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AFRICA AND THE INFORMATION ECONOMY: FOUNDATIONS, OPPORTUNITIES, CHALLENGES AND RESEARCH AGENDA

A draft issues paper to be presented at

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