC can be a hybrid of Global Positioning and Export Capacity Building Strategies developed by Dzidonu (2003). To acquire the ICT 'critical mass' needed for notable socio-economic development, considerable resources are required. Individual EAC member states are faced with enormous challenges such as: lack of a culture of maintenance of equipment, technology or services; the EAC sub-region falls in the sub-Sahara Africa, which is considered to be one of the poorest regions

of the world; the economy of the sub-region has a high dependence on agricultural sector that is predominantly subsistence based and with a narrow and weak industrial base.

This being the case, national ICT policies are more inclined towards first, cultivating the national ICT sector and domestic market. Therefore, an EAC sub-regional ICT policy would enable and push its member states attain global positioning as well as carve an export market. This is because it is believed that a sub-regional ICT policy would enable sharing of costs, resource personnel, experts, infrastructure, and information among others.

As per the research survey conducted at EAC headquarters in Arusha, these factors are largely supported except for legal, regulatory and institutional environment, which the EAC is addressing. For that matter, EAC headquarters is strategically placed for developing and implementing a sub-regional ICT policy and an e-strategy for implementing e-applications projects such as e-government. EAC headquarters is one of those that have made some progress in tapping ICTs benefits while still operating in an ICT policy vacuum. EAC headquarters has developed an application that monitors the council of ministers decisions. The application was developed after assessing one of the already acquired software for library and customizing it to offer decision support services. It is bound to be sustainable since it was created out of a need at the headquarters and it ports soundly on the MuL_Net framework developed and described in Chapter 3.

The EAC Development Strategy 2001 – 2005 is a systematic way of checking out action towards achieving the goals of regional integration in the EAC sub-region. The vision for the sub-regional integration is to create wealth and enhance competitiveness through increased production, trade and investments (East Africa Community, 2001). The establishment of a customs union has eliminated internal tariffs and adoption of a common external tariff (CET). Elimination of internal tariffs is being implemented under the principle of asymmetry. ICT can be one of the pillars of the sub-regional integration and development, globalization and modernization (East Africa Community, 2001). The development strategy emphasizes the importance of information as a resource and a tool for development. The enactment of national ICT policies into laws by sub-regional governments, and the development of the sub-regional ICT policy as their global umbrella, will reinforce ICT pillar for the sub-regional integration and development, globalization and modernization. For this to happen, the political establishments need to put ICT among their top priorities, which they have started doing.

5.2 Regional and Sub-regional ICT Initiatives

Some of the key regional and sub-regional ICT initiatives that must be supported under the spirit of integration and harmonization so as to assist its member states establish and stay focused on the roadmap to implementation of necessary reforms that lead to economy growth include:

- The Automated System for Customs Data and Management (ASYCUDA): It is given freely to all COMESA Member States[4]. This is aimed at facilitating regional trade and enables member states produce accurate, timely and reliable trade data that could then be analyzed and used to inform decision and policy makers. Shoukry (2004) argues that ASYCUDA has the capability of making the customs processes more efficient; promote trade by reducing the time taken to clear goods; makes tariff revenue collection more efficient; and above all, generate accurate trade statistics.
- CPIS: As part of the establishment of a regional public procurement system COMESA has set up CPIS. CPIS uses a web-based platform over the Internet to promote greater efficiency, transparency and monitoring of public procurement processes among the COMESA member states. Making information available to the public leads to cost savings and transparency for state institutions. CPIS is expected to reduce the discretionary powers of procurement officials, leading to development of a better public service and prompt member states to adopt legislative reforms in public procurement.
- Regional Payments and Settlement System (REPSS): It is intended to improve the flow and settlement of cross border payment transactions among financial institutions for the benefit of importers and exporters.
- East African Submarine Fibre Optic Cable System (EASSy): It is an initiative being implemented by 13 telecom operators from East and Southern African countries. The EASSy cable is a fully integrated multi-technology network. It is

[4] Asycuda information package, UNCTAD - Geneva, September 1997 v1.0 and v1.3: http://www.unicc.org/unctad/en/pressref/mt1home.htm and COMESA's Role in Information Technology and Telecoms - paper presented by isabel m. Nshimbi available at http://www.itu.int/africainternet2000/documents/doc50_e.htm

an undersea fiber optic cable that will link the countries of East Africa to the rest of the world. The US$200 million project was conceived in 2003, and is a 9900km high performance fiber optic cable linking countries on the Southern, Eastern and Northern African coastlines to the global super highway. The cable will run from Mtunzini in South Africa to Port-Sudan with landings in South Africa, Mozambique, Madagascar, Tanzania, Kenya, Somalia, Djibouti, Eritrea and Sudan. Kenya Fiber Portion of The East Africa Backhaul Transmission Link is a comprehensive backhaul system that will ensure that landlocked countries will also benefit from this project (Mininstry of Information and Telecommunication, 2006). The EASSy Project will deliver the first undersea fiber optic cable to link the countries of Eastern Africa with the rest of the world. EASSy had been strategically designed to complement other existing network systems such as the SAT-3/Western Africa Submarine Cable, which links South Africa and West African countries with Europe, and the South Africa-Far East cable. A summary of the advantages of EASSy cable is as follows:

1. Bring the power of high speed, high bandwidth connectivity to Africa.
2. Enable new services and products not possible due to bandwidth restrictions.
3. Contribute towards the macro socio -economic development of the region.
4. Improve high capacity optic connectivity within Africa and the rest of the world.

5. Reduce unit costs (capital & operational) for global connectivity leading to increase profits, and lower tariffs and charges for the end users.
6. Reduce out-payments to foreign telecommunications (satellite) facility providers.
7. Provide direct routes through own infrastructure, obviate the need for transit through Third Parties - reduced out-payments.
8. Provide more profitability for telecom entities, enhancing the chance of successful privatization.
9. Meet telecommunication needs of high bandwidth users such as Internet Service Providers and mobile operators.
10. Expansion in Inter-Africa trade facilitated by better communication in the region.

- COMTEL: The COMTEL project covers the following countries: Angola, Burundi, Comoros, Djibouti, Egypt, Eritrea, Ethiopia, Kenya, Malawi, Madagascar, Mauritius, Namibia, Rwanda, Seychelles, Sudan, Swaziland, Tanzania, Uganda, D R Congo, Zambia and Zimbabwe. Figure 5.1 below shows the planned infrastructure development map. COMTEL is the first Pan-African regional terrestrial fibre optic cable backbone network carrier with switching, Gateways and Billing systems that have an ultimate capacity of 120Gigabit/s for seamless delivery, and it has also secured provisional funding of US$ 250 – US$275 million for the 18,000 km terrestrial fibre optic cable network with a soft switch IP/MPLS of regional and international digital voice and high capacity data

traffic to and from COMESA (Osakonor, 2004). The COMTEL backbone network has been designed to include a mix of optic fibre, microwave and satellite connectivity. The network will facilitate transmission of voice, data, and TV programmes. In this way the network will cover the full breadth of information and telecommunications technology, including both voice and data transmission of various bandwidth. The intention is to build a network on existing laid out infrastructure where available. Alternatively, new transmission routes employing a mix of fibre-optic cable, digital microwave and satellite systems will be constructed to link the member states.

Fig.5.1 Planned Infrastructure Development by COMESA COMTEL Project

(Osakonor, 2004)

The ICT initiatives such as those enumerated above need strong regional, sub-regional and national ICT policy statements and appropriate e-strategies to back their successful adoption and implementation across member states. In the case of EAC, it does not need

to duplicate but instead put in place policies (any suggested??) that will guarantee its maximum tapping into the already enforced plans, resources and expertise.

5.3 Challenges to Regional Integration

Performance of regional integration schemes in Africa has been dismal. Ng'eno et al (2003) actually confirms this in their argument that none of the regional groupings has achieved the eventual objective-formation of a common market or functional customs unions. For instance, despite lowering tariff rates in COMESA region, non-tariff barriers such as administrative delays, lack of or delays at getting information at border points, pre-shipment requirements, and bureaucratic administration of rules of origin have continued to persist (Ng'eno et al, 2003). By taking on a suitable regional, sub-regional and national e-strategy, these non-tariff barriers can be removed. Chapter 3 described in details the MuL_Net framework, which is generic and could be customized to suit any level. A combination of a suitable ICT policy and application of the MuL_Net framework, would lead to effective and sustainable implementation of existing regional and sub-regional ICT initiatives discussed in section 5.2 above, across all member states and above all, provide a structured way (use of developed framework) of adopting new e-applications with greater chances of success.

Membership to multiple integration schemes is also a major characteristic for East African states. Kenya and Uganda are members of Cross-Border Initiatives (CBI), EAC, Inter-Governmental Authority on Development (IGAD) and COMESA, while Tanzania

is a member of CBI, EAC and Southern Africa Development Community (SADC). Membership to multiple schemes hinders integration because of duplication of effort, human and financial costs. It also complicates transaction procedures. Use of ICT in handling such transactions would greatly mask the complications and present a simple and functional front.

5.4 EAC Headquarters and Autonomous Institutions

The EAC headquarters and its four autonomous institutions of East Africa Community (EAC) namely: Inter-University Council of East Africa (IUCEA), East Africa Development Bank (EADB), Lake Victoria Fisheries Organization (LVFO) and East Africa Community Business Council (EABC) were surveyed using questionnaires given in appendix F and G. The questionnaires were designed to be filled by designated Institutional ICT section heads. Two questionnaires were given out per institution (type F and type G) and responses obtained from all the four institutions that participated including the headquarters.

The survey conducted at EAC headquarters and the autonomous institutions revealed three commonalities amongst them. They were as follows:

- All institutions had their sources of funding ICT vaguely defined, even where they had an ICT policy or plan in place.

- All institutions acknowledged having adequate information concerning financial cost of ICT usage and adoption.
- All institutions recognized ICT as important for future economic development of their institutions.

This Chapter will attempt to argue around these commonalities using the case of EAC headquarters to address their benefits and challenges to the institutions. It also suggests solutions largely from a strategy and policy perspective.

The survey established that EAC headquarters had neither the sub-regional ICT policy nor the sub-regional telecommunications policy, however it had in place a written plan for ICT development. This perhaps explains the reason why the list of top ten sub-regional needs at the headquarters had five of them being ICT related as shown in Table 5.1. This clearly indicated how highly ICT was prioritized. At this initial stage of the revived EAC, the EAC headquarters chose to outsource most of its ICT services. In the absence of an official ICT policy, outsourcing of the following: application development; hardware and software maintenance and Internet service provision could be viewed as a good strategy specially when human resource capacity is inadequate and ICT is not the core business of EAC. This option also tends to minimize risks of ICT investment. On the other hand, customization of applications and in-house systems maintenance for both hardware and software was being encouraged and could be construed as making steps towards building capacity and preparation for being self-reliant. A good example is

where *Adlib* software that was used to automate library had been customized to monitor council of ministers decisions.

Table 5.1: List of top ten sub-regional needs (September 2003)

	Top Ten EAC Sub-regional Needs
1	Finalization of customs union protocol
2	Harmonization of communication strategy
3	Lake Victoria Development Programme
4	Telecommunication Infrastructure Development
5	Liberalization of cross border trade and movement of persons
6	Promotion of ICT application
7	Macro-economic stability to promote investment
8	E-governance
9	Development of infrastructure and support services
10	Regional Licensing of Private Operators in the Sector

Although EAC headquarters lacked an ICT policy, it was noted that it had a written plan for ICT development. The plan had been written in the year 1999 and covered a period ranging between 5 to 8 years. Therefore most of the ICT activities that were going on could only be measured against that plan. The agencies responsible for implementation of the written ICT development and utilization plan were: East Africa Community (EAC), EAC development partners, and Regulatory Authorities of Partners States. This implied that EAC strongly supported partnership in its implementation strategy.

It was found that the funding needs and their sources were vaguely defined in the ICT development plan. Fig. 5.2 shows ICT expenditure for a period of five years.

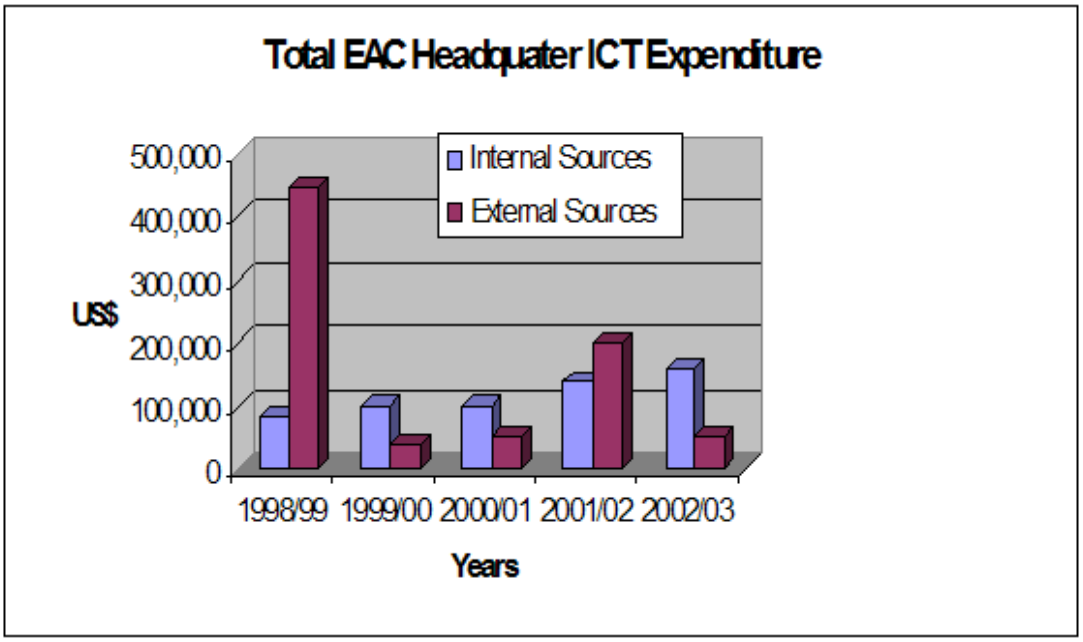


Fig.5.2: EAC ICT Internal and External Sources of Funding over five-year period.

A steady increase with time in funding from internal sources was observed for ICT. This is a good indicator of the high prioritization of ICT by the EAC headquarters.

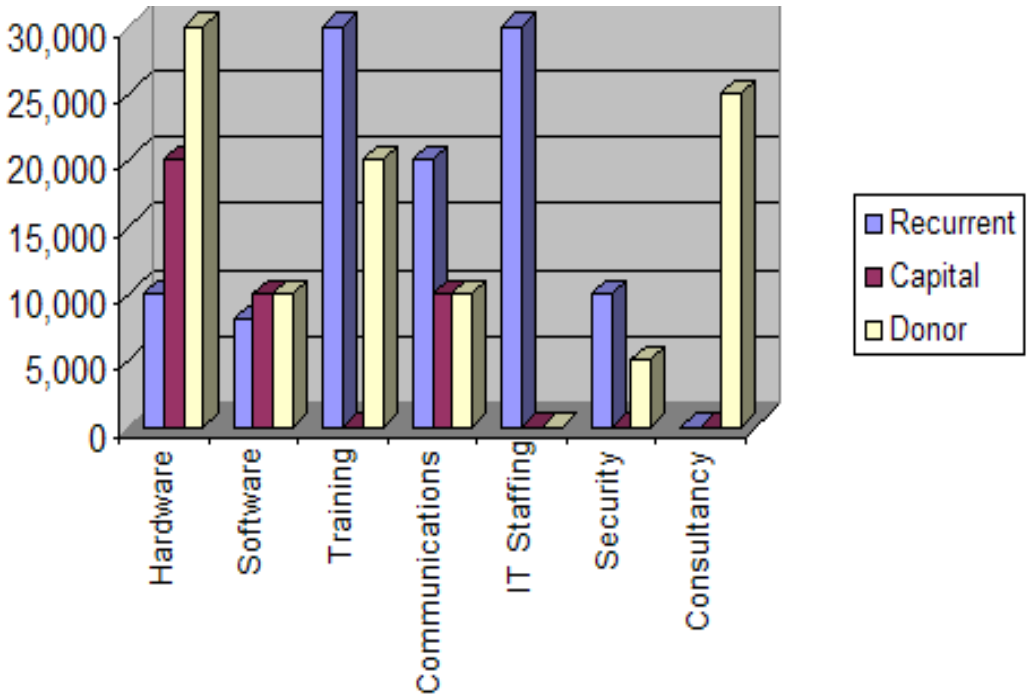


Fig.5.3: EAC Headquarters Budget Allocation

Figure 5.3 shows EAC headquarters budget allocation for the seven key ICT components. The capacity and sustainability of the expected sources of funding for each ICT component was evaluated and suggestions made.

The general reduction observed in donor sources of funding posed a risk on the budget allocation especially on hardware, training and consultancy, which seemed to heavily rely on donor sources that contribute about 1/3 of the total budget. Realization of this and establishing policies that encourage partnership with private sector can help solve the hardware problem. Equally, in areas of training and consultancy, policies that promote collaboration with higher institutions of learning in the EAC sub-region can leverage the

dwindling donor support on those areas and at the same time help build local human capacity.

The EAC headquarters expressed need for major support in the adoption of key applications such as e-government and e-commerce. These are applications that still demand high budget allocation for training and consultancy that seemed to depend on donors. Given the observed trend on donor funding, EAC needs to strengthen its policy of collaborating with sub-regional universities and in particularly through the already established EAC institution called Inter-university Council of East Africa (IUCEA). The involvement of the academia in policy formulation and implementation processes would to a large extent solve the problem of relaying on donors for training and consultancy as well as create sustainability. EAC collaboration with the academia can ensure availability of technical information. The research survey conducted at EAC headquarters found out that EAC lacked technical information and therefore its collaboration with the academia can be of great benefit.

Table 5.2 lists six donors and their respective ICT initiatives at the EAC headquarters, 2004.

Table 5.2: Donors and their EAC ICT Initiatives

Donor	ICT Initiative	Type of Support	ICT Component
EU	Databases	Development of Databases, H/W and S/W	Software
WAID	ICT Equipment & Internet	Server & Desktop Computers & upgraded Communication Links	Hardware & Communications
UK	LAN & Internet	Hardware & software	Hardware and Software
Finland	Software	AutoSoftware (Accounting and Registry)	Software
GTZ	ICT Equipment	Computer accessories and software	Hardware and Software
KOREA	Hardware Equipment	Supply of Hardware	Hardware

As shown in Table 5.2 six donors have fulfilled some of EAC ICT goals. Among the seven key ICT components the EAC headquarters budgeted for, only three were supported by the six donors namely: hardware, software and communication. Yet the other four, and particularly training and consultancy, also expected to draw their budget allocation from donor sources were yet to be identified. As long as EAC still looks upon the donor community and both the foreign and local private sectors for support towards achieving its ICT goals, it must put in place an ICT policy that promotes its goals and guards against damping and getting dependant on external sources of funding. EAC must also identify and embrace mechanisms and methods that support its policy.

EAC faces a big problem posed by the use of *closed source software* (CSS). The nature of *closed source software*, is such that the internals of the program are intentionally hidden from the user. This software hoarding forces the user to be at the mercy of the vendor by not enabling them to modify the program to suit their own needs. For instance, the EAC information processing center has used the following software packages that are of the CSS type; MS 2000 Server and MS Windows NT, Win XP Professional, MS Windows Professional, MS Win 98, Office 2000 Suite, SUN Systems and TRIM software. Maintaining using such software is expensive and continues to make EAC dependent on the provider and developer. It also poses considerable challenge when it comes to software compatibility, system integration and interoperability.

On the other hand, *Open Source Software* (OSS) is one for which the source code is freely and publicly available, though the specific licensing agreements vary as to what one is allowed to do with that code. The availability of the source code and the right to modify it is very important. It enables the unlimited tuning and improvement of a software product. It also makes it possible to port the code to new hardware, to adapt it to changing conditions, and to reach a detailed understanding of how the system works. This is why experts have come to the conclusion that to really extend the lifetime of an application, it must be available in an open source form. EAC needs to embrace OSS and promote its development in the sub-region.

Donors have assisted EAC headquarters acquire CSS, which still poses challenges associated with it. In future, EAC should specify the kind of software assistance it needs

from the donors. It would be a good idea if EAC looked into the option of developing and using OSS besides the CSS. Such action would promote local software development and at the same time create jobs and wealth in the sub-region. Despite the assistance by the donors to the EAC headquarters, it is observed that effective sharing of best practices as well as skills transfer through consultancy is poor. Considering the ICT components that benefited from the donor support is in form of hardware, software and communication, and considering that most of these components were proprietary, such an outcome is expected. Poor results are a function of lack of ICT policy to spell out what is expected of the donors. Also lack of capacity at the EAC headquarters to absorb and therefore enable skills transfer could be among possible contributing factors. Though the problem of scarcity of skilled technical human resource in developing countries is big, adopting policies that encourage mobilization and sharing of the few in the sub-region would be a great step towards fixing the problem. In view of this, the EAC supported the concept of a regional partnership between industry and higher education in the field of ICT. The research survey observed that the EAC was desiring to promote the following: centers of excellence in various fields including ICT, harmonization of education systems in partner states, and support practical/industrial oriented education system.

Since EAC headquarters and its autonomous institutions had adequate information on the costs of different aspects of ICT adaptation and utilization, they could use this information to justify and attract ICT FDI by sub-regional governments, donors and private sector. In the case of the EAC headquarters, there were only six donors who offered assistance, which was not enough to meet the ICT demands. To be able to use the

information of costs of ICT adaptation and utilization in prioritizing ICT initiatives taking into consideration all identifiable risk, an option based ICT investment decision index (IDI) has been developed and described in Chapter 2. Use of IDI would be easily adopted on the basis of two factors: First, the top-level decision-making style of EAC headquarters that involved systematic search for opportunities and anticipation of problems and secondly, the operations at EAC headquarters are mostly controlled by information systems. EAC headquarters has stated that it systematically considers the cost and benefits of options to ensure that specific goals were achieved efficiently. EAC headquarters emphasizes effectiveness, long-term planning, and careful screening of investments in order to minimize risks, which IDI supports.

5.5 Benefits of IDI

In order for governments, private sector and financial institutions to support ICT initiatives and projects investments, they need to be structured. In this effort, one would need to use IDI to ensure that risks involved are quantified and understood. Africa Development Bank (ADB) could act as an information source on some of the key parameters that go into formation of IDI. Particularly, ADB can provide a sub-regional risk free rate, which is a value used to compare deviation from risk-free investments like government bonds, treasury bills and treasury bonds depending on the period involved.

The use of IDI may require organizations such as ADB to appreciate the benefits of IDI and choose to make it mandatory to all ICT initiatives it approves for funding. Hence,

apply IDI in selection of viable, feasible and sustainable initiatives. Use of IDI can enable ADB to fulfill its roles effectively such as the mobilization of funds and direct foreign investments in Africa, encouragement of regional cooperation through initiating development and funding of regional projects so as to enhance integration, and encouragement of private sector involvement in infrastructure development (Urua, 2004).

When financial institutions appreciate the use of IDI as a decision making tool that takes into consideration the possible risk factors that are quantified and understood, application of IDI in identifying feasible ICT initiatives would convince financial institutions and development partners to fund such initiatives. This is because, the possible risks would have been identified in advance, understood, and the best option selected, before any financial request and commitment is made. Therefore, the perennial problem of financial limitations would reduce.

Kenya and Uganda are members of COMESA. One of the COMESA ICT policy objectives is to create an integrated market that attracts investment (Dafalla, 2004). Increase in private sector investment and Foreign Direct Investment (FDI) are among key benefits expected from the COMESA ICT policy. Creating an integrated market alone is not sufficient to attract investments in the ICT sector that is of high risk. This requires mechanisms and methods that consider risks, which can help establish feasible ICT initiatives that can be translated into real investments need to be developed. Therefore, IDI as a method and a tool for arriving at relevant and realizable investment can greatly

contribute towards realization and exploitation of the COMESA ICT policy objective of creating an integrated market. IDI can contribute in enabling:

- Financial institutions make decisions to support ICT initiatives
- Policy-makers and CEOs commit themselves and institutions on ICT initiatives
- Attraction of FDI in ICT initiatives
- Exploitation of integrated market
- Promotion of development through facilitating good decision-making
- Promotion of access to ICT services.
- Promotion and adequate funding of adoption of new ICT.

IDI is expected to provide a simple and reproducible ground upon which decisions can be based, instead of relying on instinct and gut feelings (Chapter 2 has the details).

In order to demonstrate how IDI is arrived at, a hypothetical case of EAC is used. Suppose the EAC headquarters required information to apply IDI on six ICT initiatives hereby referred to as e-health, e-education, e-procurement, e-entertainment, e-voting and e-business that it wished to support in its strategic plan. Table 5.3 presents the hypothetical IDI data for every ICT initiative and the ultimate decision arrived at after going through the process shown in Fig.2.1 of Chapter 2.

Table 5.3: Hypothetical Case of EAC

Hypothetical EAC ICT Initiatives IDI supported Investment Decision						
Variable	e-bussiness	e-entertainment	e-health	e-education	e-procurement	e-voting
Assets Current Value in Billion US $ ***(S)***	100	100	100	100	100	100
Time to Expiration ***(G)***	0	2	0	0.5	1	2
Exercise Price in Billion US $ ***(K)***	90	90	110	110	110	110
Volatility ***(Q)***	30%	30%	30%	20%	30%	40%
Risk-free rate ***(r)***	6%	6%	6%	6%	6%	6%
$I = K(r + 1)^{-G}$	90	80.0996796	110	106.841445	103.7735849	97.8996084
$S - I$	10	19.9003204	-10	-6.84144486	-3.773584906	2.1003916
$H = SQG^{0.5}$	0	42.42640687	0	14.1421356	30	56.5685425
$d = (S - I)/H$	#DIV/0!	0.46905505	#DIV/0!	-0.48376321	-0.125786164	0.03713003
Computed IDI Value	Positive Infinity	0.47	Negative Infinity	-0.48	-0.12	0.04
Exercise Decision	**Invest**	**Invest**	**Do Not Invest**	**Do Not Invest**	**Wait and Watch**	**Invest Carefully**

The *Do not invest* decision for e-health initiative obtained from the IDI tool shown in Table 5.3 above is meant to advice the decision maker against taking that option due to perhaps numerous risks, lacks sufficient benefits and sustainability. *Invest* decision means there is great future, necessary capacity is available and risks associated with investment are identified, understood and can be handled in the case of e-business and e-entertainment ICT initiatives. The *Wait and Watch* decision obtained for the e-procurement ICT initiative imply that this project should be approved by decision makers if no stiff competitor is envisioned.

5.6 Key ICT Policy Actors

It is important to note that the key actors in ICT policy formulation can in broad terms be categorized into five, namely: government, foreign and local private sector, civil society, donors and the academia. A general observation made seems to find academia making their contribution last of all if at all. In our view, the academia is best placed to understand what is best for its country through research and should be at the forefront. Taking the case of Kenya, the government view of ICT policy came first, the local private sector and civil society came second leaving the academia for the last. The Ministry of Planning and National Development together with IDRC took the initiative to organize and conduct an ICT policy research whose findings were to be factored into the final national ICT policy. We need to see not only government contributions and suggestions backed up with research, but also those of private sector and civil societies. Most of the national ICT conventions, conferences and workshops had no presentations based on research including the most resent and important ones such as: the 1st Kenya National ICT convention, 2003; the 2nd Kenya National ICT Convention, 2004; and the National ICT Policy Stakeholders Conference, 2005. Over 80% of the presentations were from private sector, civil societies and vendors without any indication of support from research or collaboration with academia. This trend needs to be reversed if useful and reliable way forward has to be drawn from such gatherings.

5.7 E-Government Framework

5.7.1 MuL_Net Framework: E-Government Application

As stated earlier, E-government is defined as delivery of government services and information to the public using electronic means, whereas e-governance goes beyond this to allow direct participation of consumers of government policies and decisions.

Yeo (2002) observed the high failure rate of computerized information systems of 83.8%. For this reason, many researchers are currently taking a more holistic approach to corporate ICT as the failure implies low return on ICT investments, affects business continuity and eventually frustrate the use of the technology in the region. The public sector in developing countries, having less capital at its disposal for ICT investments, cannot afford such liabilities as failure gravely affects public confidence. The ICT Layer Architecture of the MuL_Net framework is an attempt to bring some degree of coherence to planning and development of public sector ICT projects so that the drivers (policy makers) who understand the processes they wish to automate are not at the mercy of the technical specialists or the marketing agents. The framework enables the decision makers to be masters of the process.

The MuL_Net framework developed is generic. In considering the EAC, the impact is sub-regional. Moreover, if the EAC adopts this model, it would assist further in its ICT

strategy, this could have a significant effect on the ICT best practices in the partner states since EAC data is aggregated national data.

The MuL_Net framework is applicable at EAC. Since in some applications the statistical data emanates from the partner states Kenya, Tanzania and Uganda, and is collated at the EAC, all are beneficiaries as the partner states provide the input and the EAC system produces the deliverables. Furthermore, the partner states are affected by the quality of decisions based on the integrated information. See Fig.5.4 on the possible areas of applications. However, with a unified, generic view of EAC processes to be automated, the EAC Organo gram structure below (which is a time-honored public-service way of dealing with data) may well have to be reviewed and the processes re-engineered to bring about greater effectiveness and efficiency.

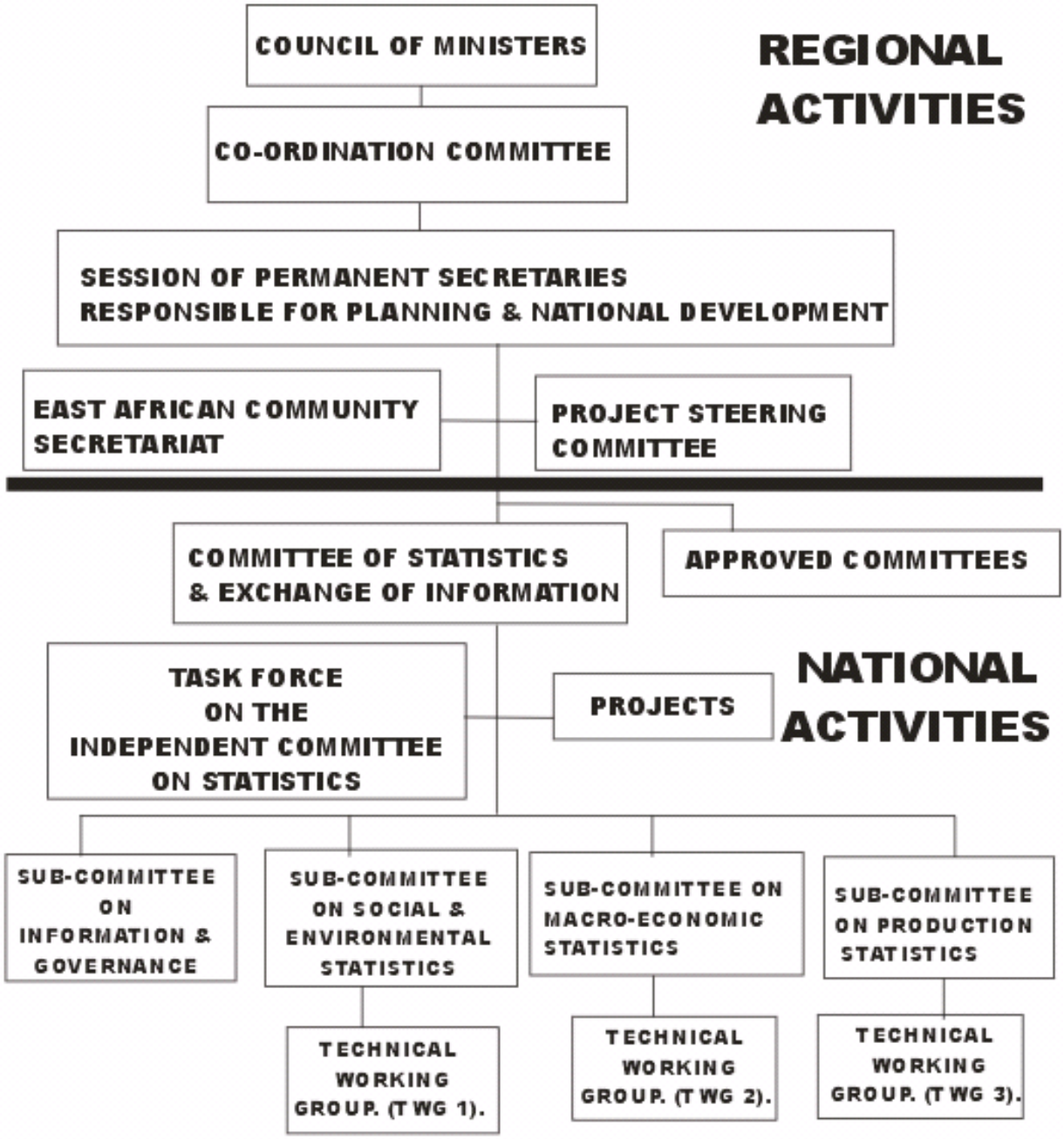


Fig.5.4 : EAC Organo Gram for Committee on Statistics and Information Exchange

Source: Henrik (2002).

The following holistic and stepwise approach to reformation is suggested: EAC must first re-identify its information needs that will help it achieve its organizational reform

objectives. The kind of information needed will determine the role of IT and specify the accompanying information systems. The information processing reform objectives can be categorized into four phases: automation, optimization, reengineering and transformation (Heeks, 2003). Each phase is derived from the type of change being pursued. Automation phase involves changing from manual operations to IT operated via deployment of information systems. As a result the same things are done but with greater efficiency, faster and cheaper. Optimization phase involves changing applications by rationalizing data structures and weak processes. Under optimization, information systems cost and personnel are closely controlled to ensure better ways of doing the same things. Reengineering phase is where redesigning data structures and work processes changes the organization. Here, Information Systems are coordinated in such a way that the same things can be done in radically different and better ways. Finally, the transformation phase implies changing the organization by completely transforming data structures and work processes so as to produce new products.

In the year 2001/02 EAC embarked on a project to establish the EAC statistics database (Henrik, 2002). The purpose of the project was:

- To facilitate the development of regional statistics
- To initiate the production and dissemination of regional statistics
- To make recommendations and implementation plans for the future

Each member state had its own national bureau of statistics. There were no automated means of delivering these statistics to the EAC secretariat. By deploying a powerful IBM database web server at the EAC Secretariat running Windows 2000 server MS Internet Information Server and PX Web Statistical dissemination software system, and delivering of PX for data entry and conversion at the national statistical offices (and other data producers), the EAC has implemented the automation phase. The automation phase ensured that statistical survey data is typed into the computer and tabulated by computer and not by hand. After successfully automating the manual process, EAC embarked on optimization phase where it was expected that the survey forms and data entry screens would be simplified and regional offices fitted with networked computers, which enable direct entry of data by field staff instead of central entry by a pool of clerical staff at EAC headquarters. In order to realize optimization, EAC deployed PC Axis software at EAC secretariat for merging and elaborating the data from the partner states. Data harmonization had not been completed by the time the project stalled. If EAC succeeds to revive the project and take it through the remaining phases of reengineering and transformation, then it is expect that during the reengineering phase, survey questions will be redesigned to provide the information that is needed by the bureau and its clients. The computer systems of the separate sectoral analysis departments will also be redesigned and linked to ensure availability of all data sets across the whole sub-region and that there will be minimum duplication of information between departments or sectors. It is expected that a new central analysis department will be created to analyze the cross-sectoral trends.

In the last phase that is transformation, we propose that the EAC Statistical database becomes the *EAC Statistical System* and operate as an agency for statistical services for the entire sub-region. In this capacity, the agency can then provide income-generating statistical services for foreign and local private firms if need be. These services may include annually-updated CD-Rom of sub-regional and national data sets; access to certain sub-region and national data sets via the Internet; and an online analysis of services for the provision of customized trend analysis and report. Developing EAC Statistical System will obtain great support for instance, from the already forming *National Statistical System* in Kenya. As a sub-regional member state, Kenya has realized the importance of having a properly coordinated bureau of statistics that provides accurate, consistent and timely statistics. Only quality statistics can enable tracking of progress being made towards meeting development goals and targets on poverty reduction, job creation, housing, agricultural production, health, education, transport and communication among others (Central Bureau of Statistics, 2003).

The establishment of the proposed *EAC Statistical System* would contribute to the development of the economic and social integration of EAC partner states, especially through improvement of the EAC secretariat ability to monitor and evaluate the impact of the decisions made by the EAC council of ministers. Emerging trends and factors responsible for any deviations would easily be monitored and remedial measures designed in time.

Figure 5.5 shows the information systems that were in place at EAC headquarters (2003). The Monitoring Council Decision System (MCDS) *Adlib*, can be seen supporting the entire process activities (Lucy, 1997). The representation of the entire process activities is common between Fig 5.5 and Fig.3.8 of Chapter 3. Therefore, Adlib maps well across the process activities of Fig. 5.5 and Fig 3.8. In Fig 5.5 Adlib is customized and becomes MCDS that supports Management Control and Strategic Planning activities. Because of the similarities in the process activities, MCDS can be accessed via web portal as an e-governance application using Fig. 3.8.

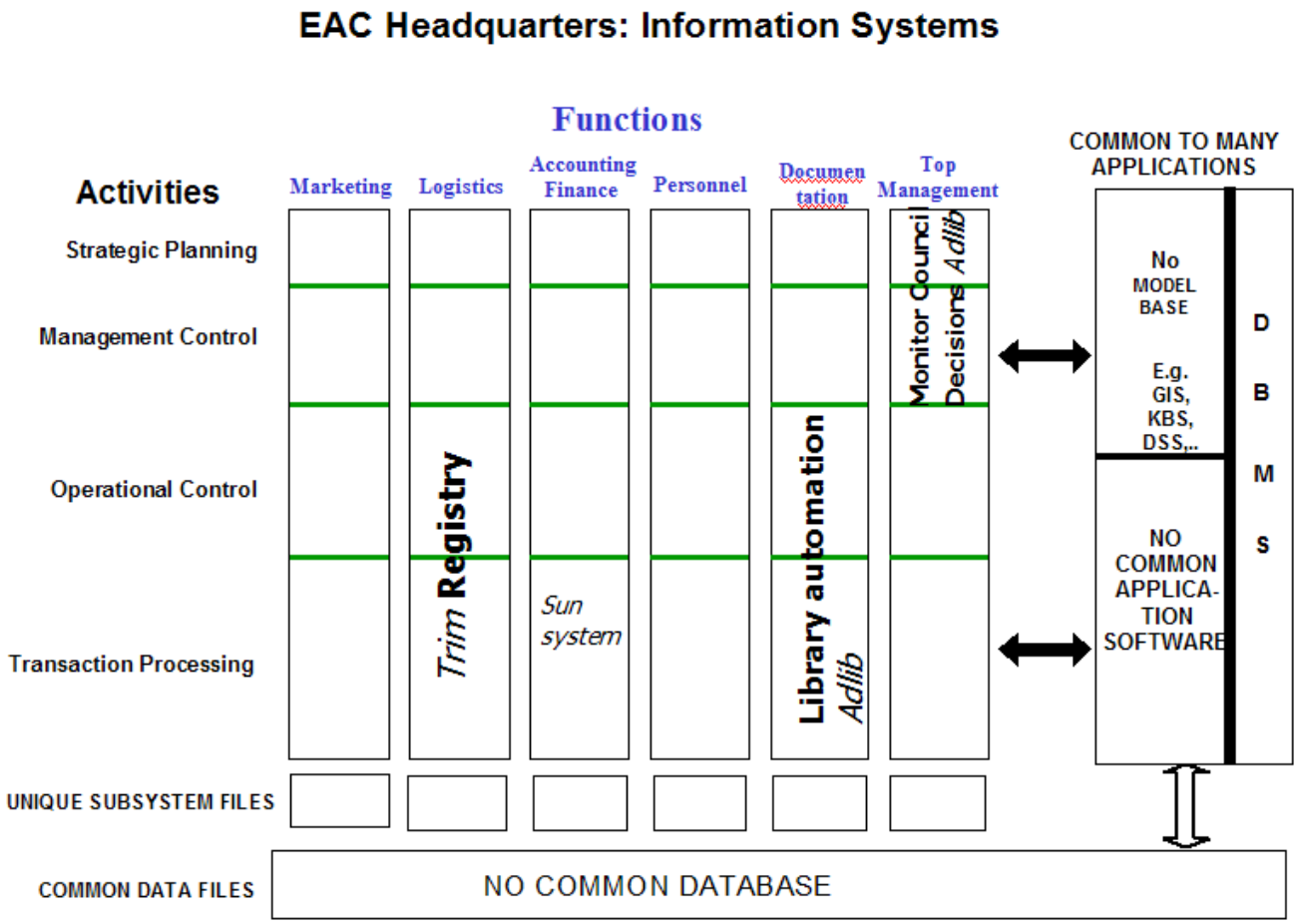


Fig.5.5: EAC Headquarters Information Systems

Table 5.4 shows MCDS process activities mapped onto their corresponding architectures of the ICT Layer architecture of the MuL_Net framework shown in Fig.3.4 of section 3.2 in Chapter 3.

Table 5.4: Mapping Organizational Process sections of the MCDS on the ICT Layer Architecture of the MuL_Net framework

ORGANIZATIONAL PROCESS	MCDS	MUL_NET FRAMEWORK ICT LAYER ARCHITECTURE
Strategic Planning	Monitor Council Decisions	Process Architecture
Management Control	Track Minutes of Council	Information Architecture
Operational Control	Customized *Adlib* (Library System)	Application Level (Information Systems) Architecture
Transaction Processing	Extraction of Council Decisions	Data Level Architecture
	LAN, Customized *Adlib*, Client Server Configuration	Delivery System Architecture

Going through the various architectures of the ICT Layer Architecture of the MuL_Net Framework, a Data Level Architecture will facilitate a database from which will be produced not only pre-specified reports but also ad-hoc reports and queries. The current categorization of production, macro-economic, social, environmental and governance, (planned) information as it now appears to be (see Fig.5.4) may well have to change or be restructured to reflect new generic, integrated and modular design paradigms. Furthermore, When the MuL_Net framework is adopted by EAC, the applications can be outsourced to the private sector provided the blue print below is followed, in particular

the development of stages iii), iv) and v) below which are prescribed by stage ii) immediately above and, which in turn is driven by the processes of EAC:

i) What processes should be automated in *e*-Governance? Process Architecture

ii) What information is needed to accomplish these processes? Information architecture

iii) How are the processes and information related? Information Systems Architecture

iv) How is the data managed? Data architecture

v) Which hardware, software and networks are required? Delivery System architecture.

5.7.2 EAC e-Government Framework Terms of Reference

The EAC with technical assistance from United Nations Economic Commission for Africa (ECA) has embarked on an exercise of developing an EAC sub-regional e-government strategy framework. The framework is envisaged to cover all major aspects of regional cooperation on e-government. The terms of reference for the development of an e-Government strategy for EAC includes (EAC Secretariat, 2005):

- A documented analysis on national, regional and international activities in the development of e-government.
- A documented analysis on various options to develop a harmonized e-government strategy.

- A high-level forum and series of consultation workshops organized for representatives of EAC Partner States and other key stakeholders, such as private sector companies, mass media and academia, to discuss findings of the assessment and the proposed e-government strategy.
- Proposal and documentation of an e-Government Strategy for EAC.

The draft Regional e-Government Framework has provided an opportunity for the generic MuL_Net framework described in Chapter 3 to be tested. The outcomes of the test are summarized in the section below.

5.7.3 Coverage and Gaps of the Draft Regional E-Government Framework

After carefully studying the draft Regional e-Government Framework document, it has been found that the following six broad issues had been addressed:

- EAC to establish a Protocol or Directorate to promote or champion e-government among its member states as well as act as a sub-regional e-government observatory.

- Establishment of suitable legal and regulatory framework to enable adoption and implementation of e-government and e-applications at large.

- Mainstreaming of ICT in education sector across the EAC sub-region.

- Need for development of information infrastructure through public-private partnership in order to enforce and support realization of universal access among EAC member states

- Targeting poverty reduction and gender equity through deployment of e-government services to local communities.

- Coordination, monitoring and benchmarking in order to support exchange of information, share experience for the sake of improvement. This is important for gathering lessons learnt as well as building of a maintenance culture.

On testing the draft Regional E-Government Framework against the MuL_Net framework described in Chapter 3, glaring gaps emerged. Those identified included:

- Lack of clearly outlined principle and objectives upon which the framework was developed.

- Lack of an architecture that could be used to structure necessary components of e-government. Consequently; critical issues such as e-government processes identification and execution, integration of systems and sustainability are not addressed. The framework also does not mention information systems nor data and delivery systems.

- The concept of commoditization and commercialisation is not embraced

- Lack of promotion of exploitation of economy of scales for instance through shared data and delivery systems.

- Lack of sensitivity to culture and cultural issues

- Lack of mechanisms of promoting ICT investments in the sub-region

- Lack of recognition and demonstration of co-existence of e-government with other e-applications such as e-commerce and e-health in readiness for integration.

All these gaps mentioned are substantially covered in the MuL_Net Framework. Besides this, in section 5.7.1 above, we tested the MuL_Net Framework's ICT Architecture layer for MCDS that ported well. For that matter, adoption of the MuL_Net framework by the EAC and customization of the same where necessary and use it to systematically implement according to its priorities all the e-applications it requires. Those e-applications top on the list that were identified at the Regional e-Government Stakeholders Workshop held in Dar es Salaam on 17-19 November 2004 were namely:

1. Customs and Immigration Control
2. e-Parliament
3. e-Health
4. e-Banking, e-Procurement
5. e-Commerce and e-Tourism
6. Meteorological and Tidal Information

5.8 Conclusion

The East African Community treaty provides for harmonization of the member states' ICT policies and regulatory frameworks. This chapter provided analysis and recommendation on the same. It has been noted that national ICT policies are more

inclined towards cultivating the national ICT sector and domestic market. However, a sub-regional ICT policy would enable and push member states towards attaining global positioning as well as capture much needed market for export.

The research survey conducted at EAC headquarters in Arusha revealed that the legal, regulatory and institutional environment was not receiving the necessary attention to enable them support the identified pillars of EAC integration and development.

The enactment of national ICT policies into laws by sub-regional governments, and the development of the sub-regional ICT policy as their global umbrella, can reinforce ICT pillar for the sub-regional integration and development, globalization and modernization.

A combination of a suitable ICT policy and application of the MuL_Net framework, would lead to effective and sustainable implementation of existing sub-regional and national ICT initiatives.

A steady increase with time in funding from internal sources at EAC was observed for ICT. This was a good indicator of the high prioritization of ICT by the EAC headquarters. Given the observed trend on donor funding, EAC needs to strengthen its policy of collaborating with sub-regional universities and in particularly through the already established EAC institution called Inter-university Council of East Africa (IUCEA). In order to extend the lifetime of any ICT application, it must be available in an open source form. Hence, EAC needs to embrace OSS and promote its development in

the sub-region. Despite the assistance offered by the donors to the EAC headquarters on hardware, software and communication, it was observed that effective sharing of best practices as well as skills transfer through consultancy was poor. The poor results could be due to lack of ICT policy to spell out what is expected of the donors. Also lack of capacity at the EAC headquarters to absorb and therefore enable skills transfer could be among possible contributing factors. Though the problem of scarcity of skilled technical human resource in developing countries is big, adopting policies that encourage mobilization and sharing of the few in the sub-region would be a great step towards fixing the problem.

The major players in ICT policy development can in broad terms be categorized into five, namely: government, foreign and local private sector, civil society, donors and the academia. It was noted that the academia seemed to make their contribution last of all if at all.

The public sector in developing countries, having less capital at its disposal for ICT investments, cannot afford to fail. Thus, the ICT Layer Architecture of the MuL_Net framework brings some degree of coherence to planning and development of public sector ICT projects so that policy makers who understand the processes they wish to automate are not at the mercy of the technical specialists or the marketing agents.

The EAC Statistical database need to be changed and become the EAC Statistical System and operate as an agency for statistical services for the entire sub-region. The

establishment of the EAC Statistical System would contribute to the development of the economic and social integration of EAC partner states, especially through improvement of the EAC secretariat ability to monitor and evaluate the impact of the decisions made by the EAC council of ministers.

All these gaps identified in this chapter are substantially covered in the MuL_Net Framework. Besides this, in section 5.7.1 above, we tested the MuL_Net Framework's ICT Architecture layer for MCDS that ported well. The outcomes of a careful study and analysis of the EAC headquarters and its autonomous institutions ICT status, testing of MuL_Net framework, and the identification of the gaps in the draft Regional E-Government Framework have informed the derivation of the ICT policy statements outlined in the next Chapter 6. These showed that the EAC stands to gain if it considered adopting the proposed policy aims when formulating its sub-regional ICT policy that is currently under consideration.

CHAPTER 6

6.0 KENYA ICT REGULATORY REGIME, ICT POLICY, ICT INITIATIVES AND E-GOVERNMENT STRATEGY

6.1 Introduction

This chapter discusses the Kenyan ICT regulatory regime with a view of making recommendations on relevant reforms.

The Kenya national ICT policy formulation process is examined in comparison with all relevant factors, conditions and ideas that could be borrowed or learnt from other nations, sub-regions and regions. A comparative study is done in order to identify any glaring gaps in the formulated national ICT policy. The chapter also attempts to answer the key questions as to whether ICT initiatives in Kenya informed the national ICT policy formulation process and/or have any linkage with it.

A critic on Kenyan E-government Strategy is articulated. The critic majors on showing that local government and particularly local authorities were left out. It also explains both the benefits of including local authorities in the national e-strategy and the consequences of leaving out local authorities in the national e-strategy.

6.2 Regulatory Regime

The regulatory regime in the Kenyan ICT sector just like in most developing countries, has not been reforming at the pace at which ICT has been developing, hence stifling new ICT adoption and implementation. In order to create an enabling environment for ICT in Kenya, there is need to consider constitutional reform and cross-sectoral statutory reforms in Kenya in relation to ICT. This will facilitate the development of integrated ICT laws and policies to mainstream ICT and spearhead Kenya's socio-economic development.

After carefully analyzing *The Kenya Communications Act, 1998* we arrived at several reform recommendations explained here below.

The CCK board and its members need to be competent and independent from political influence and neutral to all industry players. Even the proposed information and Communication Bill 2006 that is seeking to recreate CCK still does not guarantee a board that is competent and independent. For instance Part II 6. (1) states *The Minister may issue to the Commission guidelines on sector policy as may be appropriate*; Part II 8. (1) states *The management of the Commission shall vest in a Board of Directors of the Commission which shall consist of –*

(a) a chairman who shall be appointed by the President;

(b) the Director-General who shall be appointed by the Minister;

(c) the Permanent Secretary in the ministry for the time being responsible for information and communications or his representative

As long as the president and the minister whose ministry CCK fall under still appoint the chairman and the Director-General of CCK, it is difficult to rule out for instance, political interference.

As it stands now, CCK does not allow broadcasters the liberty to choose their preferred mode of broadcasting. Now that ICT technologies are converging, broadcasters can be left to select their mode of broadcasting for this could spur innovation and developments. It is also recommended that CCK can consider giving Internet Service Providers (ISPs) the liberty to adopt the Internet Connectivity mode of their choice. ISPs at their own volition can invest in wireless broadband technology, VSAT technology and fibre optic connectivity without seeking CCK's prior approval. Licensing restrictions on the technological type of networks an operator may deploy is not appropriate. Fixed networks are expected to be able to use mobile networks and vice versa. A satellite network should be able to use a fixed network. This calls for the distinctions between voice and data to be removed. Digitalization of signals has already made the distinction between voice and data technologically meaningless, but it persists as a matter of policy and law. If an Internet service provider wishes to use Voice over Internet Protocol, this should be permitted and should not be subject to the old monopoly control of a moribund fixed line operator (Currie, 2004).

It is recommended that CCK issue license to more Internet Backbone Operators (IBO) to compete with the former state monopoly Jambonet. The monopoly enjoyed by Jambonet has deprived Kenya country of reliable Internet connectivity that has caused the loss of several business opportunities. By CCK continuing to act in favour of Jambonet, by restricting entry of other IBOs in the market, it ceases to be an independent regular as required by WTO.

After the Kenya Posts and Telecommunications Corporation Act, Cap 411 was repealed, it is observed that the Kenya government did not seize the opportunity and quickly privatized Telkom Kenya and Jambonet so as to attract Foreign Direct Investment (FDI) as well as promote competition in telecommunications infrastructure development and service provision. However, CCK can still license any operator that wish to compete with Telkom since competition leads to efficiency and possibly lower prices for users.

The analysis of *The Kenya Communications Act, 1998* also revealed that the National Communication Secretariat (NCS) needed to be given equal weighting as CCK in the Act. The Act only spells out that a Communication Secretary will head NCS while the rest of the officials shall be determined from time to time. Such structure is ill equipped to attract and retain competent ICT policy experts with capacity to advice the government adequately on ICT policy that can accelerate ICT development and national economic growth. Although the Information and Communication Bill 2006 outlines clearly the functions of NCS, it ignores the importance of strengthening the structure of NCS in order to enable it function as expected. Otherwise, the functions that were later assigned

to NCS through the Kenya Gazette Vol. CIII-No. 77 of 3rd December 2001, are now clearly stated in the Information and Communication Bill 2006 and are as listed bellow:

a) Formulation and review of info-communications policies and recommendations that aim to advance strategic interest;

b) Carrying out info-communications policy research and analysis;

c) Conducting continuous reviews of all phases of development in info-communications;

d) Advising the government on the most efficient and effective way for managing the radio frequency spectrum;

e) Assisting in the preparation of country position papers for international meetings and conferences relating to info-communications; and

f) Updating sector policy statements, sessional papers and legislation relating to info-communications.

On analyzing The Kenya Communication Regulations 2001, it was observed that the Regulation 11 of the Kenya Communications Regulations 2001 that states that the Commission may require licensees to comply with international conventions or agreements relating to communications services to which Kenya is signatory, does not provide for licensing of regional in addition to national ICT service providers. Therefore there is need to accommodate the provisions of the East African Treaty Article 99 where interconnectivity among the member states and adoption of a common frequency management and monitoring scheme is expected to be undertaken jointly. Kenyan

statutes do not capture these developments and therefore stifling EAC sub-regional integration.

For The Kenya Broadcasting Corporation Act, Cap 221, Sihanya and Odek (2005) reported that the Act's provisions have not been updated to reflect a liberalized telecommunications industry and consequently reflect the "single nationwide broadcaster" philosophy. This needs to be revised to reflect the liberalized market.

In general, it has been observed that some of the key issues affecting the ICT environment from a legal and regulatory perspective include:

- Ineffective legal and regulatory framework in a converging ICT market structure
- Lack of predictability of regulatory decisions based on a clear legal and regulatory framework
- The lack of clarity in the interaction of the policymaking and regulatory processes.

It is important to note that the supply of resources, facilities and services must be coordinated to bring services to the market in an efficient and timely way. Regulations affect the public resources, facilities and services components of the supply chain, and also directly affect the structure and efficiency of the supply side of the market. Inadequate regulations can impose inefficiency in the supply chain.

6.3 ICT Policy and Development

6.3.1 Policy Issues

Kenya as a country has just formulated its national ICT policy (Ministry of Information and Communications, 2006). It was presumed that the factors and conditions that are known to be necessary for the ICT policy formulation process would be addressed, so as to facilitate implementation. These factors and conditions include: dialog and participation of key stakeholders, governance and socio-political enabling environment, legal regulatory and institutional environment, and committed political, economic and social leadership. Of these factors, dialog and participation of key stakeholders and legal regulatory issues were not adequately addressed during the ICT policy formulation process (Etta and Elder, 2005). Some of the consequences of lack of adequate consultation with major stakeholders in the ICT policy making process is reflected in the gaps between the ICT policy statements articulated in the draft ICT policy (Ministry of Information and Communications, 2004) that was later converted to the final ICT Policy (Ministry of Information and Communications, 2006) without any major alteration except for layout and a few ICT policy statements identified and pointed out in this chapter. For that matter, it is important to note that the content of documents referred to separately in this chapter as *Draft ICT Policy* and *ICT Policy* is the same.

ICT policy making has been identified as one of those currently heavily influenced and funded by donors (Etta and Elder, 2005). During the 1980's, the World Bank and IMF issued prescriptions in the form of Structural Adjustment Programs (SAPs) that were

handed down to errant nations as remedy for economic development, and as the 1990's drew to a close, after nearly two decades and numerous experiments on sponsored policy intervention program of SAPs, success remained elusive. As a direct consequence, SAPs engendered apathy and lack of local ownership, thus undermining and complicating the political and technical capacity for policymaking and implementation. Despite the big temptation to go for the donor driven and supported ICT policy formulation, Kenya remained determined to develop its own ICT policy for which its development process has been studied and analyzed in this chapter.

In the middle of the glaring failure of SAPs, a new initiatives called African Information Society Initiative (AISI) was launched in 1996 claiming that Africa needed a common vision for its quest not only to bridge the digital divide between Africa and the rest of the world but more importantly to create effective digital opportunities to be developed by Africans and their partners, and to speed the continent's entry into the information and knowledge global economy. In brief, AISI is an action framework for building information and communication infrastructure in Africa. So far, AISI has provided support to 28 African countries to develop their own National Information and Communication Infrastructure (NICI) policies, plans and strategies, Kenya is not one of the countries assisted to develop its own policy. The drawback of involving AISI in Kenya ICT policy formulation process, is that the NICI cycle framework proposed for developing policy that is normally advocated and applied by AISI (see Fig.5.1), though it appears comprehensive, its implementation details or plans have proved to be complex and difficult to follow. Chapter 4 attempted to address such challenges and gaps through the generic MuL_Net framework developed and presented.

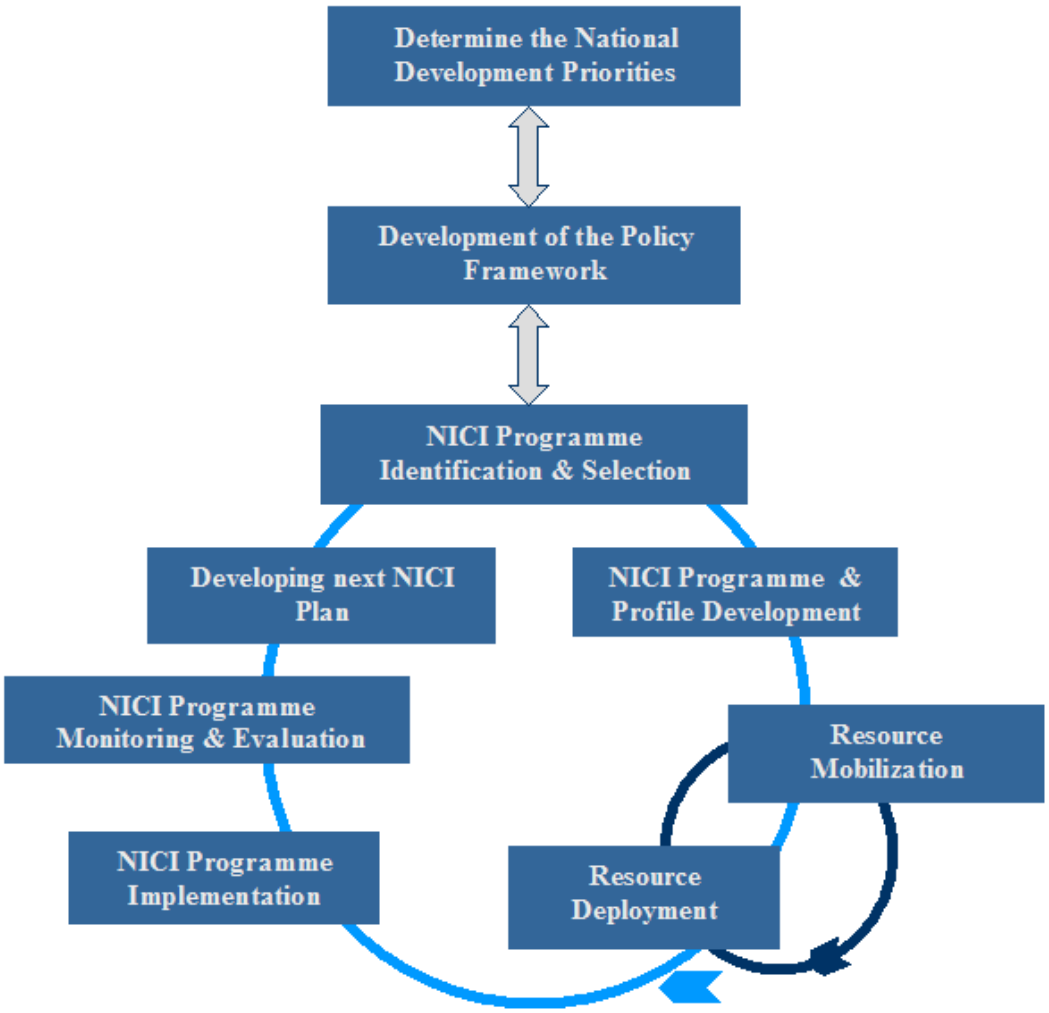


Fig.6.1: NICI Iterative Cycle (ECA, 2004)

The draft Kenya ICT policy clearly states that it was modeled on the COMESA Model ICT policy, which was adopted by the COMESA Council of Ministers in March 2003 (Ministry of Information and Communications, 2004). This has necessitated the understanding of how the COMESA Model ICT policy statements were developed before seeing their suitability for Kenya.

Now that Kenya chose not to involve AISI, which is a sub-regional ICT initiative in its ICT policy formulation process, one expects that Kenya's ICT policy was informed by

the existing local ICT initiatives and that there are linkages between them. This is the issue this chapter explores in detail.

6.3.2 Proposed Generic ICT Policy Statements (GIPS)

The regional ICT trends reported in Chapter 4 of this thesis together with outcomes of a study and analysis of the EAC sub-region member states' national ICT policies, COMESA ICT policy, EAC headquarters and its autonomous institutions ICT status whose details are found in Chapter 5, revealed new insights about the kind of policy statements that ought to be included in a balanced national ICT policy. This section presents eleven ICT policy categories (themes) and the corresponding statements (objectives) of each as follows:

I. Strategic ICT leadership

1. Encourage participation in regional and global governance of ICT
2. Encourage use of ICT to mainstream gender and other empowerment issues
3. Encourage collaboration with other countries on regional projects
4. Support enhancement of capacity for research and development in ICT
5. Provide leadership in incubating new ICT applications including the promotion of the development of mobile phone data and information applications
6. Articulate the vision of ICT and what ICT can do for the nation and its citizen
7. Encourage communities through local government to propose specific bottom up projects that aggregate the supply of services needed to create a demand for information infrastructure development.

8. Encourage the CBOs and local authorities to own ICT initiatives in order to attain the necessary critical mass for ICT to contribute significantly in socio-economic development.
9. Encourage discussion on the nature of power relations between and among all stakeholders in order to stimulate and enable participatory policy making, which is regarded as a *best practice* ingredient for better policies.

II. Human Capital

1. Promote Mainstreaming of ICT in the education system.
2. Encourage development of enumeration and incentive packages for skilled ICT personnel in order to minimize their turnover
3. Support enhancement of capacity for research and development in ICT
4. Encourage institutions of higher learning to undertake R&D activities in collaboration with telecommunications service providers and manufacturers.
5. Support stakeholders that contribute in the policy making process with research findings so that they understand their roles, limits and responsibilities.

III. Institutional Framework

1. Stimulate ICT innovation
2. Support of the development of appropriate mechanism for coordination and implementation of ICT policy
3. Promote institutional rationalization for purposes of co-coordinating ICT policy implementation

IV. Legal and Regulatory Framework

1. Promote balanced telecommunication reforms in privatization and liberalization through creation of simple and explicit regulatory systems
2. Encourage open competition in order to attract FDI
3. Promote establishment of technologically neutral framework for ICT licensing
4. Encourage national organizations that have rights of way to contribute in the development of the national information infrastructure.
5. Promote duty free zones to attract ICT investment.
6. Promote publication of the rights and obligations of ICT consumers
7. Encourage development of a national standard interconnection model that specifically address the issue of Reference Interconnection Offer (RIO) for major operators as well as issues of universal services obligations.
8. Encourage publication of information and mechanisms of administration and management of domain names.

V. Information

1. Support establishment of the office of Information Commissioner and its functions.
2. Support the public to obtain access to the greatest extent possible consistent with the public interest and the right to privacy, to information in the possession of government, public bodies and specified private bodies.
3. Encourage promotion of national culture and identity in media

4. Encourage stakeholders and development partners to support creation of local content in order to preserve the knowledge and culture of traditional communities
5. Promote sharing of information and data through provision of timely and quality statistics.

VI. Information Technology Services

1. Encourage adoption of E-applications
2. Support preservation of digital records and archives for future referencing and posterity.
3. Encourage public and private sectors to develop and deploy Open Source software.
4. Offer incentives for individuals to own a PCs and mobile phones.
5. Encourage development of e-applications that are a shared vision among all stakeholders.
6. Develop e-applications that address social, economic, political and cultural needs of the time.

VII. Telecommunications Services

1. Encourage investing in telecommunication systems and broad bandwidth.
2. Promote utilization of all installed ICT infrastructure to be optimally utilized and synchronized.

3. Promote direct interconnectivity between mobile cellular service providers and other service providers including sharing of infrastructure.
4. Encourage development of National Geospatial Data Infrastructure
5. Promote development of uniform numbering schemes in order to simplify interfacing and Interconnection

VIII. Broadcasting

1. Promote development of broadcasting legislation that cover policy advisory and dispute resolution for the sector as well as take into consideration the overlaps now in existence due to technological convergence and integration
2. Support the protection of the public, especially minors, from unregulated pornographic and violent programming in the broadcast media
3. Promote broadcasting which is for, by and about specific geographical communities or communities of interest, whose ownership and management are representative of those communities, which pursues a social development agenda and which is not-for-profit.
4. Support establishment of commercial broadcasters that contribute to the promotion of culture and empowerment of the poor and vulnerable groups in society while remaining commercially viable
5. Encourage broadcasters to play a crucial role in providing a level playing field in the electronic media for all political actors so as to promote diversity, good governance, human rights and democracy.
6. Encourage gradual transformation from analogue to digital broadcasting.

7. Support the conversion of studio production and communication technologies from analogue to digital and the development of necessary capacity to operate as a digital broadcaster.
8. Support streamlining of the operations of the film and music industries and promote local production and talent.
9. Stimulate the growth of advertising industry as a major source of income for the broadcasting media.

IX. Radio Frequency Spectrum

1. Promote frequency allocation based on international standards while keeping in mind public interest objectives.

X. Postal Services

1. Encourage postal corporations to have a Universal Service Obligation in the provision of equitable access to quality and efficient postal services.

XI. Universal Access

1. Encourage establishment of a Universal Service Fund.
2. Encourage annual allocation of funds equivalent to a reasonable proportion of nation's GDP for ICT deployment, diffusion and universal access in partnership with the private sectors and development partners.
3. Encourage ICT operators to have social obligations.

The COMESA ICT Policy and the draft Kenya ICT policy documents were studied and analyzed. As a result of this analysis, key ICT policy statements were identified. In order to visualize commonalities and gaps between the derived generic ICT policy statements, against the COMESA and the Kenya draft ICT policy statements, Fig. 6.2 (a) and (b) are presented. In these figures, the serial number of each of the derived generic policy statement per category above falls in a column and is used to represent the statement. The shaded areas under COMESA ICT policy or Kenya draft ICT policy rows indicate the derived generic ICT policy statements they map with.

Mapping COMESA and Draft Kenya ICT Policy Statements on Derived Generic ICT Policy Statements														
	Strategic ICT Leadership									Human Capital				
GIPS Number	1	2	3	4	5	6	7	8	9	1	2	3	4	5
COMESA ICT Policy														
Kenya Draft ICT Policy														
	Legal & Regulatory Framework									Institutional Framework				
GIPS Number	1	2	3	4	5	6	7	8		1	2	3		
COMESA ICT Policy														
Kenya Draft ICT Policy														
	Information Technology Services									Information				
GIPS Number	1	2	3	4	5	6				1	2	3	4	5
COMESA ICT Policy														
Kenya Draft ICT Policy														

Fig.6.2 (a): Mapping ICT policy Statements

Mapping COMESA and Draft Kenya ICT Policy Statements on Derived Generic ICT Policy Statements														
	Broadcasting									Telecoms Services				
GIPS Number	1	2	3	4	5	6	7	8	9	1	2	3	4	5
COMESA ICT Policy														
Kenya Draft ICT Policy														
	Radio Freq. Spectrum	Postal Sevices	Universal Access											
GIPS Number	1	1	1	2	3									
COMESA ICT Policy														
Kenya Draft ICT Policy														

Fig.6.2 (b): Mapping ICT policy Statements

6.3.3 Gaps in Draft Kenya ICT Policy

Arising from statements on ICT policies for the region, a number of gaps can be pointed with respect to the draft Kenya ICT policy as it stands today. If addressed, these would enrich the policy and make it relevant and useful for Kenya. These gaps are illustrated in Fig. 6.2, and we look out each one of them at a time.

Strategic ICT leadership:

Using Fig.6.2 (a), we note that policy statements identified by the GIPS numbers 4, 5, 6, 7, 8 and 9 of section 6.3.2 were not clearly addressed in both the Kenyan draft and final ICT policy document. What emerges from this analysis is that there is no clear statement expressing deliberate government commitment to articulate the vision of ICT and what

ICT can do for the nation and its citizen. A statement that could indicate government's encouragement of citizens through local government on bottom up projects that aggregates the supply of services needed to create a demand for information infrastructure development are missing. Such a statement can also encourage CBOs and local authorities to own ICT initiatives in order to attain the necessary critical mass needed for ICT to contribute in spurring socio-economic development.

Human capital:

The idea of supporting stakeholders that contribute in the policy making process with research so that they understand their roles, limits and responsibilities remained elusive in the Kenya Draft ICT policy (See Fig.6.2 (a) GIPS number 5). Yet its important that national policies must be informed on the basis of facts.

Legal and Regulatory Framework:

According to our benchmark of eight GIPS, Kenyan Draft ICT policy did not clearly mention three GIPS, which we can identify in Fig. 6.2 (a) as GIPS number 6, 7 and 8. This means the Kenyan Draft policy does not directly state that it promotes publication of the rights and obligations of ICT consumers. The issue of encouraging the development of a national standard interconnection model that specifically address the issue of Reference Interconnection Offer (RIO) for major operators as well as issues of universal services obligations are not addressed. The policy could also have encouraged publishing of information and mechanisms of administration and management of domain names.

Information Technology Services:

There is no clear indication of support for the development of e-applications that are a shared vision among all stakeholders, and addresses social, economic, political and cultural needs of the time. Incentives for individuals to own PCs or mobiles are lacking.

Information:

In all cases, whenever the office of Information Commissioner is established, one of its key functions include supporting the public to obtain access to the greatest extent possible consistent with the public interest and the right to privacy, information in the possession of government, public bodies and specified private bodies. Therefore, lack of a policy statement on creation or establishment of an Information Commissioner office in the Kenya policy document is a major gap.

Telecommunications Service:

The development of National Geospatial Data Infrastructure is crucial for any nation that wishes to adopt major e-applications such as e-government, commerce and e-learning. The Kenya ICT policy document does not address this anywhere. It can also be in order if the same document indicated support for the development of uniform numbering schemes in order to simplify interfacing and Interconnection of ICT.

Universal Access:

The ICT policy could also have mentioned statements that can encourage annual allocation of funds that are of a significant proportion of the national GDP for ICT deployment, diffusion and universal access. The policy document could also have spelt out a statement of encouragement to those who wish to become ICT operators in Kenya to have social obligations such as contributing towards improved social services such as road maintenance in the rural, medical clinics in the rural and clean water supply in rural.

Looking at Fig.6.2 , it is evident that modeling on COMESA Model ICT policy was not the best given that it also falls short by about half of the derived generic ICT policy statements established via regional ICT studies research reported in Chapter 4. As far as adoption of COMESA Model ICT policy is concerned, Kenya scored high. However, with the above observed gaps in the draft ICT policy, there is no doubt that Kenya needed to look beyond COMESA. The presence of the COMESA Model ICT policy seemed to have provided a shortcut to the Kenya ICT policy formulation process perhaps on assumption that the COMESA ICT policy had been well researched and broad enough. Therefore the need for supporting the policy formulation process with empirical research.

Nevertheless, the only new significant inclusion in the final Kenya ICT policy document are statements that spell out the government's commitment to play a role in the development of ICT in Kenya. For example, the government's commitment to make budgetary provision in order spur the growth of ICT; CCK to be strengthened to ensure

quality and compatibility of IT products and services; increase diffusion of ICT knowledge through establishment of a National ICT Centre of Excellence with nationwide coverage, and to promote capacity building and innovation. The National ICT Centre of Excellence proposed for establishment to be partially financed through the Universal Service Fund.

6.4 ICT Initiatives in Kenya

6.4.1 Overview of ICT Initiatives in Ministries

ICT is a vital catalyst for social change and economic development that is increasingly seen as an essential tool for developing countries. Therefore, there was need for a comprehensive overview of all ICT related initiatives in order to answer the following research questions also captured in details in the questionnaire given in appendix B.

a) What are the existing initiatives with respect to ICT in terms of policy, projects in all sectors?
b) Who are the principal actors in these initiatives?
c) What are the objectives/outcomes of these initiatives?
d) Who is funding these initiatives?
e) How sustainable are these initiatives?
f) What is the way forward with respect to these initiatives?
g) Do the ICT initiatives inform the country's ICT policy formulation process?
h) What linkages existed between the ICT initiatives and the ICT policy?

All the data collected in pursuit for answers to the research questions listed above on ICT initiatives in Kenya are tabulated in appendix C and D. The analysis on this data enabled a matrix of ICT initiatives across ministries to be realized as shown in Fig.6.3. No fill across a ministry in Figure 6.3 is interpreted as the ministry having no ICT initiative in the corresponding sub-sector.

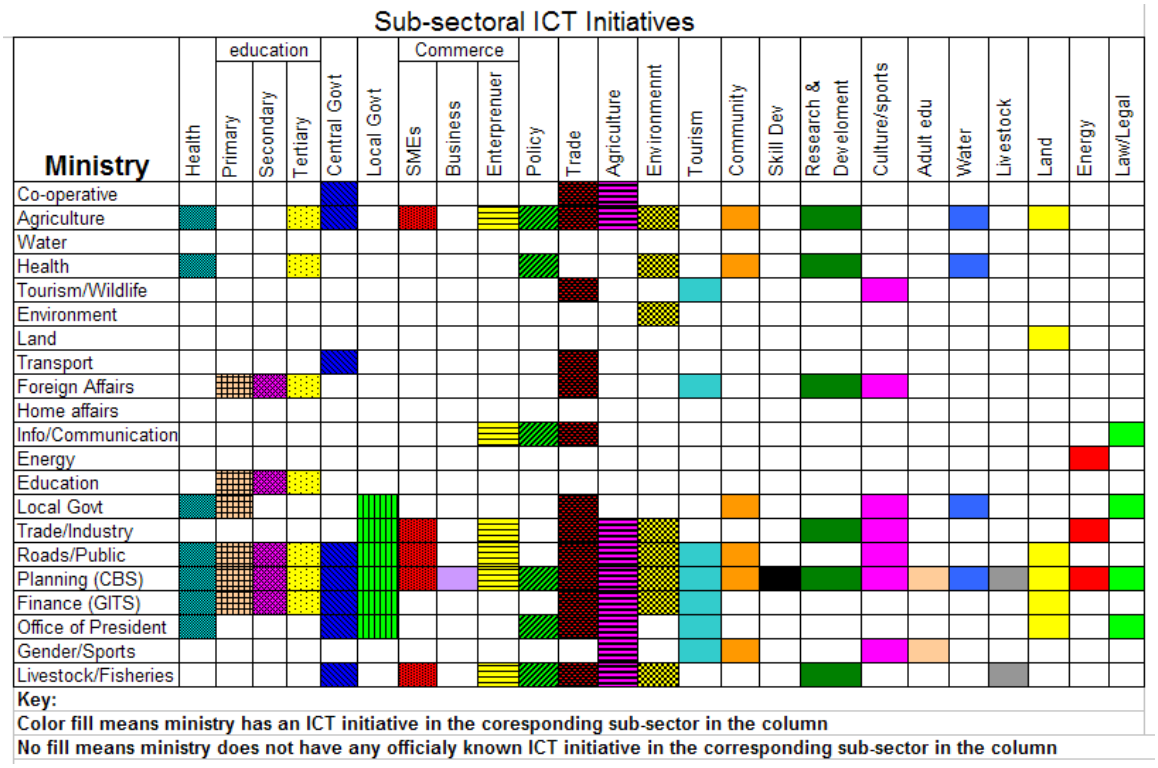


Fig.6.3: Ministerial ICT Initiatives Matrix

Figure 6.3 above shows that most ministries had at least an ICT initiative that cut across another ministry. The ICT initiatives across the ministries were similar and consisted of largely infrastructure development and local content development in their websites; and therefore, generally concentrated in the Physical/ICT Infrastructure sector. Several

ministries therefore have some ICT initiatives at least in one sub-sector. Emphasis on community and cultural focused ICT initiatives is lacking. For a country as culturally diverse as Kenya, greater emphasis on the development of local electronic content can be of great importance. Fig.6.4 shows that only 18% of the ministries were contributing largely to the development of local electronic Internet content despite the fact that local knowledge when derived from local content it is able to foster entrepreneurial activity and at the same time ensure that valuable cultural heritage is preserved.

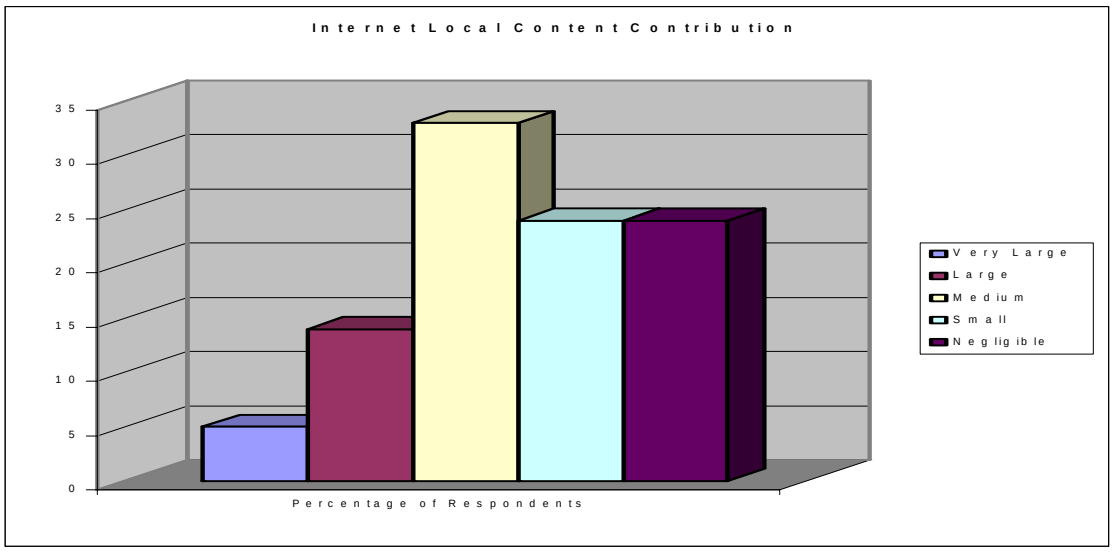


Fig.6.4: Percentage of Extent of ICT Initiatives Contribution to Internet Local Content

On analyzing the data, it was found that only the ministry of finance had mainstreamed ICT and therefore has the ICT department that was referred to as Government Information Technology Services (GITS). GITS is fully operational and has its own budget allocation and scheme of service for its ICT officers. The other ministries rely on ICT officers seconded to them by the ministry of finance, and who normally work under planning department or administration. Of the ministries that participated in the research

86% found technological innovation of significant concern to them, hence worthy their attention and therefore resources could be mobilized in that direction. This is demonstrated in Fig.6.5. This means that ministries are ready and aware of current trends in technology and therefore can adopt it easily.

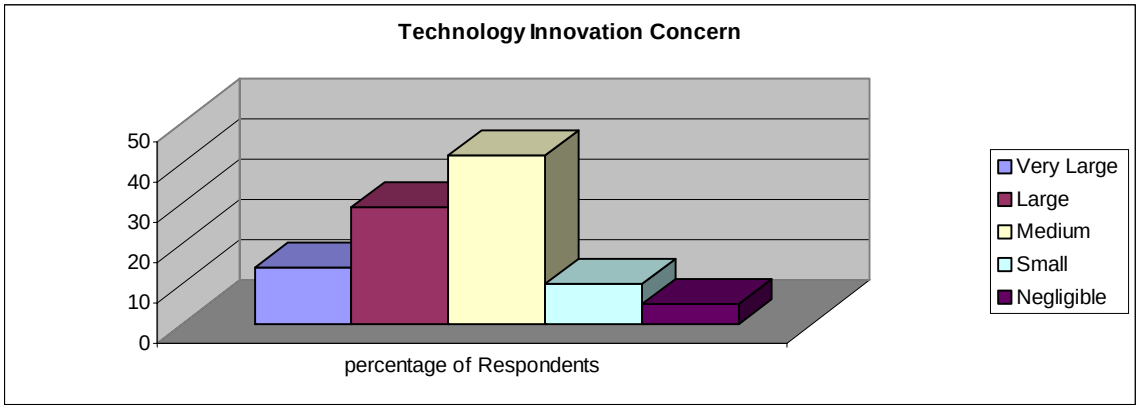


Fig.6.5: Percentage Extend to Which Technology Innovation is of Concern

Sectors such as General Economic Services and Security were found not to have attracted significant ICT initiatives yet they are crucial to the Kenyan economy. The slow implementation of reforms in the Kenyan ICT law and regulatory regime has strongly contributed to this scenario as discussed in section 6.1.

6.4.2 ICT Initiatives Linked to Draft ICT Policy

The ICT initiatives that could be identified with some of the draft ICT policy statements and hence linked to them, have been singled out as follows (note that the policy statement numbers and categories referred to are found in section 6.3.2):

a) The Ministry of Agriculture has developing an information database that was to be accessed via an interactive website. This was part of the ministry's strategy for revitalization of agriculture through e-farming. E-farming was identified as reliable, quick and efficient means of providing agricultural extension services that could help improve production hence fight poverty. USAID was funding these projects. *This initiative is linked to category VI-Statement No.1*.

b) CCK and IDRC had funded the Universal Access Study. The study aimed at establishing the rural demand, policy, financial mechanisms and universal access strategies. The study was completed in 2005. *This initiative is linked category XI -Statement No.1*.

c) Kenya Education Network (KENET) had connected over 22 member educational and research institutions nationwide. Its aim was to develop sustainable communication and network among educational institutions through high-speed access to the global Internet. KENET stakeholders included CCK, TKL, Kenya Data Network and Telecommunication Service Providers of Kenya (TESPOK). *This initiative is linked to category VI-statement No.1 and category II –statement No.10.*

d) The ministry of health was working on e-health ICT initiative. The project had two main objectives namely: to enable dissemination information to both

health workers and patients; and to impart knowledge, skills as well as improve patient management by health professionals. The project started in the year 2000 and was still going on. The ministry was exploring ways of getting financial support from several organizations including: Global Fund, PEPFAR, World Bank, DFID, UNICEF, USAID, NEPAD, JICA and WHO. East Africa Integrated Disease Surveillance Network (EAIDSNet) was the ICT initiative identified in the ministry of health that was working on improving communication and enhancing networking among stakeholders. EAIDSNet supported prompt action to disease outbreaks by providing timely feedback to decision-makers. The Government of Kenya, East Africa Community (EAC) and USAID were funding it. *This e-health initiative is linked to the category VI- statement No.1*

e) The Ministry of Education Science and Technology was developing an Education ICT Strategy that had the following components: policy, capacity development, technology, science, infrastructure, technical support, research and development, access, digital content, standards, partnership, resource mobilization, emerging technology, global initiatives and science park. The World Bank was funding the development of an Education Management Information System (EMIS) that targeted administration structure of the entire ministry down to the district level with provision of extension to schools. EMIS World Bank project was a five-year project started in 2005 and expected to be completed by 2010. *This initiative is linked to category VI- statement*

No.1, category VII-statement No.1, category III-statement No. 1, category II-statement No. 1 and category V-statement No. 4.

f) Since the year 2001, the ministry of finance had been the backbone of most of the government ICT initiatives. It was found to be responsible of the following activities:

i) Government websites development, hosting & maintenance

ii) Recruitment of ICT personnel for government

iii) Preparation of the scheme of service for ICT personnel in government

iv) Overseeing of ICT operations in government

v) Rollout of ICT infrastructure for government as part of e-government implementation plan.

vi) Deployment and maintenance of IFMIS and IPPD software applications under e-government project across all government ministries.

vii) Preparation of ICT equipment specifications for government

viii) Development and implementation of ICT infrastructure standards in government

These government initiatives are linked to category I –statement No.2, and category II-statement No.2, category III- statement No.2 and 3,category V-statement No.3 and category VI- statement No.1

g) Kenya Revenue Authority was working on Customs Reforms and Modernization Project. This project aimed at facilitating electronic exchange of trade documentation between stakeholders in the customs clearance process. *This initiative is linked to category VI- statement No.1*.

h) The e-government directorate had been created under the Office of the President. Its main goal was to implement the e-government strategy whose immediate plans are:

i) Provision of official e-mail addresses to all government officers
ii) Interconnection of all government offices via fibre optics replacing telcom lease lines
iii) Improvement and completion of all stalled government ICT projects including websites
iv) Promotion of ICT to the public through reliable service delivery
v) Adherence to professionalism in handling of ICT projects under e-government.
vi) Structure e-government rollout in favour of success and sustainability.

This initiative is linked to category I- statement No.2, category III- statement No.3 category VI- statement No.1and category VII- statement No.2.

i) The Kenya National Assembly (parliament) was working on and ICT initiative that enables it provide live coverage of parliament. A plan to have all Members of Parliament trained on computer literacy and Internet applications was underway. The Management Information System that supports Bill drafting and tracking was being developed. The development had started in September 2004 and was still underway. A parliamentary interoperability system in Africa was being developed so as to enable transfer and application of lessons learned in previous parliaments. A highly interactive parliamentary website had been developed and was due for launching. The government of Kenya funded all stated ICT initiatives at parliament. There was one ICT initiative on literacy, research and legal issues that required a dynamic and interactive database that had other sponsors besides Kenya government. They were namely: European Union (EU), Democratic Governance Service Program (DGSP), and DFID. The parliament had also developed a website to publish activities related to the Constituency Development Fund (CDF). USAID had funded the initial e-government project at parliament through donation of routers and facilitation of connectivity. *This initiative is linked to category VI- statement No.1*.

j) Goal-ICT organization champions ICT initiatives for youths in Kenya. Its objectives were to enhance participation of youths in information society, socio-economic development, employability, and enterprise development. The initiative started in 2002 and is expected to end in 2008. Donors and private sector fund the initiative. The Goal-ICT organization expressed its lack of

participation when it came to it being represented in the development partners' roundtable forums. *This initiative is linked to category I-statement No.2.*

k) The African Centre for Women, Information and Communications Technology (ACWICT) promoted women's access to and control of ICT as a tool for sustainable development. It had five ICT initiatives namely: Agri Trade Kenya, All Girls ICT Camps, Women Owened and Operated Telecentres, ICT for WOMEN Entreprenurs and Strategic use of ICTs in Gender and Governance in Kenya. ACWICT drew its support from donors. ACWICT had established six access-centres in western region of Kenya. Among key challenges ACWICT faced were: high cost of internet access; lack of ICT infrastructure; lack of adequate ICT human resource capacity; and insufficient funding due to over dependency on donors. *This initiative is linked to category VI-statements No.2 and category XI-statement No.1*.

6.4.5 ICT Initiatives without link to Draft ICT Policy

Despite the following key ICT initiatives listed below being in place, the draft Kenya ICT policy seem not to have been informed by them. In fact, these initiatives are all supported by one or more of the derived generic ICT policy statements implying, they were worthy of consideration.

a) An ICT Trust Fund was established in 2005 to help mobilize funds to support ICT in schools. Stakeholders included ministry of education, Kenya Electricity Generating Company, Microsoft Corporation, Kenya Airways, Kenya Airports Authority, East Africa Standard, Kenya Pipeline Corporation, Kenya Revenue Authority, Postal Cooperation of Kenya, Safaricom Limited, Network Initiatives of Computers in Kenya, Telecom Kenya Limited (TKL), Barclays Bank of Kenya and the Communication Commission of Kenya (CCK). *This initiative is linked to category XI-statement No.2.*

b) The World Bank was also supporting an ICT initiative called Kenya Kountry Business Incubator (KekoBI) that aimed at nurturing, protecting and nourishing ICT ideas and businesses. *This initiative is linked to category I-statement 4.*

c) The ministry of transport was having a joint ICT project together with Safaricom and Celtel called SMS3000. The project aimed at assisting police force on getting reports from citizens via their personal mobile phones. Especially reports on carjacking, accidents and any form of crime as a way of enhancing community policing. A National Enquiry Point was being set at the ministry of transport that was to provide access to WTO material and information via websites. *This initiative is linked to category VI-statement No.6.*

d) Road construction and maintenance is an on going exercise throughout the country. Therefore the development of an Electronic Reporting System for the status of road works was timely. SIDA, GTZ and DANIDA were funding this initiative. SIDA was funding this activity in Nyanza province for a period of five years start 2005; GTZ was funding Rift Valley province starting 2005 and DANIDA was funding Coast province project for a duration of five years that started in the year 2000. Also mapping, reporting and evaluation of all roads in Kenya were being done using Geographical Information Systems (GIS). World Bank was supporting this project for a period of two years. The GIS project was completed in 2004 and was ready for deployment as from June 2005. *This initiative is linked to category VII-statement No.4*

e) The Tourism Trust Fund (TTF) was supporting the development of a web portal that will promote and publicize Kenya via one stop site. *This initiative is linked to category XI-statements No.2.*

f) A Statistical Information System that generated an index of industries and Labour Productivity were being developed by the ministry of trade and industry with the help of UNDP and UNIDO. The projected started in the year 1990 and was now at its final stages. *This initiative is linked to category V-statement No.5.*

g) The Central Bureau of Statistics (CBS) under the ministry of planning and national development was computerizing all districts in order to empower them to conduct local statistics and avail their findings to their residents. An Integrated Multi-sectoral Information System (IMIS) was being developed to support interoperability and inter-sectoral transfer of data and information. The World Bank, USAID and CIDA were funding the STAT-CAP project. The project aimed at training police, prisons, educationist and health experts on how to use statistics generated in their sector for planning, prediction and management. CBS was disseminating historical data on demographic health survey (DHS) in an electronic form on Compact Discs (CDs). The ministry of planning through the ICT initiatives at CBS, expected a major revival in production and dissemination of accurate, consistent and timely statistics to government and all stakeholders. The ministry believed that quality statistics would help monitor development goals, poverty alleviation, job creation, housing, agricultural production, health, education, trade, communication, transport and emerging trends among others (Central Bureau of Statistics, 2003). *This initiative is linked to category V-statement No.5.*

In general, what this means is that Kenya was not adequately informed by ICT initiatives within its borders. This is normally the price that is paid whenever the policy formulation process does not involve all key stakeholders and therefore ends up with glaring gaps.

6.4.6 Discussion

The research revealed that most of the existing ICT initiatives were standalones hence lacked integration and as a result, there was a lot of overlap in areas where savings would have been made. It was also noted that there was need for sectoral ICT policies to guide ICT rollout as well as provide the sectoral input to the national ICT Policy. Without which, the national ICT policy lacked a sound foundation to anchor on.

Finally, ICT initiatives thrive and have a future where they are linked to ICT policy. It is therefore important especially where the ICT policy is developed after several key initiatives are in place, to take cognition and be informed by them if their survival is valued.

6.5. E-Government

6.5.1. E-Government Adoption

E-government is not a shortcut to economic development, budget savings, or a clean, efficient government; it is a tool for achieving these goals. The process of deploying this tool often is a struggle and presents costs and risks, both financial and political (Working Group on E-Government in the Developing World, 2002). These risks can be significant. If not well conceived and implemented, e-government initiatives can waste resources, fail in their promise to deliver useful services, and thus increase public frustration with government. Particularly in the developing world where resources are scarce, e-

government must target areas with high chances for success. Moreover, e-government in the developing world must accommodate certain unique conditions, needs, and obstacles, which may include a lack of infrastructure, corruption, weak educational systems, and unequal access to technology. Too often, the lack of resources and technology is compounded by a lack of access to expertise and information.

The e-government process needs continuous input and feedback from stakeholders who are mainly the public, businesses, and officials who use e-government services. Their views and ideas are essential to making e-government work. E-government, when implemented well, is a participatory process.

In the case of Kenya, applying the MuL_Net framework described in Chapter 3 in adoption and implementation of e-government would ensure that the e-government project is more likely to meet the needs of the business functions it is intended to support, deliver all expected benefits, and is completed on time to cost and functionality.

6.5.2. E-Government Critical Success Factors

a) Sharing the Vision among All Stakeholders

It is important to encourage all perceived stakeholders to participate in defining the e-government vision. If the public and private sectors are consulted only after e-government plans have been developed and implementation has begun, e-government

programmes risk being underused or even irrelevant. This is the case in Kenya, particularly with respect to local authorities who are key stakeholders, yet they have been left out in the initial stages of development and implementation as noted from the research conducted at ALGAK and five local authorities. A shared vision ensures that key constituents and communities will accept and support e-government programmes from the beginning to the end. A shared vision of e-government means a shared stake in the outcome.

b) Communication of the Vision to All Stakeholders and the Public

As soon as the vision for e-government is conceived and is clearly captured, it is crucial that leaders from the government, private sector, civil society, academia, community based organisations, and non-governmental organisations communicate the vision and key objectives to the government and to the public at large. In Kenya, since the launch of the e-government strategy, little publicity or campaigning has been done to share the vision with the public in general. A communications strategy should be established to ensure that people understand the vision, the changes that will occur, and the tangible benefits for them from e-government. To communicate the e-government vision to the broadest possible audience, it is best to use the media most likely to reach target audiences. For the public and businesses, this might mean town meetings, newspapers, TV/radio broadcasts or web sites. For civil servants, discussing the vision in speeches, department meetings, or trainings might be effective. The communication strategy will

depend upon the circumstances of each sector of society and the nature of the e-government application.

Like any government reform effort, political will is required to implement every e-government project. A strong political champion for ICT is needed in Kenya who is responsible for the financial resources, inter-agency coordination, policy changes, and human effort required to plan and implement sustainable e-government.

c) Promotion of Projects to Justify Cost and to Raise Political Will

The e-government budgets must include funds to promote and publicize projects through various media channels (e.g., radio, posters, public meetings, newspapers). Without promotion, the target audience may not learn about the project or use it. And without a large number of people benefiting from the project, the benefits will not be sufficient to justify the costs. This, in turn, can undermine political will. In contrast, a strong promotion effort can generate public excitement, which can increase political will.

Like all reforms, it is important to show success early and not spend too much time on developing visions, strategies and work plans. It is also important to identify a few high-profile problems and address them with pilot e-government solutions quickly (for example, within a year or less) that will address both the back office operations of government and the interface with the public. The Kenya Revenue Authority (KRA) is one of the upcoming centres of excellence in e-government uptake. So far KRA has

efficiently published information and delivered necessary forms online. Now KRA together with KPA have launched an online clearing and forward mechanism which is a big step towards realization of interactive e-government. Through such projects, the Kenya government can steadily increase its e-government presence to the public.

d) Identification of Revenue and Allocation of Resources

The Kenyan e-government strategy needed to identify revenue streams like user charges, subscriptions, or budgets that could help achieve financial sustainability.

e) Setting Parameters for Measuring E-Government

The parameters to measure e-government performance can be divided into two groups: parameters that measure the government's adoption of e-government and parameters that measure the impact of e-government applications.

The following are some of the government performance parameters:

i) Volume of transactions handled electronically;

ii) Response time to inquiries;

iii) Length of trouble-free operations of an e-government service starting from its launch;

iv) Number and/or percentage of public services provided electronically;

v) Number of new services delivered electronically;

vi) Percentage of territorial area covered by a service.

The following are some of the government impact parameters:

i) Number and/or percentage of constituents or localities accessing information or services electronically;

ii) Increased convenience or efficiency in delivering information or services;

iii) Length of time for procuring goods, services, and information (from the government, business, or citizen perspective);

iv) Reduced cost to citizens or government.

6.5.3 Kenya E-Government Strategy

The Kenya E-government Strategy (Cabinet Office, 2004) document was designed to achieve a predetermined set of goals and objectives, namely, to efficiently deliver government information and services to the citizens; to promote productivity among public servants; to encourage participation of citizens in government; and to empower all Kenyans in line with development priorities outlined in the Economic Recovery Strategy for Wealth and Employment Creation (2003-2007).

Some of the outstanding achievements of e-government strategy implementation with respect to the component of government to government (G2G) include publishing

information on central government ministry web sites; on-going training, mainly computer literacy for government officers; integrating existing financial management systems, human resource systems, payroll systems, and email systems; and building local area networks and intranets in government. The government has successfully adopted aspects of e-government with respect to the component of government to business (G2B) in some of its organisations like the KRA, the KPA and the Central Bank of Kenya (Gakiria, 2004). For the case of the government to citizen (G2C) component of e-government, the provision of all postal corporations nationwide with Very Small Aperture Terminals (VSATs) by the Kenyan government is a big step towards facilitating the G2C component of e-government. That helped in providing citizens with affordable Internet access.

6.5.4 Gaps in Kenya E-government Strategy

Some of the outstanding gaps and limitations of the Kenyan e-government strategy are as follows:

1. Electronic publishing of key information to citizens like jobs and examination results has not yet taken place.
2. E-government needs to be publicized. This has not happened. Citizens need to be told about e-government so that they can buy in.
3. An e-government champion is missing in action, hence, hindering the necessary momentum required for sustainable implementation and publicity of e-government.

4. A clear demonstration of political will to mobilize resources for e-government is lacking.
5. The implementation is basically top-down and taking a phased approach, starting at central level government (ministries) down to provincial level and finally to district level. There is no clear indication of how local authorities will be brought on board.
6. The strategy is biased towards supporting the G2G component more than the G2C component. The G2C component is more likely left to benefit through the trickle down effect. This statement can be supported by the fact that local authorities (LAs) that form a major government wing that enforce about 90% of the G2C component are not directly mentioned at all in the e-government strategy.
7. Only the Internet channel of e-government communication is clearly stated in the strategy. The other channels of e-government communication, like FM radio, short messaging system (SMS), and TV, which are available and appropriate, are not mentioned.
8. The e-government strategy is discrete in nature and approach and has numerous disjointed parts. Therefore, the strategy is most likely to experience a lot of challenges during its implementation. The following observations support this statement about the e-government strategy:

    a) It quotes best practices from other countries that it wishes to apply without outlining how they will be achieved.
    b) It applauds standards in general to be observed and does not outline them or refer to an existing document. This poses as an obstacle to

implementation. Where implementation is already done, or going on, integration is the challenge due to the possibilities of mismatched standards.

c) It lacks emphasis on public- private partnership in the rollout of e-services.

d) It does not address outsourcing among its key methods of supporting e-government rollout.

e) It lacks an evaluation/audit mechanism for establishing its status at any given time. Government officers developed it single handedly. Therefore, all other stakeholders never had an opportunity to participate in its formulation, yet they are expected to participate in its implementation for it to succeed.

The gaps identified in the e-strategy, particularly where local authorities are not mentioned, creates the need to establish the position of local authorities as key stakeholders in e-government. A stakeholders driven approach to formulation, adoption and implementation of e-government guarantees it's sustainability. Local authorities are one of the key stakeholders and by involving them in sharing e-government vision, they would be ready to share their local resources in supporting the e-government project hence boosting their sustainability. This would take the sustainability risk out of the hands of the central government and put some of it in the hands of local authorities and their communities. This is in line with a number of scholars who have recently identified local authorities, and in particular, community-led development authorities as part of a

broader shift from government to governance, where new institutional and administrative arrangements and actors extend beyond formal state authorities and play an increasingly significant role in ensuring that communities have the capacity to take a more active role in their development (Lynda Herbert-Cheshire and Vaughan Higgins, 2004).

The surveys conducted at ALGAK and in Bungoma district in Kenya revealed that local authorities are neither informed nor involved in the ongoing national e-government implementation. It appears that the Ministry of Local Government at the central government level could still be planning how it will first inform its local authorities about the national e-government strategy and thereafter could engage them in the process of e-government uptake. The local authorities in Kenya currently need to accelerate their reform agenda to deliver the much needed services in time, efficiently, and in a transparent manner. For that matter, the national e-government strategy may need to look at the strategy again and see the benefits of including local authorities among the first line stakeholders in e-government planning and implementation.

On the other hand, the private sector is seen as merely a place for *outsourcing*. The e-government strategy needed to spell out clearly that the government is interested in making the private sector a genuine partner in e-government. Private sector partnerships are especially promising when there is a possibility of creating revenue from e-government services or where e-government projects can be replicated for other agencies or governments. Outsourcing from the private sector can help relieve the government of limitations in its ICT manpower. However, the private sector cannot substitute for

government in all cases; government must retain responsibility for policy making, certain basic public services, and decisions about access and pricing.

One effective strategy is to pair an experienced multinational company with a suitable local company in the development and delivery of e-government applications. This can promote the transfer of technology and skills to local industry while at the same time ensure that outsourcing produces results.

The e-government strategy has recommended that local standards be set and used as a guide when implementing e-government. Though the idea was to enhance national integration of systems, it poses as a barrier to globalization. It is important to note that some crucial decisions have been made by the World Trade Organization (WTO) in relation to global standards. The WTO's agreement on the technical barriers to trade that became effective from 1996 (Kagami, Tsuji, and Giovannetti, 2004) stated that domestic standards occasionally work as barriers to trade. Therefore, it was agreed that ISO standards should always prevail. European countries, especially the UK, think standards are economic weapons in international negotiations. Therefore, communities should prepare themselves to globally promote their own products by trying to meet ISO standards. Kenya can gain if it conformed to ISO standards in its e-government implementation.

Although the e-government strategy had included an elaborate plan on training, the plan mainly addressed the computer literacy gap. Other deficiencies among government employees need to be addressed (Heeks, 2003). This include:

- Top managers are not well informed, and are often uncomfortable with e-government, hence feel reluctant to be involved.
- IT professionals are normally limited to data processing, lack a strategic perspective of IT and are always defensive of the IT unit.
- The majority of staff are not conversant with e-government, and have little exposure and access to computers.

6.5.5. ICT for Local Government

About 70% of Kenya's population lives in the rural areas and now demand a local government that has the capacity to deliver the benefits of this century (Wanjohi, 2003), particularly those arising from globalization, especially through e-government applications that can enable local government to deliver services efficiently, effectively, and timely to the people.

One of the right places to start rolling out e-government for community socioeconomic development is through local government. All ICT policy and e-government project issues have a place in local government. Irrespective of where the initiatives are

conceptualized and hosted, their final implementation involving the community in many cases is through the local authorities.

E-government in local authorities is built upon three critical pillars: information, technology and people (Hitchcock, 2002). It includes a focus on the innovative management of information. This focus is intended to provide a better balance between information management and technology to ensure that technology is viewed as an enabler, not an end in itself. Investments in information management and technology must be planned, coordinated across the local authorities and agencies, and be fiscally prudent. Investment decisions should be clearly linked to service delivery and improvements in service quality. A responsible investment framework should provide the maximum return on local authority expenditures including ongoing maintenance and support costs.

The questionnaire given in appendix E1 was used to gather data on local authorities in Bungoma. The summary of the findings is given in appendix E2. It was observed across the five Bungoma local authorities that whenever they required computer generated accounts, budgets, and reports, they had to outsource computer services. The local authorities are now planning to train their personnel as well as install their own computer systems.

The Kenya Local Government Reform Programme (KLGRP) aims to improve the local authorities' financial management and revenue mobilization particularly by deploying

Integrated Financial Management Systems (IFMS). The already existing LATF, and now the e-government project, should accelerate the acquisition of these systems by local authorities to realize the objectives of KLGRP. IFMS should apply to all local authorities and not to a few selected ones.

In December 2004, all the local authorities in Bungoma district were informally aware of the e-government strategy in Kenya that was released in March 2004. They had been informed through the public media and not the usual official circular from the Ministry of Local Government. For that reason, such local authorities did not know with certainty what to expect from the e-government strategy. All they knew was that there were advantages of adopting e-government and that they would like to have those benefits, especially those that enforced cheaper and faster communication and service delivery to citizens, increased transparency and efficiency, and supported greater participation of citizens. ALGAK intends to establish monitoring, follow-up, and control systems at all levels, including progress reports; review meetings and reports; budgets and budgeting control systems; and reports from special committees/task forces (ALGAK, 2002).

For over four decades now, Kenya has experienced increased poverty and rural-urban migration. Local authorities bear the burden of the increased incidence of poverty, homelessness, and unemployment and are challenged to put in place policies and strategies as well as undertake projects that would lead to rapid development with equitable wealth generation. Among the ongoing reforms, ICT can catalyze and accelerate financial management and help monitor participation in poverty reduction and

combating of HIV/AIDS through the development of indicators that can be compared. It has become easy and cheaper to access and exchange information with the advent of ICT.

ICT provides local authorities with the opportunity to acquaint themselves with new strategies for effective lobbying, advocacy, design, implementation, and delivery of services to citizens by using only those management information systems that follow local, national, regional, and international trends. Even the overall theme of the ALGAK strategic plan for 2002-2006, 'participatory democracy and governance for sustainable development through local authorities' (ALGAK, 2002), can be realized with much ease if ICT and e-government were adopted. ALGAK's strategic priority areas and objectives include the development of strategic partnerships for effective programme implementation. This is where efforts can be made to partner with private ICT agencies/organizations in order to support sustainable ICT and e-government adoption. When e-government is adopted, it will make poverty baseline surveys and appropriate intervention mechanisms easier to accomplish. The CDI described in Chapter 4 would come in handy especially if deployed as a web application, to inform policy and decision-makers.

Local authorities are expected to be among those directly involved as key stakeholders when it comes to ICT policy. Though the Ministry of Local Government is acknowledged for having participated in the draft national ICT policy, local authorities seem not to have participated in anyway, as noted from the research done in Bungoma district and ALGAK. The national ICT policy (Ministry of Information and Communications, 2004)

highlights, to a large extent, the ICT needs of local authorities that are mostly the needs of citizens, despite local authorities not being aware of it. Since the local authorities provide the interface with citizens, a lack of direct involvement in ICT policy formulation will complicate and present a real challenge for policy implementation, especially the G2C aspect.

Though the e-strategy only mentions Internet, radio deserves attention especially if local authorities were to be mainstreamed in the strategy. Despite the ease and wide acceptance and affordability of radio, local authorities do not use local radio to communicate to their citizens even though KLGRP (Ministry of Local Government, 2001) has allowed them to use local languages in their communication to citizens. Local authorities should take advantage of FM radios that broadcast in vernaculars. Local authorities can help build local content on these radio stations.

What about AM radio? It is possible that the digital elite might argue that by talking about AM radio, we are trying to take people backward. Then why is AM radio not among the ICTs being deregulated especially in developing countries? AM radio is one medium that can be a carrier of information and knowledge to the people over a wider region and can help in the preservation and exchange of local knowledge (Rodrigues and Wafula, 2004).

Radio technology is an old and familiar technology that has not been exhaustively used. Radio technology is reliable, affordable, and reaches a wider population instantly.

Previously, there were obstacles raised by government in licensing radio frequencies so as to have monopoly of government radio stations. The current regulatory regime has removed all these obstacles. Local authorities should be encouraged to make use of this electronic media in their communication to citizens and governance. That would be a perfect step towards the adoption of sustainable e-government as citizens demand more information from their local authorities and as local authorities seek to inform citizens, as well as collect information from citizens for use in planning, budgeting, and the coordination of services. Therefore, as LATF performance conditions are implemented, the use of ICT can be expanded to include Local Authority E-Service Delivery Action Plan (LAEDAP). Since KLGRP does not demand that local authorities must provide services directly or totally by themselves, LAEDAP can be jointly prepared in partnership with the private sector or ICT agencies.

6.6 Conclusion

It has been noted that the CCK board and its members need to be competent and independent from political influence and neutral to all industry players. Even the proposed information and Communication Bill 2006 that is seeking to recreate CCK still does not guarantee a board that is competent and independent. The licensing restriction on the technological type of networks an operator may deploy is not appropriate. Fixed networks are expected to be able to use mobile networks and vice versa. Also a satellite network should be able to use a fixed network. Consequently; this calls for the distinctions between voice and data to be removed. Digitalization of signals has already

made the distinction between voice and data technologically meaningless, but it persists as a matter of policy and law in Kenya

On analyzing The Kenya Communication Regulations 2001, it was observed that the Regulation 11 of the Kenya Communications Regulations 2001 that states that the Commission may require licensees to comply with international conventions or agreements relating to communications services to which Kenya is signatory, does not provide for licensing of regional in addition to national ICT service providers. Therefore there is need to accommodate the provisions of the East African Treaty Article 99 where interconnectivity among the member states and adoption of a common frequency management and monitoring scheme is expected to be undertaken jointly.

In the case of Kenya, it was noted that dialog, participation of key stakeholders and legal regulatory issues were not adequately addressed during the ICT policy formulation process.

In general, Kenya was not adequately informed by ICT initiatives within its borders. Also research revealed that most of the existing ICT initiatives were standalones hence lacked integration. In most cases, ICT initiatives thrive and have a future where they are linked to ICT policy.

E-government is not a shortcut to economic development, budget savings, or a clean, efficient government; it is a tool for achieving these goals. E-government in the

developing world faces challenges such as lack of infrastructure, corruption, weak educational systems, and unequal access to technology.

Local authorities are one of the key stakeholders in e-government. Hence, by involving them in sharing e-government vision, they can be ready to share their local resources in supporting the e-government project hence boosting its sustainability.

The e-government strategy needed to spell out clearly that the government is interested in making the private sector a genuine partner in e-government. Local authorities bear the burden of the increased incidence of poverty, homelessness, and unemployment and are challenged to put in place policies and strategies as well as undertake projects that would lead to rapid development with equitable wealth generation. The CDI described in Chapter 2 would come in handy especially if deployed as a web application, to inform policy and decision-makers. For Kenya, since the local authorities provide the interface with citizens, a lack of direct involvement in ICT policy formulation will complicate and present a real challenge for policy implementation, especially the G2C aspect.

This chapter has discussed and made recommendations on key ICT regulations particularly the Kenya Communication Act, 1998 and the Kenya Communication Regulations 2001. Gaps in the ICT policy pertaining to strategic ICT leadership, legal framework, human capital, information and information services, telecommunication services and the universal access have been identified and recommendations on how to fill them suggested. It is also established that not all existing ICT initiatives informed the

Kenya ICT policy formulation process despite belonging to key stakeholders. This chapter has also presented a detailed critic on the Kenyan e-government strategy pointing out gaps and offering suggestions on how to go about them. The omission of local authorities, which are considered one of the major stakeholders in any e-government strategy, has been discussed especially with regard to the role they play when it comes to implementing G2C and sustainable development.

CHAPTER 7

7.0 CONCLUSION AND FURTHER WORK

7.1 Conclusion

This thesis has shown the need and benefit of developing new and appropriate decision support tools for leaders. Tools that can capture even intangible benefits, which ICT is largely associated with. ROA can enable abstract benefits such as improved asset utilization, improved resource control, improved organizational planning, improved organizational flexibility, and more timely information to be measured and assigned a value. Evaluation based on ROA could sometimes accept investments that an evaluation based on NPV might reject. Use of ROA in combination with an appropriate decision criterion can assist in computing the probability of expected loss as well as expected opportunity loss as shown in Fig.2.1. This combined with the interpretation of IDI to the policy-makers and CEOs in the form of a simple *Do not Invest*, or *Wait and Watch*, or *Invest Carefully*, or *Invest* provide a strong decision support mechanism.

The community approach to formal political discourse and development initiatives is a sign of a basic shift in government organization. This is because governing through a community approach seeks to desocialise and individualise risk where individuals are encouraged to shape their lives according to their moral code and the community obligations. With the shift from society to the community as the object of rule, expertise

knowledge becomes crucial in empowering people to manage their lives and adopting a prudent and calculative approach to self-governance through appropriate decision making. CDI can enable communities become agents and not just beneficiaries of development through building development around individuals and groups rather than people around development. CDI promotes sustainability through deployment of local resources and indigenous efforts. The development of the CDI is also intended to enable capture the information on the demand side of development in order to inform the supply side of development.

Most parts of Africa currently have access to radios, but do not use these tools of communication to drive development effectively. ICT can play a major role in speeding-up the process of information diffusion and improving market efficiency.

Effective poverty alleviation requires significant change in current structures, attitudes, and behaviour by people and their leaders. CDI is meant to capture this and help provide an in-depth understanding of the sources of poverty and block them. The ICT-based CDI is designed such that leaders and citizens alike will be able to measure their own strengths and weaknesses, as well as recognize their opportunities.

IDI can be a strategic tool for use in Governance and Organization layers of the MuL_Net framework as discussed in section 3.2.1.3 and 3.2.2.2 of Chapter 3, particularly in relation to supporting ICT investment decisions. IDI offers the necessary analysis that

can ensure that risks involved are quantified and understood, hence enabling most national and international financial institutions to fulfill their development roles.

Likewise, in section 3.2.1.1 of Chapter 3, CDI is proposed for use to inform leaders and their people on the existing scenario in relation to development issues at community level. CDI is designed in such a way that it can provide an effective means of use of information and communication in economic and social pursuits. It can help leaders in taking strategic direction in shaping local culture towards supporting sustainable development. Section 3.2.2.5 of Chapter 3 discusses cultural issues and suggests use of CDI as a new culture that would benefit leaders and their people.

MuL_Net framework is a need-based and development-oriented strategy. It recognizes and supports successful adoption of e-applications in a way that would contribute to sustainable production and consumption patterns, and reduction of traditional barriers. The MuL_Net framework marks a shift from the old vertical sectoral e-strategy model that was based on the distinct communication sectors, to a new three Muti-Layered and Networked framework for ICT shown in Fig.3.1 in which the role of all these sectors is conceptualized in an integrated and holistic approach as a result of the growth of the Internet, convergence and digitalization.

MuL_Net framework emphasizes the importance of *Public-Private Partnerships* as a tool for bringing the skills and resources of the business and NGO sectors into strategic collaboration and alignment for realization of sustainable development.

Telecommunications and Internet worlds have merged, hence MuL_Net framework suggests that ISPs particularly when they offer services functionally equivalent to what their telecommunication counterparts offer; telecommunications regulations should apply in the absence of new ISP regulations. Such regulatory challenges demand for regulating services as opposed to technologies.

All nations have a challenge of promoting a culture of building ICT capability. MuL_Net framework captures and strengthens the cultural aspect as a significant ingredient in using ICT to boost the pace of development such as networking and information sharing.

The IS knowledge of the top management directly influenced the extent of ICT assimilation in organizations. It's even better if such top managers have characteristics of hybrid managers. Hybrid managers can bring benefits such as: improved internal communications; bridging of cultural and political gaps within the organization; promotion of a better understanding of and more effective use of systems; and encouragement for a proactive attitude to change.

The OECD countries have allowed competition in ICT sector to advance and possibly caused the high development of Internet access observed. OECD countries are able to sell goods and services globally as a result of good ICT policies and strategies combined with suitable enabling environment.

AM radio technology has not been used exhaustively in COMESA and EAC. More so in the area of passing relevant development information to communities in the form and languages they understand. By choosing to limit such technologies, communities have been denied the opportunity to coordinate the production, distribution and consumption of what they produce. Entrepreneurs have always been there but due to in most cases political reasons and fear, they have not fully provided these services. Particularly in Africa, people live in communities with already established mass cultures.

Despite the prediction by Norris (2003) that countries with GDP per capita of less than US$ 9000 are not expected to adopt ICT at high rate, Fig.4.5 shows that COMESA and EAC are doing so and at a higher rate than EU and OECD. This observation can be largely attributed to culture and communication needs that for too long had not been met due to poor infrastructure development.

Therefore, one way of realizing sufficient broadband in COMESA region that can support e-applications including those identified and recommended by COMESA such as ASYCUDA, CPIS and REPSS, is to pursue a strong policy considerations for enhancing competition through adequate opening up of telecommunications and Internet sectors to spur information infrastructure development. In fact, policy-makers around the globe are encouraging investing in telecommunications systems and bandwidth as a major strategy towards building a knowledge-based economy.

The East African Community treaty provides for harmonization of the member states' ICT policies and regulatory frameworks. It has been noted that national ICT policies are more inclined towards cultivating the national ICT sector and domestic market. However, a sub-regional ICT policy would enable and push member states towards attaining global positioning as well as capture much needed market for export.

The research survey conducted at EAC headquarters in Arusha revealed that the legal, regulatory and institutional environment was not receiving the necessary attention to enable them support the identified pillars of EAC integration and development. The enactment of national ICT policies into laws by sub-regional governments, and the development of the sub-regional ICT policy as their global umbrella, can reinforce ICT pillar for the sub-regional integration and development, globalization and modernization.

A steady increase with time in funding from internal sources at EAC was observed for ICT. This was a good indicator of the high prioritization of ICT by the EAC headquarters. Given the observed trend on donor funding, EAC needs to strengthen its policy of collaborating with sub-regional universities and in particularly through the already established EAC institution called Inter-university Council of East Africa (IUCEA). In order to extend the lifetime of any ICT application, it must be available in an open source form. Hence, EAC needs to embrace OSS and promote its development in the sub-region. Despite the assistance offered by the donors to the EAC headquarters on hardware, software and communication, it was observed that effective sharing of best practices as well as skills transfer through consultancy was poor. The poor results could

be due to lack of ICT policy to spell out what is expected of the donors. Also lack of capacity at the EAC headquarters to absorb and therefore enable skills transfer could be among possible contributing factors. Though the problem of scarcity of skilled technical human resource in developing countries is big, adopting policies that encourage mobilization and sharing of the few in the sub-region would be a great step towards fixing the problem.

The EAC Statistical database need to be changed and become the EAC Statistical System and operate as an agency for statistical services for the entire sub-region. The establishment of the EAC Statistical System would contribute to the development of the economic and social integration of EAC partner states, especially through improvement of the EAC secretariat ability to monitor and evaluate the impact of the decisions made by the EAC council of ministers.

It is recommended that the CCK board and its members need to be competent and independent from political influence and neutral to all industry players. Even the proposed information and Communication Bill 2006 that is seeking to recreate CCK still does not guarantee a board that is competent and independent. The licensing restriction on the technological type of networks an operator may deploy is not appropriate. Fixed networks are expected to be able to use mobile networks and vice versa. Also a satellite network should be able to use a fixed network. Consequently; this calls for the distinctions between voice and data to be removed. Digitalization of signals has already

made the distinction between voice and data technologically meaningless, but it persists as a matter of policy and law in Kenya

On analyzing The Kenya Communication Regulations 2001, it was observed that the Regulation 11 of the Kenya Communications Regulations 2001 that states that the Commission may require licensees to comply with international conventions or agreements relating to communications services to which Kenya is signatory, does not provide for licensing of regional in addition to national ICT service providers. Therefore there is need to accommodate the provisions of the East African Treaty Article 99 where interconnectivity among the member states and adoption of a common frequency management and monitoring scheme is expected to be undertaken jointly.

In the case of Kenya, it was noted that dialog, participation of key stakeholders and legal regulatory issues were not adequately addressed during the ICT policy formulation process.

In general, Kenya was not adequately informed by ICT initiatives within its borders. Also research revealed that most of the existing ICT initiatives were standalones hence lacked integration. In most cases, ICT initiatives thrive and have a future where they are linked to ICT policy.

E-government in the developing world faces challenges such as lack of infrastructure, corruption, weak educational systems, and unequal access to technology. Local

authorities are one of the key stakeholders in e-government. Hence, by involving them in sharing e-government vision, they can be ready to share their local resources in supporting the e-government project hence boosting its sustainability.

The Kenya e-government strategy needed to spell out clearly that the government is interested in making the private sector a genuine partner in e-government. Local authorities bear the burden of the increased incidence of poverty, homelessness, and unemployment and are challenged to put in place policies and strategies as well as undertake projects that would lead to rapid development with equitable wealth generation. The CDI described in Chapter 2 would come in handy especially if deployed as a web application, to inform policy and decision-makers. For Kenya, since the local authorities provide the interface with citizens, a lack of direct involvement in ICT policy formulation will complicate and present a real challenge for policy implementation, especially the G2C aspect.

It is also established that not all existing ICT initiatives informed the Kenya ICT policy formulation process despite belonging to key stakeholders.

A combination of a suitable ICT policy and application of the MuL_Net framework, would lead to effective and sustainable implementation of existing sub-regional and national ICT initiatives.

The major players in ICT policy development can in broad terms be categorized into five, namely: government, foreign and local private sector, civil society, donors and the

academia. It was noted that the academia seemed to make their contribution last of all if at all.

The public sector in developing countries, having less capital at its disposal for ICT investments, cannot afford to fail. Thus, the ICT Layer Architecture of the MuL_Net framework brings some degree of coherence to planning and development of public sector ICT projects so that policy makers who understand the processes they wish to automate and are not at the mercy of the technical specialists or the marketing agents.

7.2 Further Work

The following are recommendations for further work:

1. The need for development of policies and strategies for preserving digital information and making it accessible for the present and future in Sub-Saharan Africa (SSA) countries. This view is also supported by several researchers including Ngulube (2004).
2. Need to develop a specific value for D^{μ} that reflects ICT investment domain.
3. The MuL_Net framework has been partially tested due to constrains of data and time. Therefore a full test in future is recommended.
4. Though this research work attempted to develop a holistic generic e-strategy model, the limitation experienced due to lack of ICT related social indicators and data needs to be addressed if the MuL_Net framework is to be effectively applied to solve problems such as absolute poverty and deliver sustainable development.

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APPENDIX A: CORRELATION ANALYSIS USING SAS V8

Using the ITU data, the annual average per indicator (AAI) for all the regions was calculated by summing the absolute values of all member countries and dividing by their total number. The normalized annual indicators (NAI) were obtained by dividing AAI by the mean population per year for the region. NAI was then multiplied with 100 to obtain the annual average of ICT indicator per 100 inhabitants. Taking the case of EU, COMESA and EAC, the normalized indicators used in Chapter 2 are given in Tables A1, A2 and A3 followed with their respective correlation analysis results. The symbols used to represent the indicators are defined as follows:

- GDP - Gross Domestic Product
- TTSR -Total Telecommunication Service Revenue
- INT-HOST -Internet Hosts
- TTS -Total Telephone Subscribers
- MOB-SUB -Mobile Subscribers
- PC -Personal Computer
- INT-USERS -Internet Users

Table A1: EU annual average of ICT Indicators per 100 Inhabitants

YEAR	GDP US$	TTSR US$	INT-HOST	TTS	MOB-SUB	PC	INT-USERS
1993	1616.85	31390.22	0.1073	40.47	2.03	9.35	0.53
1994	1717.23	33900.75	0.2026	43.14	3.27	10.73	1.05
1995	1971.37	39930.67	0.4405	46.8	5.29	12.8	2.19
1996	2014.16	42434.96	0.7205	51.84	8.42	14.58	3.78
1997	1897.06	44555.46	1.0995	58.62	13.16	17.03	6.44
1998	1961.38	49949.73	1.5199	68.52	21.47	19.66	10.38
1999	1962.89	54953.94	2.0022	83.14	34.77	22.01	15.54
2000	1814.94	58614.94	2.4883	101.79	52.11	24.89	21.21
2001	1826.18	59168.22	3.036	114.78	65.15	27.54	26.13
2002	1999.47	54452.79	3.6903	122.74	74.09	30.87	31.45

Correlation Analysis Results obtained using SAS Software v8, for the EU annual average values of Seven ICT indicators (variables) shown in Table A1 over a ten year period (1993-2002) is shown below:

7 Variables: GDP_US, TTSR_US, INT_HOST, TTS, MOB_SUB, PC and INT_USERS

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum	Label
GDP_US	10	1878	132.17927	18782	1617	2014	GDP US$
TTSR_US	10	46935	10014	469352	31390	59168	TTSR US$
INT_HOST	9	1.57862	1.30783	14.20760	0.10730	3.69030	INT-HOST
TTS	10	73.18400	30.66276	731.84000	40.47000	122.74000	TTS
MOB_SUB	10	27.97600	27.03810	279.76000	2.03000	74.09000	MOB-SUB
PC	10	18.94600	7.31330	189.46000	9.35000	30.87000	PC
INT_USERS	10	11.87000	11.17513	118.70000	0.53000	31.45000	INT-USERS

Pearson Correlation Coefficients

	GDP_US	TTSR_US	INT_HOST	TTS	MOB_SUB	PC	INT_USERS
GDP_US	1.00000	0.44640	0.36658	0.28080	0.24474	0.41033	0.28809
TTSR_US	0.44640	1.00000	0.90473	0.90355	0.87233	0.93222	0.88379
INT_HOST	0.36658	0.90473	1.00000	0.99432	0.99016	0.99653	0.99678
TTS	0.28080	0.90355	0.99432	1.00000	0.99747	0.98582	0.99786
MOB_SUB	0.24474	0.87233	0.99016	0.99747	1.00000	0.97442	0.99760
PC	0.41033	0.93222	0.99653	0.98582	0.97442	1.00000	0.98519
INT_USERS	0.28809	0.88379	0.99678	0.99786	0.99760	0.98519	1.00000

Table A2: COMESA annual average of ICT Indicators per 100 Inhabitants

YEAR	GDP US$	TTSR US$	INT-HOST	TTS	MOB-SUB
1993	3382.55	284.12	0.000003	2.08	0.0045
1994	3397.63	328.64	0.000078	2.27	0.0057
1995	38.92	5.8	0.00025	2.51	0.0128
1996	43.65	6.28	0.001	3	0.0198
1997	46.95	6.25	0.0014	3.55	0.0531
1998	47.62	8.14	0.0025	4.07	0.091
1999	49.94	9.84	0.0038	5.24	0.3016
2000	52.19	11.9	0.0055	6.79	0.726
2001	48.08	12.07	0.0055	8.57	1.455
2002	40.41	11.4	0.0069	10.03	2.2976

Correlation Analysis Results obtained using SAS Software v8, for the COMESA annual average values of five ICT indicators (variables) shown in Table A2 over a ten year period (1993-2002) is shown below:

The CORR Procedure

5 Variables: GDP_US_, TSR_US_, INT_HOST, TTS and MOB_SUB

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum
GDP_US_ GDP US$	10	714.79400	1410	7148	38.92000	3398
TTSR_US_ TTSR US$	10	68.44400	125.86372	684.44000	5.80000	328.64000
INT_HOST INT-HOST	10	0.00269	0.00257	0.02693	3E-6	0.00690
TTS TTS	10	4.81100	2.79080	48.11000	2.08000	10.03000
MOB_SUB MOB-SUB	10	0.49671	0.78588	4.96710	0.00450	2.29760

Pearson Correlation Coefficients, N = 10
Prob > |r| under H0: Rho=0

	GDP_US_	TTSR_US_	INT_HOST	TTS	MOB_SUB
GDP_US_	1.00000	0.99657	-0.54389	-0.49746	-0.33008
TTSR_US_	0.99657	1.00000	-0.52690	-0.47986	-0.31473
INT_HOST	-0.54389	-0.52690	1.00000	0.97699	0.87816
TTS	-0.49746	-0.47986	0.97699	1.00000	0.95243
MOB_SUB	-0.33008	-0.31473	0.87816	0.95243	1.00000

Table A3: EAC annual average of ICT Indicators per 100 Inhabitants

YEAR	GDP US$	TTSR US$	INT-HOST	TTS	MOB-SUB
1993	0.0019	567.43	0	0.44	0
1994	0.0023	550.38	0	0.47	0
1995	0.0027	533.66	0.0001	0.52	0.01
1996	0.0028	517.72	0.0004	0.55	0.02
1997	0.0031	502.12	0.0007	0.58	0.04
1998	0.0032	486.89	0.0012	0.67	0.1
1999	0.003	472.04	0.0046	0.75	0.17
2000	0.0029	451.19	0.0067	1.09	0.5
2001	0.003	439.63	0.005	2.01	1.46
2002	0.0031	430.32	0.0077	3.09	2.52

Correlation Analysis Results obtained using SAS Software v8, for the EAC annual average values of five ICT indicators (variables) shown in Table A2 over a ten year period (1993-2002) is shown below:

The CORR Procedure

5 Variables: GDP_US_ TTSR_US_ INT_HOST TTS MOB_SUB

Simple Statistics

Variable Label	N	Mean	Std Dev	Sum	Minimum	Maximum
GDP_US_ GDP US$	10	0.00280	0.0004082	0.02800	0.00190	0.00320
TTSR_US_ TTSR US$	10	495.13800	47.30038	4951	430.32000	567.43000
INT_HOST INT-HOST	10	0.00264	0.00303	0.02640	0	0.00770
TTS TTS	10	1.01700	0.86722	10.17000	0.44000	3.09000
MOB_SUB MOB-SUB	10	0.48200	0.84655	4.82000	0	2.52000

Pearson Correlation Coefficients, N = 10
Prob > |r| under H0: Rho=0

	GDP_US_	TTSR_US_	INT_HOST	TTS	MOB_SUB
GDP_US_	1.00000	-0.79003	0.50086	0.42274	0.38034
TTSR_US_	-0.79003	1.00000	-0.90601	-0.78103	-0.74919
INT_HOST	0.50086	-0.90601	1.00000	0.81254	0.79078
TTS	0.42274	-0.78103	0.81254	1.00000	0.99865
MOB_SUB	0.38034	-0.74919	0.79078	0.99865	1.00000

APPENDIX B: QUESTIONNAIRE ON ICT INITIATIVES IN KENYA

Introduction:

The Ministry of Planning and National Development wish to conduct a research whose outcome is expected to support the National ICT policy formulation and implementation process in Kenya. The Ministry has identified the need for a comprehensive overview of all ICT related initiatives in Kenya. This will support the government's activities; ensure greater coherence, development and refinement of a more effective national ICT policy implementation strategy.

This questionnaire targets founder/Initiator, management, host and financing organizations or individuals associated with ICT initiatives in Kenya. Kindly read the instructions below and respond to the questionnaire to the best of your ability.

Section I: Background Information

1.1 Name _____(Optional)

1.2 Name of Institution/Organization _____

_____(Mandatory)

1.3 Position in Institution/Organization _____(Mamdatory)

1.4 Full Address of Institution/Organization_____

_____(Mandatory)

1.5 What does your institution do? _____

_____

1.6 How long has it done this? _____

1.7 Are ICTs your core business? _____

Section II: Mapping ICT Initiatives

Instructions: Please tick what applies to your ICT initiative(s)

	What sector is your ICT initiative(s) working in?	*Please tick in this column*	*What is the coverage of your ICT initiative(s)? e.g. National, district …*
2.1	Health		
2.2	Central Government		
2.3	Local Government		
2.4	Primary Education		

2.5	Secondary Education		
2.6	Tertiary Education		
2.7	Agriculture		
2.8	Research & Development		
2.9	Tourism		
2.10	Culture		
2.11	SMEs		
2.12	Water		
2.13	Entrepreneur		
2.14	Trade		
2.15	Policy		
2.16	Environment		
2.17	Law/Legal		
2.18	Community		
2.19	Land		

Section III

Instructions: Please enter your response in the empty second column.

	Question	Response
3.1	i) How many ICT initiatives does your institution/organization have currently ongoing? ii) What is the name(s) of the/ser initiative (s)?	
3.2	State the objectives of the initiative(s).	
3.3	For each ICT initiative Kindly state the following:	
	i. Founder/Initiator	
	ii. Financier	
	iii. Host	
	iv. Manager	

3.4	Where do the funds for this ICT initiative come from?	
3.5	i. When did your ICT Initiative start? ii. When is it expected to end?	
3.6	What are the futures plans for the initiative?	
3.7	i) Does the ICT initiative have a website? ii) Does the Initiative have an email address? iii) What is the website address?	

Section IV

Instructions: *In response to any of the questions in the table below, tick ONLY in one column labeled Yes or No or N/A that you find appropriate. Please give your comments on each question in the column labeled Comments.*

	Question	Yes	No	N/A	Comments
4.1	i) Does the ICT initiative supply computers? ii) Does the ICT initiative assemble computers?				
4.2	i) Does the ICT initiative supply software? ii) Does the ICT initiative develop software?				
4.3	Does the ICT initiative provide community information centers with internet access?				
4.4	Does the initiative install ICT infrastructure ?				
4.5	i. What FOUR major challenges or constraints has this initiative encountered?				

4.6 To what extend approximately in percentage form, has the ICT initiative achieved its objectives? Please tick appropriate box.

Over 75% ☐ 75% ☐ 50% ☐ 25% ☐ Below 25% ☐

4.7 To what degree approximately in percentage form of the ICT initiative objectives address gender issues? Please tick appropriate box.

☐ Over 75% ☐ 75% ☐ 50% ☐ 25% ☐ Below 25%

4.8 To what extend does the ICT initiative find technology innovation of concern to it? Please tick appropriate box.

☐ Very Large ☐ Large ☐ medium ☐ Small ☐ Negligible

4.9 To what extend does the ICT initiative contribute to the Internet local content development? Please tick appropriate box.

Very Large ☐ Large ☐ medium ☐ Small ☐ Negligible ☐

Thank you for your time, contribution and participation. Please feel free to add any information you consider vital for national ICT Policy implementation for Kenya.

APPENDIX C: SUMMARY OF ICT INITIATIVES IN GOVERNMENT MINISTRIES

Ministry of: -	Project Title	Objectives	Start Date	End Date		
					National	**International**
1.Gender	-LAN Development -Website Maintenance Service	Connect all offices Promote Kenya Globally	Not yet 2004	On-going	(GoK)	
2.Water/irrigation	-IPPD -LAN rollout	e-government implementation	2004	On-going		

Ministry of: -	Project Title	Objectives	Start Date	End Date	National	International
3.Livestock/Fisheries development	-STAT_CAP	Build statistical capability and use by officers	2004	On-going	GoK	
	-LAN Development	Connect all offices	2004	On-going	GoK	
	-e-government	Implement	2004	On-going	GoK	
	-Website Development	Promote Kenya Globally	2004	On-going	GoK	

Ministry of: -	Project Title	Objectives	Start Date	End Date	National	International
4.Agriculture	- IPPD & IFMIS is running - LAN linked to GITS -Working on WAN - Staff Training Programme -Development of Agriculture Information Database Strategy for revitalization of agriculture through e-farming	-Implement e-government -Create Interactive website - Fighting poverty -replicate extension services			GoK	USAID

Ministry of: -	Project Title	Objectives	Start Date	End Date	National	International
5.Information & Communication (CCK)	-Universal Access Study -East African Internet Forum (EAIF) -Kenya Network Information Centre (KENIC) -E-government ICT Trust Fund KENET, -KeKoBI, -MoU with JKUAT & UoN	-Conduct research on rural demand, policy financial mechanisms and universal access strategies - (ICANN) - DOT KE Country Code Top Level Domain (ccTLD) -Make Government more result-oriented, efficient and citizen centred -mobilize funds to support ICT in schools -Operational Support -Nature ICT Businesses -R&D			CCK KPA,KRA, PCK,TKL, BBK,NICE	DRC USAID World Bank

Ministry of: -	Project Title	Objectives	Start Date	End Date	National	International
6.Health	-e-government -e-health -East Africa Integrated Disease Surveillance Network(EAIDSNet)	-LAN rollout -health ICT Policy formulation -Disseminating information to both health workers and patients -imparting knowledge, skills and improving patient management by health professionals -improve communication and networking with stakeholders -Institute prompt action to disease outbreaks and response -provide timely feedback to decision-makers	2004 2000 2004	On-going On-going On-going	GoK -Celtel -NHIF -Safaricom -GoK	 -Global Fund -PEPFAR -World Bank -DFID -UNICEF -USAID -NEPAD -JICA -WHO EAC USAID

Ministry of: -	Project Title	Objectives	Start Date	End Date	National	International
7.Co-operative Development.	-Training officers -Intent to developing system to manage wealth declaration info. -Developing an auditing system to support external auditors -Infrastructure development -Development of Co-operative societies Management System	-Facilitate communication	2004 2004		GoK	FAO

Ministry of: -	Project Title	Objectives	Start Date	End Date		
					National	**International**
8.Transport	-LAN Rollout -Computer training centers for staff -SMS3000 Project -Networking Motor vehicle inspection unit countrywide -IPPD-installed -IFMIS-in the process -National inquiry point	-Help Secure roads -Assist police force reporting -Enhance Community policing -promote efficiency -speed up process -process payroll -Manage finance Provide access to WTO Material via websities	2004	2005	-TLB -Safaricom -Celltel	-World Bank -WTO

Ministry of: -	Project Title	Objectives	Start Date	End Date	National	International
9.Roads/Public Works	-Electronic Reporting System	-provide efficient and timely reporting				
	Nyanza	-map all roads in	2005	2009		SIDA GTZ
	Rift valley	Kenya	2005	2009		DANIDA
	Coast	e-government	2000	2006		
	GIS for mapping, reporting and evaluation	implementation	2002	2004		World Bank
	-email, IPPD and IFMIS		2004	On-going	GoK	

Ministry of: -	Project Title	Objectives	Start Date	End Date	National	International
10.Education science/technology	-Education ICT strategy	-policy -capacity development -technology -science infrastructure -technical support -R&D -access -digital content -standards -partnership -resource mobilization -emerging technology -global initiatives -science park			GoK	
	Education Management Information System (EMIS) -ICT trust fund -NICE	- Targeting administration structure of entire ministry upto district level with provision to be extended to schools. Finance school ICT needs ICT structure	2005	2010	NGO	World bank

Ministry of: -	Project Title	Objectives	Start Date	End Date		
					National	International
11.Home affairs	-VPs website; vicepresident.go.ke	-publish VP speeches and calendar of events			GoK	
	-IPPD -LAN rollout	-e-government implementation and infrastructure development				
	-Staff Training Centre	-promote computer literacy				

Ministry of: -	Project Title	Objectives	Start Date	End Date	National	International
12.Foreign affairs	-Interconnect all Kenya missions/high commissions using VSAT technology	-to manage them from Kenya			GoK	
	-Computerizing the ministry	-LAN rollout	2003	On-going		
	-Website maintenance	-Upgrade website for marketing Kenya worldwide				
	E-Card Directory	-provide contacts				

Ministry of: -	Project Title	Objectives	Start Date	End Date		
					National	**International**
13.Tourism/Wildlife	-Web Portal Development -IPPD & IFMIS	-to promote Kenya via one-stop -e-government implementation	2004	On-going	Tourism Trust Fund (TTF) GoK	

Ministry of: -	Project Title	Objectives	Start Date	End Date	National	International
14.Trade & industry	-Statistical Information System	-On industries and Labour Productivity Index	1990			UNDP, UNIDO,
	-Developing a Web based application					
	-Integrating LAN					
	-IFMIS & IPPD					
	-Joint Loans Board computerization	-e-government implementation			GoK	
	-Website Maintenance	-Administer loans to SMEs			GoK	
	-e-procurement & e-tendering	-Publishing calendar of events, workshops, exhibitions				
	-Corruption reporting via e-mail	-Enhancing competitiveness of SMEs			GoK	
	-Keplotrade	-Help fight corruption			GoK	
	MESPT	-support trade negotiation for Africa, Caribbean & Pacific Countries			GoK	EU
		Building Capacity on trade			GoK	

Ministry of: -	Project Title	Objectives	Start Date	End Date	National	International
16.Planning/Development-(CBS)	-Historical data on demographic health survey (DHS) dissemination -Computerizes district offices ken-info(fully developed) -Integrated Multisectoral Information System (IMIS) -Ken-Info -Document management System				GoK GoK	DFID, CIDA
	STAT-CAP	To train Police, Prisons, Educationist, Health experts on use of statistics	2003	On-going		World Bank USAID CIDA

Ministry of: -	Project Title	Objectives	Start Date	End Date	National	International
17. Finance- GITS	-Government websites Development & Maintenance -Recruit ICT personnel for Government -Prepare scheme of service for ICT personnel -Oversees ICT operations in government -Rollout ICT infrastructure for government		2001	On-going	GoK GoK GoK GoK GoK	

Ministry of: -	Project Title	Objectives	Start Date	End Date		
					National	**International**
18.Office of the President	-e-government	-to implement e-government strategy	2004	On-going	GoK	

Ministry of: -	Project Title	Objectives	Start Date	End Date	National	International
19.Finance- KRA	-Customs Reforms and Modernization Project -VAT -Income Tax -Road transport -Customs -Stamp duty (GIS) -Agency fee land rates -Treasury -Customs for permit issuing(MOA) -KEPHIS(MOH) -Licensing	-Facilitate electronic exchange of trade documentation between stakeholders in the customs clearance process			GoK	

APPENDIX D: SUMMARY OF PRINCIPAL ACTORS OF ICT INITIATIVES IN KENYA

Principal Actors/Sponsors	ICT Initiatives	Objectives	Coverage
1. USAID	1) Strategy for revitalization of agriculture through e-farming	- Fighting poverty -replicate extension services	National
	2) KENET	Operational Support	National
	3) e-health	Disseminating information to both health workers and patients -imparting knowledge, skills and improving patient management by health professionals	National

Principal Actors/Sponsors	ICT Initiatives	Objectives	Coverage
	4) East Africa Integrated Disease Surveillance Network(EAIDSNet	Institute prompt action to disease outbreaks and response -provide timely feedback to decision-makers	National
	5) STAT-CAP	To train Police, Prisons, Educationist, Health experts on use of statistics	National
	6) IFMIS,IPPD		National
2. IDRC	1) Universal Access Study	Conduct research on rural demand, policy financial mechanisms and universal access strategies	National
	2) East African Internet Forum (EAIF)	Internet Corporation for Assigning names and Numbers (ICANN)	National

Principal Actors/Sponsors	ICT Initiatives	Objectives	Coverage
	3) Kenya Network Information Centre (KENIC)	Established to Manage operate the DOT KE Country Code Top Level Domain (ccTLD)	National
	4) E-government	Make government more result-oriented, efficient and citizen centred	National
	5) Catalyzing Access to ICTs in Africa (CATIA) Africa ICT policy Monitor	To build and strengthen stakeholder and public awareness of and capacity to engage in the national ICT policy process and translation of policy principles into policy implementation.	National
	6) Mainstreaming ICT Policy Research project	To investigate and support ICT implementation process in Kenya	National

Principal Actors/Sponsors	ICT Initiatives	Objectives	Coverage
	7) Kenya ICT National policy and Strategy Development Project	Ensure the adoption of Policy and legislation of Legal Framework and Implementation of Smart Strategy	National
	8) DrumNet	Providing Market. Finance and Information services	Central province
3. World bank	1) STAT-CAP	To train Police, Prisons, Educationist, Health experts on use of statistics	National
	2) Education Management Information System (EMIS)	Targeting administration structure of entire ministry upto district level with provision to be extended to schools.	National
	3) GIS for mapping, reporting and evaluation	-map all roads in Kenya	National
	4) LAN Rollout		

Principal Actors/Sponsors	ICT Initiatives	Objectives	Coverage
	5) KeKoBI,	Nature ICT Businesses	National
	6) e-health	-Disseminating information to both health workers and patients -imparting knowledge, skills and improving patient management by health professionals	National
	7) IFMIS	Strengthening government finance and accounting functions	National
4.JICA	1) e-health	Disseminating information to both health workers and patients -imparting knowledge, skills and improving patient management by health professionals	National
5.UNICEF	1) e-health	Disseminating information to both health workers	National

Principal Actors/Sponsors	ICT Initiatives	Objectives	Coverage
		and patients -imparting knowledge, skills and improving patient management by health professionals	
6.SIDA	1) Electronic Reporting System	Provide efficient and timely reporting	Provincial
7.WHO	1) e-health	-Disseminating information to both health workers and patients -imparting knowledge, skills and improving patient management by health professionals	National
8.WTO	1) National inquiry point	Provide access to WTO Material via websities	National
9.CIDA	1) STAT-CAP	To train Police, Prisons, Educationist, Health experts on use of statistics	National

Principal Actors/Sponsors	ICT Initiatives	Objectives	Coverage
	2) Computerizes district offices ken-info(fully developed)		National
10.NEPAD	1) e-health	-Disseminating information to both health workers and patients -imparting knowledge, skills and improving patient management by health professionals	National
11.EAC	1) East Africa Integrated Disease Surveillance Network(EAIDSNet	improve communication and networking with stakeholders -Institute prompt action to disease outbreaks and response -provide timely feedback to decision-makers	National

Principal Actors/Sponsors	ICT Initiatives	Objectives	Coverage
12.DFID	1) e-health	-Disseminating information to both health workers and patients *-Imparting knowledge, skills and improving patient management by health professionals*	National
	2) Catalyzing Access to ICTs in Africa (CATIA) Africa ICT policy Monitor	To build and strengthen stakeholder and public awareness of and capacity to engage in the national ICT policy process and translation of policy principles into policy implementation.	National
	3) Historical data on demographic health survey (DHS) dissemination		National

Principal Actors/Sponsors	ICT Initiatives	Objectives	Coverage
	4) -Computerizes district offices ken-info(fully developed)		
	5) IFMIS	Strengthening government finance and accounting functions	National
13.Global Fund	1) -e-health	Disseminating information to both health workers and patients -imparting knowledge, skills and improving patient management by health professionals	National
14.FAO	1) Development of Co-operative societies Management System		National

Principal Actors/Sponsors	ICT Initiatives	Objectives	Coverage
15.EU	1) -Keplotrade	support trade negotiation for Africa, Caribbean & Pacific Countries	National
16.UNIDO	1) Statistical Information System	On industries and Labour Productivity Index	National
17.PEPFAR	1) e-health	Disseminating information to both health workers and patients *-imparting knowledge, skills and improving patient management by health professionals*	National
18.GTZ	1) Electronic Reporting System	provide efficient and timely reporting	Provincial
19.UNDP	1) Statistical Information	On industries and Labour Productivity Index	National

Principal Actors/Sponsors	ICT Initiatives	Objectives	Coverage
	System		
20.DANIDA	1) -Electronic Reporting System	provide efficient and timely reporting	Provincial
21.TESPOK	1) Catalyzing Access to ICTs in Africa (CATIA) Africa ICT policy Monitor	To build and strengthen stakeholder and public awareness of and capacity to engage in the national ICT policy process and translation of policy principles into policy implementation	National
22.Shelter Forum	1) Korogocho Community Newsletter	To empower community members with information gathering skills.	Divisional

Principal Actors/Sponsors	ICT Initiatives	Objectives	Coverage
		2.To introduce an Income Generating Activity for the poor residents 3.To create employment opportunities for idle youth	
23.ITU	1) Centre of Excellence for English speaking Africa	Institutional and Human resources capacity Building in ICT	Regional
24.Telecom Surplus Fund	1) Centre of Excellence for English speaking Africa	Institutional and Human resources capacity Building in ICT	Regional
25.IFAD	1) DrumNet	Providing Market. Finance and Information services	Central province
26.Nancy Sowho & Dan Natuka	1) Training & Digital Library	1.Provide reference services on ICTs to students, researchers, clients and the general public who may	Regional

Principal Actors/Sponsors	ICT Initiatives	Objectives	Coverage
		have interest in the topic. 2.Promote the use of ICT's to interested parties in Kenya and its environs by disseminating information concerning the progress realized at all times from across the targeted region and the globe in general. 3.Create awareness to the general public on the ICT trends in terms of emerging technologies and the need to adopt them. 4.Provide a platform from which to facilitate the adoption of these technologies by the general public to the computer and information age across the region by creating awareness through the intended	

Principal Actors/Sponsors	ICT Initiatives	Objectives	Coverage
		ARCC magazine (Information Age).	
27.Kenya World Summit on the Information Society (WSIS) Civil Society Caucus	1) Catalyzing Access to ICTs in Africa (CATIA) Africa ICT policy Monitor	To build and strengthen stakeholder and public awareness of and capacity to engage in the national ICT policy process and translation of policy principles into policy implementation.	National
28.PRIDE AFRICA	1) DrumNet	Providing Market. Finance and Information services	Central province

APPENDIX E1: LOCAL GOVERNMENT QUESTIONNAIRE

1. As in every society, elected, representative democracy needs to be complemented by mechanisms of citizen participation, to enable those elected to gauge better what are the needs and priorities of citizens, as well as to create a sense of ownership on the part of citizens of the services provided by government. Is there a tradition of citizen participation in local government?
2. In what ways has the financial position of Local Authorities been considerably strengthened in the past two or three years as a result of the transfers made through the Local Authority Transfer Fund (LATF)?
3. How do Local Authorities involve their residents in decisions about how resources are used?
4. How do Local Authorities account to their residents for these decisions?
5. Are you aware of the Local Authority Service Delivery Action Plan (LASDAP)?
6. Who participates in the formulation of LASDAP in your Local Authority?
7. What key issues does LASDAP target to address?
8. Does citizen participation threaten the autonomy and position of some councilors in any way?
9. How are decisions about the use of additional resources being made and by whom?

10. To what extent do ordinary citizens, and particularly the poor, participate in reaching those decisions?

11. To what extent do the resulting expenditure choices reflect the needs, priorities and interests of citizens, including the poor?

12. How accountable is the Local Authority for the pattern of expenditures which actually results?

13. Are the accounts, budget, and reports computer generated?

14. Are you aware of e-government strategy in Kenya?

15. What does the local Authority expect from the e-government strategy?

16. Is your local Authority ready for e-government?

17. Local Authorities are one of the stakeholders when it comes to Information and Communication Technologies Policy (ICT).

    To what extend has your local authority participated in the formulation of the Kenyan national ICT policy?

18. Does the draft National ICT policy address the needs of Local Authorities?

19. Does your Local Authority have services that are computerized? Please list.

20. Does the Ministry of Local Government delay budget approval for some local Authorities? If yes Give reasons.

21. Does Local Authority use local radio to communicate to its citizens?

22. Is participation costly for both the Local Authority and citizens?

APPENDIX E2: BUNGOMA DISTRICT- CASE OF FIVE LOCAL AUTHORITIES

TCS- Town Council of Sirisia

TCM- Town Council of Malakisi

MCK-Municipal Council of Kimilili

MCW-Municipal Council of Webuye

MCB-Municipal Council of Bungoma

1. As in every society, elected, representative democracy needs to be complemented by mechanisms of citizen participation, to enable those elected to gauge better what are the needs and priorities of citizens, as well as to create a sense of ownership on the part of citizens of the services provided by government. Is there a tradition of citizen participation in local government?
    - Yes.- TCS,TCM,MCK
    - LASDAP has helped enforce this-MCK
    - Yes. By electing councilors regularly every after five years-MCB, MCW,

2. In what ways has the financial position of Local Authorities been considerably strengthened in the past two or three years as a result of the transfers made through the Local Authority Transfer Fund (LATF)?
    - LATF has contributed approximately 34% of LAs total revenues. -MCB
    - This has helped LAs to settle outstanding depts, improve service delivery, train employees- MCK, TCM, TCS

- help enforce community participation in the Local Authority Service Delivery Action Plan (LASDAP)- MCW, TCM
- Improve financial management and accountability.-TCM, TCS

3. How do Local Authorities involve their residents in decisions about how resources are used?
    - Through LASDAP process of project identification-TCS,TCM, MCK, MCB
    - Through questions asked by for instance, community based organizations, by writing articles in newspapers such as the Link and daily news papers-MCK
    - public notices of the resources available for LASDAP, Community organizations groups for project proposals, awareness, Consultative meetings with the citizens-MCW
    - Through public barazas- TCS
    - Projects that benefit low income groups are given priority-TCM

4. How do Local Authorities account to their residents for these decisions?
    - Through implementation of projects-TCS
    - Provision of services, through the annual budget-TCM
    - Through implementation of LASDAP projects as prioritized- MCB, MCW

5. Are you aware of the Local Authority Service Delivery Action Plan (LASDAP)?
    - Yes-ALL
6. Who participates in the formulation of LASDAP in your Local Authority?
    - Organizational groups, Professionals of various fields, NGOs-TCS
    - Stakeholders with the assistance of council's chief officers and the councilors.-TCM
    - Social welfare officers in social services department, Administrative officers-clerk, treasurer and the works officer-MCW
    - Citizens, public meeting, consultative meetings with all stakeholders, and council finally prioritizes-MCK
    - NGOs, CBOs, Church leaders, business community-MCB
7. What key issues does LASDAP target to address?
    - Citizen participation in project identificat ion, use of finaces, public involvement in decision making, transparent utilization of resources and funds, and accountability.-MCB
    - Water, Roads, projects that assist the poor, establishment of a computer centre to help disseminate information and support of councils functionality-MCK
    - Health issues: construction of dispensaries, water springs, cattle dips; economic issues: rehabilitation of roads for accessibility to markets in order to eradicate poverty; education: building of schools, nursery schools and polytechnics.-MCW
    - Improve provision of public services to citizens on a sustainable basis. No projects involving ICT are being proposed.-TCM
    - Service delivery, capital projects, needs of communities-TCS

8. Does citizen participation threaten the autonomy and position of some councilors in any way?
    - No. citizens prioritize their needs which are then considered for delivery to them-TCS
    - Yes. It denies councilors political right to own a project. The projects remain the property of government. Councilors had a tendency of owning projects within their wards before.-TCM
    - Yes. If the councilor is a non performer the citizens will require him to vacate the seat.-MCW
    - Yes. Councilors want to do away with LASDAP for emphasizing citizen participation. Also citizens demand to be paid for their participation. This could be due to the assumption that they are doing the councilors work which he/she is paid to do. Citizens lack the understanding of their role/duty to participate in decion making process in general.-MCK
    - No. –MCB

The Local Authority Transfer Fund (LATF), introduced in 1999/2000, transfers 5% of income tax to Local Authorities, through a transparent formula. It is provided as a block grant to finance local service delivery, particularly for the poor.

9. How are decisions about the use of additional resources being made and by whom?
    - Government through circulars addressing : dept reduction, financial management, service delivery improvement; councilors and public also make decisions.-MCB

- Councils committees and finally through councils resolution-MCW
- Councils resolution, stakeholders via workshops and seminars-TCM
- Financial committee and full council, that is finally approved by the ministry o Local government.-TCS
- As said earlier-MCK

10. To what extent do ordinary citizens, and particularly the poor, participate in reaching those decisions?

- Through their local are councilors-TCS
- Through their area councilors, inviting them to participate in decion making-TCM
- Through consultative meetings with community based organizations CBOs groups-MCW
- Very minimal due to lack of understanding of their role of participating effectively. They need to be educated on how to participate effectively and the importance of doing it. Perhaps through civic education.-MCK
- Through the LASDAP programme/process-MCB

11. To what extent do the resulting expenditure choices reflect the needs, priorities and interests of citizens, including the poor?

- It reflect about 25% of the citizens priorities of the total LATF allocation-MCB
- Good planning is helping keep with most of the choices of citizens, however, lots of emergencies make it difficult to adhere to the original budget.-MCK
- Improvement of infrastructure and building of heath centres and schools-MCW
- LASDAP has taken care of it by implementing projects that have been prioritized to implement projects that benefit low-income groups-TCM

- As per the resolution of Council and LASDAP-TCS

12. How accountable is the Local Authority for the pattern of expenditures which actually results?

- ?? no response-TCS
- By implementing projects prioritized in the annual budget to meet the needs of citizens-TCM
- By paying off council depts, and salaries arrears-MCW
- Production of abstract of accounts as a requirement to get LATF, it is mandatory that council budget is published in at least one daily newspaper-MCK
- It's the duty of LA to ensure that the expenditure reflects 100% of the citizens interest-MCB

13. Are the accounts, budget, and reports computer generated?

- No. –MCB
- No. However, outsourcing is done to produce computer generated reports-MCK
- Yes.-MCW
- No. However, outsourcing is done to produce computer generated reports- TCM
- No. However, planning to train and install computers-TCS

14. Are you aware of e-government strategy in Kenya?

- Not much.-TCS
- Yes-TCM
- No.-MCW
- No.-MCK
- Yes.-MCB

15. What does the local Authority expect from the e-government strategy?

- No response. Due to lack of information-MCB
- Not aware of it therefore could not expect anything-MCK
- Expect benefits from expected advantages of e-government.-MCW
- Improvement of ICT backed services in government and all sectors.-TCM
- To train staff and councilors-TCS

16. Is your local Authority ready for e-government?

- No response-TCS
- Yes. It only lack funds to implement it.-TCM
- No. however, it will be once it is incorporated in e-government strategy.-MCW
- Yes. MCK
- No response-MCB

17. Local Authorities are one of the stakeholders when it comes to Information and Communication Technologies Policy (ICT). To what extend has your local authority participated in the formulation of the Kenyan national ICT policy?

- No response-MCB
- Not at all-MCK
- Not directly. However, ready to implement any existing policy that supports ICT-TCM
- No response-TCS
- No. -MCW

18. Does the National ICT policy address the needs of Local Authorities?

- No response-TCS
- It does. If it allows participation of local authorities to address their needs. Also when ALGAK emphasizes use of ICT-TCM

No. The local authority had just been made aware through daily newspapers information on ICT-MCW

- No response-MCK
- No response-MCB

19. Does your Local Authority have services that are computerized? Please list.

- No response-MCB
- No. however services are outsourced-MCK
- Yes. Only typing/word processing services-MCW
- No. Computers have not yet been bought-TCM
- No.-TCS

20. Does the Ministry of Local Government delay budget approval for some local Authorities? If yes Give reasons.

- No.-TCS
- No. there is improvement since te procedures were changed to have budget approval done at provincial level.-TCM
- Yes. –MCW
- No.-MCK
- No response-MCB

21. Does Local Authority use local radio to communicate to its citizens?

- No response- MCB
- No. –MCK
- No-MCW
- No. due to financial limitations.-TCM
- No. -TCS

22. Is participation costly for both the Local Authority and citizens?

- Yes.-TCS
- Yes.TCM
- No.- MCW
- No.-MCK
- No response-MCB

APPENDIX F: EAC HEADQUARTERS AND INSTITUTIONAL LEVEL QUESTIONNAIRE

This questionnaire is to be filled in by the ICT sector head.

* The word Informatics is uses synonymously with ICT

Policy

1. Is there an institutional policy on informatics?	**Yes**	**No**
If "no" skip to 1f.		

la. What year was the policy adopted?	**Year**

1b. Is there a ICT strategic plan steering committee ?	**Yes**	**No**

If "no" , skip to 1d.

1c. What is the basis of its composition

ld. How specifically does the policy identify each of the following?			
	Very specific	**Vague**	**Not identified**
Major performance dates			
Funding needs			
Funding sources			
Assessment criteria			
Responsibility for achievement			

1e. With what success has the policy been implemented?		

	Last year	Last 5 years
Great		
Moderate		
Little		

lf. Are there specific plans to formulate such a policy	**Yes**	**No**
lg. Have there been other policies in the past?	**Yes**	**No**
2. Is there a university policy on telecommunications?	**Yes**	**No**

3. How high is informatics development and funding as a institutional priority?	
• Of highest priority	
• High, but certain other needs are first	

• Low, many other needs are first	
• Not a institutional priority	

4. What are the top five institutional needs to be met within available funding?
1.
2.
3.
4.
5.

Opinion of the Value of Informatics

5. How important do you feel that informatics is to the future development of your institution?	
• Of greatest importance	
• Very important	

• Moderately important	
• Not very important	
• Not important at all	

6. In your opinion, how much information do you have on the costs of different aspects of informatics adaptation and utilization?				
	A large amount	**An adequate amount**	**A small amount**	**None**
Financial costs				
Organizational disruption				
Cultural dislocation				

7. How much information do you feel that you have on the long-range importance of each of the following?				
	A large amount	**An adequate amount**	**A small amount**	**None**
Local-area networks				
Intranets				
Wide-area networks				
Internet connectivity				
Linkage among EAC institutions				

1. It has been said that a modern informatics system requires the synthesis of several specialties, including computer science, information systems, communications, and systems management.

8a. To what extent do you agree with this statement?

• I strongly agree	
• I agree	
• I disagree	
• I strongly disagree	

8b. In your opinion, how relevant is this statement to the long-term operation of your centre?	
• It is of great relevant	
• It is of some relevance	
• It is of little relevance	
• It is of no relevance	

9. Where do you get most of your knowledge about informatics? Rate the importance to you of each of the following sources:	**Importance**		
	Low	**Medium**	**High**
	1	**2**	**3**

Direct operational experience			
Interactions with data processing operations			
Conferences			
Demonstrations			
Educational courses taken			
Reading and discussions			

10. Have you attended an informatics demonstration during the past year?	**Yes**	**No**
If ”Yes”:		

10a. Indicate the subject and attendance of each demonstration you have attended in the last year.	
Subject	**Attendance**

Institutional ICT Planning

11. Is there a written plan for informatics development and utilization in your institution ?	**Yes**	**No**
If "yes:" continue below (Include a copy with this package.) If "no", skip to 11g.		

11a. When was the plan written?	**Date**
11b. How many years does it cover?	**Years**

11c. What agencies are responsible for its implementation?	**Agencies**

11d. What aspects of informatics does it cover? ***Mark all that apply***.	
• 1. Electronic Information Management	
• 2. Management Information System	
• 3. *e*-learning	
• 4. Library Automation	
• 5. Research	
• 6. Research Management	
• 7. Statistical Data Management	
• 8. Spatial Data Management	
• 9. Hardware configuration	
• 10. Hardware specifications	
• 11. Hardware procurement	

11d. What aspects of informatics does it cover? ***Mark all that apply***.	
• 12. Operating Systems software	
• 13. Applications software	
• 14. Software specifications	
• 15. Software procurement	
• 16. Software development	
• 17. Peripheral configurations	
• 18. Peripheral specifications	
• 19. Peripheral procurement	
• 20. Local area networking	
• 21. Wide area networking	
• 22. Internet connectivity	
• 23. Hardware maintenance	
• 24. Software maintenance	

11d. What aspects of informatics does it cover? ***Mark all that apply***.	
• 25. Training	
• 26. Information System Management	
• 27. Security	
• 28. Regulatory Issues	

11e. In your opinion, how clearly defined in the plan are each of the following?			
	Clearly defined	**Vaguely defined**	**Not Present**
1.Output objectives			
2.Time frame			
3.Milestone events with specified outputs			
4.Milestone events with responsibilities			

5.Funding needs for explicit time periods			
6.The source of needed funds			
7.Systematic assessment of outcomes			
8.Periodic review of external factors			
9.A process for periodic review and revision			

11f. How well has the plan been implemented?	
• **Very well** - Almost all product objectives have been achieved as scheduled.	
• **Well** - The majority of product objectives have been achieved as scheduled.	

• **Not very well** - Fewer than half of product objectives have been achieved as scheduled.	
• **Poorly** -- Very few of the product objectives have been achieved as scheduled.	

11g. Is a plan now being developed?	**Yes**	**No**
11h. If a plan is not being developed, will one be developed?	**Yes**	**No**
11i. If "Yes", when?		

Allocations in the Institutional Budget

The purpose of questions in this section is to develop as accurate an estimate as possible of total expenditures on informatics and to state this total as a proportion of all institutional expenditures. Figures are to be obtained for each department/ sector and these summed to produce overall totals.

12. List the amounts in the current sector budget which relate to informatics. Round to the nearest thousand.

Category	Amount in US$ - by Type and Source		
	Recurrent	**Capital**	**Donor**
1. Hardware			
2. Software			
3. Training			
4. Communications (H/W, S/W)			
6. IT Staffing			
7. Security			
8. Other (specify)			

13. What have been total expenditures for informatics in the sector during the past five financial years? Indicate the amount from local sources and that from external assistance.

Year	**Amount in US$**	
	Internal Sources	**External Sources**
1998/99		
1999/00		
2000/01		
2001/02		
2002/03		

14. **In the past five years, what proportion of amounts budgeted for informatics were spent as designated? Check the appropriate answer.**

Proportion of Budget Spent as Designated				
Year	10% or less	>10<50%	>50<90%	**>90 to 100%**
1998/99				

1999/00				
2000/01				
2001/02				
2002/03				

14a. If the proportion spent has been less than 90% for any year, please explain why very briefly. Were the reasons financial, technical, a change in priorities, or what?

15. What increases in expenditures for informatics are specifically planned for the sector during the next three years? Enter as a percent of the immediately preceding budget and categorize by source (where "external" includes donors).

	Percent of Increase	
Year	**Internal Sources**	**External Sources**
2004/05		
2005/06		
2006/07		

Information Processing and Computer Use In the EAC Institution

Questions in this section refer to the institutional /IT /Computer Centres. Please indicate if a department/section functions as a central information processing for the institution.

16. Is there an information processing centre in your institution?	**Yes**	**No**
If "yes" continue below. If "no" skip to 17.		

16a. Does the centre function as a central information processing centre for the institution?	**Yes**	**No**
If "yes" continue below. If "no" skip to 17.		

16b. List the hardware, peripherals, and software packages used at the centre?

Central processors:	**Brand Name & Model**
Client Servers:	
Communication devices:	

Central processors:	**Brand Name & Model**
Storage devices & Capacity:	
Security devices:	
Software packages:	

Central processors:	**Brand Name & Model**
Peripheral Devices:	

16c. How many people work in the information processing centre? Enter numbers in terms of full-time equivalents.

	Full-Time	**Part-Time**
Management/ Administrative		
Technical		
Support		

16d. What is the current informatics policy in general on:

	In-house	Out-sourcing	Customization
1. Application development			

	In-house	Out-sourcing
2. System Maintenance (H/W)		
3. System Maintenance (S/W)		
6. Internet Service Provision		

16e. What is the position level of the person to whom the senior-most manager in the information processing centre reports? Is it Director, or Section Heads i.e Finance Officer, or what?

16f. To what extent would you say your institution is looking for ways to use the internet applications to improve responsiveness to its constituents. (tick one)

• Currently implementing internet solutions	
• Evaluating alternative internet options	
• Determining the need/opportunity for the use of the internet	
• Just thinking about it	
• We have not thought about it	
• We are not knowledgeable of what service/information to offer on the internet	

16g. Does your Institution have an official website ?	**Yes**	**No**
If "Yes" is the website currently used or will be used for		
• Disseminating information only		
• Transaction processing only		

• Both disseminating information and transaction processing	

16h. Mark all functions which are performed by the sector information processing centre.	
• 1.Integrated management information system	
• 2. Medical Data	
• 3.Research	
• 4.Research Management	
• 5.Geographic Information Systems (GIS)	
• 6.Spatial Data	
• 7.Statistical Data analysis	
• 8.Personnel records	
• 9.Fiscal information	
• 10.Financial records	
• 11.Private-sector organizations information	

16h. Mark all functions which are performed by the sector information processing centre.	
• 12.Communications	
• 13.Publishing	
• 14.Demographic data	
• 15.Electronic Document Management	
• 16.Filing System	
• 17.Tracking Systems (e.g. project)	
• 18.Network Security	
• 19.Applications Security	
• 20.Data Security	
• 22. Library Automation	
•	
•	
•	

16i. Mark all local-area and/or wide-area networks which are operated by the information processing centre.

• Local-area network within the Institution	
• Intranet	
• Links to other Wide-area network within the EAC Secretariat, other EAC Institutions	
• Links to the other International networks	

16j. Does the information processing centre have branches in other locations?		**Yes**	**No**
If "Yes" where?			Skip to 17.
If "No" are these planned for?			

17. How many personal computers are used in your Institution?	
0 - 25	
25 - 50	

50 - 100	
100 - 200	
more than 200	

18. To what extent are personal computers used in the centre for each of the following?

	Extensive use	**Moderate use**	**Little use**	**No use**
1.Word processing				
2. Spreadsheets				
3. Database Management System				
4. Desktop publishing				
5. Graphics generation				
6. General communications				

7. *e*-mail				
8. Electronic conferencing				
9. Bibliographic searches				
10. Internet access				
11. Statistical applications				
12. Accounting				
13. Scientific research				
14. Image processing				
15. Electronic Data Management				
16. GIS/Spatial Data Display				
17. Office Filing				
18. *e*-learning				
19. Library Automation				
20. Management Information System				

21. Research				
22. Research Management				

19. To what extent is general information processing used in the centre for each of the following?

	Extensive use	**Moderate use**	**Little use**	**No use**
1.Word processing				
2. Spreadsheets				
3. Database Management System				
4. Desktop publishing				
5. Graphics generation				
6. General communications				
7. *e*-mail				
8. Electronic conferencing				
9. Bibliographic searches				

10. Internet access				
11. Statistical applications				
12. Accounting				
13. Scientific research				
14. Image processing				
15. Electronic Data Management				
16. GIS/Spatial Data Display				
17. Office Filing				
18. *e*-learning				
19. Library Automation				
20. Management Information System				
21. Research				
22. Research Management				

20. Are Optical disks used in the Institution?	**Yes**	**No**

The Support System

21. Has the centre experienced interoperability (compatibility) problems with either hardware or software in the past?	**Yes**	**No**
If "Yes":		
22a. Indicate the proprietary and/or legacy systems that are in place, which have experience a problems in the past.		
Hardware:	**Minor Problems**	**Major Problems**
Central processors		
Storage devices		
Switching units		
Other peripherals		

Security issues		
Software:		
Operating systems		
Applications		
Files		
Security issues		

23. Is the Institution currently experiencing interoperability (compatibility) problems with either hardware or software?	**Yes**	**No**
If "Yes":		
23a. Indicate the proprietary systems that are in place, which are experiencing problems. Mark all that apply.		

Hardware:	**Minor Problems**	**Major Problems**
Central processors		
Storage devices		
Switching units		
Other peripherals		
Security issues		
Software:		
Operating systems		
Applications		
Files		
Security issues		
Communications:		
Internet connectivity		
e-mail access		

24. Indicate the extent to which consumables are available locally.			
Consumable	**Readily Available**	**Sometimes Difficult to Find**	**Always Difficult to Find**
Paper			
Ribbons			
Ink			
Toner			
Cables			
Other (specify):			

25. Indicate the extent to which maintenance in each category is performed by the Institutional personnel. Mark for each category.			
	Level of Local Maintenance		
Category	**None**	**Basic**	**Advanced**
Hardware			
Software			
Files			
Communications			
Networks			

26. What problems have been experienced in obtaining service for different system components?			
	Level of Problem		
Category	**None**	**Minor**	**Major**
Hardware			

Software			
Files			
Communications			
Networks			
Security			

27. For each of the following, indicate whether, to the best of your knowledge, it is manufactured or assembled in the region.

	Developed or Manufactured	**Assembled**	**Don't Know**
1. Computers			
2. Disk			
3. Printers			
4. Optical disks (CD-ROMs)/DVD			

27. For each of the following, indicate whether, to the best of your knowledge, it is manufactured or assembled in the region.			
	Developed or Manufactured	**Assembled**	**Don't Know**
5. Flash memory			
6. Cables			
7. Diskettes			
8. Paper			
9. Toner			
10. Ink			
11. Commercial Software			
12. Other (specify):			

27. For each of the following, indicate whether, to the best of your knowledge, it is manufactured or assembled in the region.			
	Developed or Manufactured	**Assembled**	**Don't Know**

28. With what efficiency do each of the following types of communication operate at the institution?			
	High Efficiency	**Moderate Efficiency**	**Low Efficiency**
Telephone			
Fax			
Internet			
e-mail			

29. Is there a fibre optic backbone available at the Institution?	**Yes**	**No**

If “Yes”:		
29a. Is the Institution an Internet Service Provider?	**Yes**	**No**
29b. If "no" name the Internet Service Provider.		

Security

30. Has the Institution developed an ICT security Policy?	**Yes**	**No**
If "No" skip to 31		
If "Yes", has it been implemented?		
• Yet to be		
• Partially		

• Fully	

31. If "No", is there a plan to develop one?	**Yes / State the time frame**	**No**

	Yes	**No**
32. Is there an off-site backup?		
33. Is the information system insured?		

Relations with Ministry of Education, Industry and other national, regional blocks/initiatives

34. In your opinion, with what success do projects/programs in major universities in the region address national or Sub-regional problems?

	National	**Sub-regional**

	National	Sub-regional
With great success		
With moderate success		
With small success		
With no success		

	Yes	No
35. Do you see universities as having a key role in economic and other development efforts in the region?		
36. Do you see a need for universities to be partners with national ICT/Informatics sector in development efforts?		
37. In your opinion, does EAC encourage the use of informatics in your institution?		
If ”Yes”:		

38a. Indicate the length of time each type of support has been offered.

	Number of Years	**Don't Know**
Moral support		
Financial support		
Technical support		
Other (specify):		

	Yes	**No**
39. Do you see the private sector as having a key role in economic and other development efforts in the region?		
40. Do you see a need for the private sector to be partners with your ICT/Informatics centre in development efforts?		

41. Do other national, regional and international initiatives assist the institution in achieving its informatics goals?		
If "Yes":		

42a. List the initiatives and indicate for each the type of support given.

The national/regional block	**Initiatives**	**Type of support**

	Yes	No
43. In your opinion, is the concept of a national-industry-higher education partnership for development operational?		
If "yes," the partnership concept is operational:		
	Yes	**No**
43a. Has this concept been specifically acted on in informatics?		
If "yes," the concept has been acted on in informatics as follows:		
43b. Describe briefly the manner in which the concept has been acted on.		

Need for Outside Assistance

44. How much and what types of outside assistance do you feel are needed in formulating and implementing an informatics policy for your institution?

	Perceived Need			
	Major Support	**Moderate Support**	**Little Support**	**No Support**
1. Policy formulation				
2. Planning				
3. Tendering				
4. Procurement				
5. Training				
6. Maintenance of hardware				

7. Maintenance of software				
8. Applications development				
9. Management Information System				
10. *e*-learning				
11. Research systems				
12. Library Automation				
13. Other (specify):				

45. Has your Institution received external (non-governmental) support in informatics in the past?	**Yes**	**No**
If "Yes":		
45a. In your opinion, how valuable in general has the external assistance been?		

• Of great value	
• Of moderate value	
• Of little value	

45b. What type of external assistance has been most helpful?

45c. What type of external assistance has been least helpful?

46. Year the centre was re-established _____

Problem Areas

47. How serious have each of the following potential problems been in the past in informatics?

	Very Serious	**Moderate**	**Minor**	**No Problem**
1. Shortage of funds				
2. Lack of technical information				
3. Lack of information on availability				
4. Procurement/delivery of hardware				
5. Procurement/delivery of software				
6. Internal support				
7. Internal communications				
8. External communication				
9. Shortage of trained personnel				
10. Maintenance				

	Very Serious	**Moderate**	**Minor**	**No Problem**
11. Hardware compatibility				
12. Software compatibility				
13. System Integration				
14. Inter-operability				
15. Absence of supportive environment				
16. Security				

48. Any other issues or comments?

APPENDIX G: SAMPLE QUESTIONNAIRE FOR THE STUDY OF MANAGERIAL PRACTICES AND ORGANIZATION STRUCTURES OF EAC HEADQUARTERS AND INSTITUTIONS.

Your institution has been selected to participate in this study and you been included in the sample of respondents.

Please respond to the following questions and statements as honestly as possible. Your responses will be kept strictly confidential and will not be used for anything other than the requirements of this study. You need not provide you name.

Thank you for your cooperation.

SECTION A:

NAME OF INSTITUTION.....

DEPARTMENT.....

POSITION (Please tick one):

Management Level:

Top .....

Middle .....

Junior .....

SECTION B: Please indicate with a tick(√) the extent to which you agree or disagree with each of the following statements.

	Strongly Agree	Agree	Neither Agree Nor Disagree	Disagree	Strongly Disagree
1. I know the purpose, philosophy or central theme of my organization					
2. All the employees in my organization fully grasp its purpose					
3. Ninety percent or more people display commitment to the common purpose of my organization					
4. Individual employees perceive personal benefits from committing themselves to the common purpose					

	Strongly Agree	Agree	Neither Agree Nor Disagree	Disagree	Strongly Disagree
5. I know which employees fail to grasp or display commitment and why					
6. It is possible to measure the level of individual and collective commitment to the common purpose					
7. I can recognize the warning signals with an employee's associated decline in commitment					
8. I usually take action on employees who are not yet committed					

	Strongly Agree	Agree	Neither Agree Nor Disagree	Disagree	Strongly Disagree
9. I am genuinely committed to the common purpose myself					
10. I usually consider the impact on the organization's common purpose when I evaluate strategic and operational alternatives					
11. Formulation of an ICT policy at my organization includes background study to consider the wisdom of a policy					

	Strongly Agree	Agree	Neither Agree Nor Disagree	Disagree	Strongly Disagree
12. Formulation of ICT policy at my organisation is preceded by gathering and analyzing appropriate facts about the needs of a particular situation					
13. Tentative drafts of a policy are usually prepared and circulated for comment before a particular statement is adopted as representing the official position of my organization					
14. My organization does a good job of communicating policies to all personnel who are concerned with them					

	Strongly Agree	Agree	Neither Agree Nor Disagree	Disagree	Strongly Disagree
15. My organization's supervisory and management training seminars/workshop usually devote sessions to an explanation and discussion of existing policies					
16. My organisation has too many unwritten polices					
17. My organisation's policies are consistently applied by the organisation's top and middle managers					
18. Application of my organisation's policies requires the exercise of administrative judgement of top and middle managers					

	Strongly Agree	Agree	Neither Agree Nor Disagree	Disagree	Strongly Disagree
19. My organization's polices are consistently applied by the lower levels of management					
20. Many of my organization's policies are now outmoded					
21. Periodic review of policies is necessary to avoid retaining out-moded policies					
22. My organization reviews its policies regularly					
23. Policy making at my organization entails contributions by middle levels of management					

	Strongly Agree	Agree	Neither Agree Nor Disagree	Disagree	Strongly Disagree
24. Policy making at my organization entails contributions by lower levels of management					

SECTION C: Please tick (√) the response...(Yes, No, Don't know) that best represents you opinion, on each question.

		Yes	No	Don't Know
Q1	Does your organization have clearly stated goal and objectives?	_____	_____	_____

		Yes	No	Don't know
Q2	Does your organization monitor and forecast relevant trends in the economic, political, social and technological environment?			
	a) Economic environment	_____	_____	_____
	b) Political-legal environment	_____	_____	_____
	c) Social-cultural environment	_____	_____	____
	d) Technological environment	_____	_____	_____
Q3	Does your organization monitor and anticipate the needs of key			
	a) Service recipients (the public)?	_____	_____	_____
	b) Employers?	_____	_____	_____
	c) Government?	_____	_____	_____
	d) Employees?	_____	_____	_____

		Yes	No	Don't Know
Q4.	Does your organization have an effective budgeting process?	_____	_____	_____
Q5.	Does you organization allocate resources based on stated goals?	_____	_____	_____
Q6	Does your organization have objectives strategies, goals, and polices that are mutually consistent, supportive and clearly communicated?	_____	_____	_____
Q7	Does your organization have a clear organizational structures as evidenced by a formal organizational chart?	_____	_____	_____
Q8	Does the organization chart reflect the most desirable structure for your organization?	_____	_____	_____
Q9	Does the organizational chart exhibit acceptable spans of control (i.e number of people reporting directly to a supervisor)?	_____	_____	_____

		Yes	No	Don't know
Q10	Are similar activities appropriately grouped together in the organizational chart?	_____	_____	_____
Q11	Are staff functions, such as Administrative Assistants, shown appropriately in the organization chart?	_____	_____	_____
Q12	Is the unity of command principle (i.e. one employee one boss) adhered to in your organization?	_____	_____	_____
Q13	Do your organization's managers delegate authority well?	_____	_____	_____
Q14	Does your organization's have written job descriptions?	_____	_____	_____
Q15	Does your organization issue staff members with written specifications?	_____	_____	_____
Q16	Does your organization have written job specifications?	_____	_____	_____
Q17	Are you organization use job descriptions and specifications?	_____	_____	_____

Q18	Are your organization's jobs meaningful, rewarding and challenging?	_____	_____	_____
Q19	Is employee morale high?	_____	_____	_____
Q20	Is managerial morale high?	_____	_____	_____
Q21	Is job satisfaction high?	_____	_____	_____
Q22	Is a participative management style used?	_____	_____	_____
Q23	Is creativity encouraged?	_____	_____	_____
Q24	Are absenteeism rates in your organization low?	_____	_____	_____
Q25	Are turnover rates low?	_____	_____	_____
Q26	Does a good system for two-way communication exist in your organization?	_____	_____	_____
Q27	Are managers in your organization effective leaders?	_____	_____	_____
Q28	Does your organization have an equitable reward system?	_____	_____	_____

		Yes	No	Don't Know
Q29	Does your organization and its employees adapt well to change?	_____	_____	_____
Q30	Are employees able to satisfy their individual needs through your organization?			
	a) Spiritual needs	_____	_____	_____
	b) Economic needs	_____	_____	_____
	c) Social needs	_____	_____	_____
	d) Self Development needs	_____	_____	_____
Q31	Are departmental policies reasonable and supportive of stated goals?	_____	_____	_____
Q32	Does your organization hire employees only after careful interviewing, testing and selecting?	_____	_____	_____
Q33	Does your organization provide adequate development programmes for:			
	a) employee	_____	_____	_____

	b) management	_____	_____	_____
Q34	Does your organization provide reasonable employee benefits?	_____	_____	_____
Q35	(a) Does your organization have an effective performance appraisal system?	_____	_____	_____
Q35	(b) Is the output from the appraisal system used for			
	i) pay increase determination and	_____	_____	_____
	ii) promotion?	_____	_____	_____
Q36	Does your organization have a good wage and salary administration system?	_____	_____	_____
Q37	Is unethical behaviour effectively controlled in your organization?	_____	_____	_____
Q38	(i)Are your organization's financial control systems			
	a) timely?	_____	_____	_____
	b) accurate?	_____	_____	_____

	c) thorough?	_____	_____	_____
	(ii) Are your operational control systems			
	a) timely?	_____	_____	_____
	b) accurate?	_____	_____	_____
	c) thorough?	_____	_____	_____
	(iii) Are your organization's administrative control systems?			
	a) timely?	Yes	No	Don't Know
	b) accurate?	_____	_____	_____
	c) thorough?	_____	_____	_____
Q39	Do all managers in your organization use the information system to make decisions?	_____	_____	_____
Q40	Is there a chief information officer or director of information systems' position in your organization?	_____	_____	_____
Q41	Is the data in the information system update regularly?	_____	_____	_____

		Yes	No	Don't Know
Q42	Do managers from all functional areas of your organization contribute input to the system?	_____	_____	_____
Q43	Are your organization's information systems aligned to its strategies?	_____	_____	_____
Q44	Are computer training workshops provided for users of the information system?	_____	_____	_____
Q45	Is the organization's information system continually being improved in content and user friendliness?	_____	_____	_____

Q46 I spend approximately _____ percentage of my working time in meetings? (Please fill the gap)

SECTION D: Please circle the numbers that indicates the extent to which you possess the following management skills and their relative importance to you work:

		My Skill Level			Relevance to Work		
I.	Administrative skills:	High	Low	Ave	Rev	Not	Very
	Overall rating:	1	2	3	1	2	3
	Planning	1	2	3	1	2	3
	Organization & Time management	1	2	3	1	2	3
II.	Leadership skill:						
	Overall rating:	1	2	3	1	2	3
	Leadership style and influence	1	2	3	1	2	3
	Motivating others	1	2	3	1	2	3
	Group skills	1	2	3	1	2	3
	Delegating	1	2	3	1	2	3

		My Skill Level			Relevance to Work		
I.	Administrative skills:	High	Low	Ave	Rev	Not	Very
	Controlling	1	2	3	1	2	3
	Staffing	1	2	3	1	2	3
	Coaching and Developing people	1	2	3	1	2	3
III.	Interpersonal skills:						
	Overall rating:	1	2	3	1	2	3
	Human relation skills	1	2	3	1	2	3
	Conflict Management and Negotiating	1	2	3	1	2	3
IV.	Communication skills:						
	Overall rating:	1	2	3	1	2	3
	Informing	1	2	3	1	2	3
	Listening	1	2	3	1	2	3

		My Skill Level			Relevance to Work		
I.	Administrative skills:	High	Low	Ave	Rev	Not	Very
	Oral Communications	1	2	3	1	2	3
	Written Communications	1	2	3	1	2	3
V.	Personal Adaptability:						
	Overall rating	1	2	3	1	2	3
	Stress Management	1	2	3	1	2	3
	Self Confidence	1	2	3	1	2	3
	Self Acceptance	1	2	3	1	2	3
	Flexibility	1	2	3	1	2	3
VI.	Occupational/Technical knowledge						
	Overall rating	1	2	3	1	2	3
	Job knowledge	1	2	3	1	2	3

		My Skill Level			Relevance to Work		
I.	Administrative skills:	High	Low	Ave	Rev	Not	Very
	Functional knowledge	1	2	3	1	2	3
VII.	Cognitive skills:						
	Overall rating:	1	2	3	1	2	3
	Problem Analysis & Decision Making	1	2	3	1	2	3
	Financial/Quantitative Skills	1	2	3	1	2	3
	Innovation and Resourcefulness	1	2	3	1	2	3
	Handling Detail	1	2	3	1	2	3
VIII	I.T Skill:						
.							
	Overall rating:	1	2	3	1	2	3
	Word processing	1	2	3	1	2	3

		My Skill Level			Relevance to Work		
I.	Administrative skills:	High	Low	Ave	Rev	Not	Very
	Spreadsheet	1	2	3	1	2	3
	Create Database	1	2	3	1	2	3
	e-mail	1	2	3	1	2	3
	Internet search	1	2	3	1	2	3

SECTION E: Please rate each of the following statements by circling either 1,2,3,4,5,6, or 7:

(1 relates to the left end of the scale and 7 to the right end).

1.a In top level decision making the planning mode is characterized by systematic search for opportunities and anticipation of problems; a systematic consideration of cost and benefits of alternatives; and a conscious attempt at integrating programmes of action to achieve specified goals efficiently. The emphasis is on effectiveness, long-term planning, very careful screening of investments to minimize risks and extensive use of expertise and solid search before making decisions. (1 means little resemblance and 7 means great resemblance. The others follow in that order).

Little resemblance to style of top level decision-making	1 2 3 4 5 6 7	Very great resemblance to style of top level decision making in the organization

b) The strategic long term importance to top management of forecasting the external environment is of

Little strategic Importance	12 3 4 5 6 7	Extreme strategic importance

c) The strategic long term importance to top management of research is of

Little strategic Importance	12 3 4 5 6 7	Extreme strategic importance

d) The strategic long term importance to top management of planning long term investments and their financing (long term capital budgeting)is of

Little strategic Importance	12 3 4 5 6 7	Extreme strategic importance

e My organization is characterized by an operating top management philosophy of

i)

In decision-making great reliance on personnel with experience	1 2 3 4 5 6 7	In decision making great reliance on specialized technically trained line and staff personnel's common sense

ii)

A bird-in-hand Emphasis on immediate future in goals making	12 3 4 5 6 7	Emphasis on Long term (over 5 years) planning strategy

iii)

Heavy reliance on apprenticeship	12 3 4 5 6 7	Heavy reliance on management "Learning by hard knocks"

2. To what extent is decision making at top levels in your organization characterized by participative group or democratic decision making, in relation to the following classes of decision (a "4" in the scale means responsible executives discuss with others before deciding).

a. My organization's operating management philosophy is

Strongly individualistic decision making by the formally responsible	12 3 4 5 6 7	Strongly group or committee oriented consensus seeking participative decision-making

b. The strategic long term importance of participative decision-making at middle and senior management levels is of

Little strategic importance	12 3 4 5 6 7	Extreme strategic importance

c. The strategic long term importance of management by objectives (goal setting by subordinates with their superiors' help) is of

Little strategic importance	12 3 4 5 6 7	Extreme strategic importance

d. Human relations training for managers to make them understand better their colleagues and subordinates, and to help them communicate more effectively with them is

Not common at all	12 3 4 5 6 7	Very commonly used

e. My organization's operating top management philosophy is characterized by:

(i)

Highly structured channels of communication and a highly restricted access to important financial and	12 3 4 5 6 7	Opening channels of communication with important financial and Operating information

operating information operating information throughout the organization.		flowing quite freely

(ii)

. Strong insistence on managerial style throughout the formal and very informal	12 3 4 5 6 7	Managers' operating a uniform styles allowed to range freely from the very organization

(iii)

Strong emphasis on giving the most say in decision making to formal line managers	12 3 4 5 6 7	Strong tendency to let the expert in a given situation have the most say if this means bypassing of formal

		line authority

iv)

A strong emphasis on holding fast on true and tried management principles despite any changes in environmental condtions	12 3 4 5 6 7	A strong emphasis on adapting freely to changing circumstances without too much concern for past practice

v)

Strong emphasis on always getting personnel to follow the formally laid down procedure	12 3 4 5 6 7	Strong emphasis on getting things done even if this means disregarding formal procedures

vi)

Tight formal control of most operations by means of sophisticated control and information systems	12 3 4 5 6 7	Loose informal control: heavy dependence on informal relationships and norm of cooperating for getting work done

vii)

Strong emphasis on getting line and staff personnel to adhere closely to formal job descriptions	12 3 4 5 6 7	Strong tendency to let the requirements of the situation and the individual's personality define proper on job behaviour

viii)

Great centralization in decision making with most operating decisions made at the top management level	12 3 4 5 6 7	Great decentralization with most operating decision made at lower management levels

ix)

A policy offering virtually unlimited job security to employees	12 3 4 5 6 7	A strong performance oriented up-or-out policy

x)

In decision making great reliance on specialized technical line	12 3 4 5 6 7	In decision making great reliance on personnel with experience and trained common sense

xi)

Strong group or committee oriented concensus-seeking participate decision.	12 3 4 5 6 7	strong individualistic decision making by the formally responsible executive

xii)

Making friendly accommo-		Though bargaining with the

dation with the Union or employees representatives	12 3 4 5 6 7	union or employees representatives

xiii)

In promoting managers a strong emphasis on the ability to co-operate and get along well with other	12 3 4 5 6 7	In promoting managers a strong emphasis on comp-etiveness & capacity to out perform others

xiv)

Strong emphasis on giving the most say in decision making to formal line managers	12 3 4 5 6 7	Strong tendency to let the expert in a given situation have the most say even if this means temporary by-

		passing of formal line and staff personnel

xvi)

Strong reliance on task forces or project teams for executing new project innovations & improvements	12 3 4 5 6 7	Strong reliance on formal line managers for executing new project innovations & improvement in operations

xvii)

Managers operating styles allowed to range from the very formal to the very informal.	12 3 4 5 6 7	Strong insistence on a uniform managerial style throughout the organization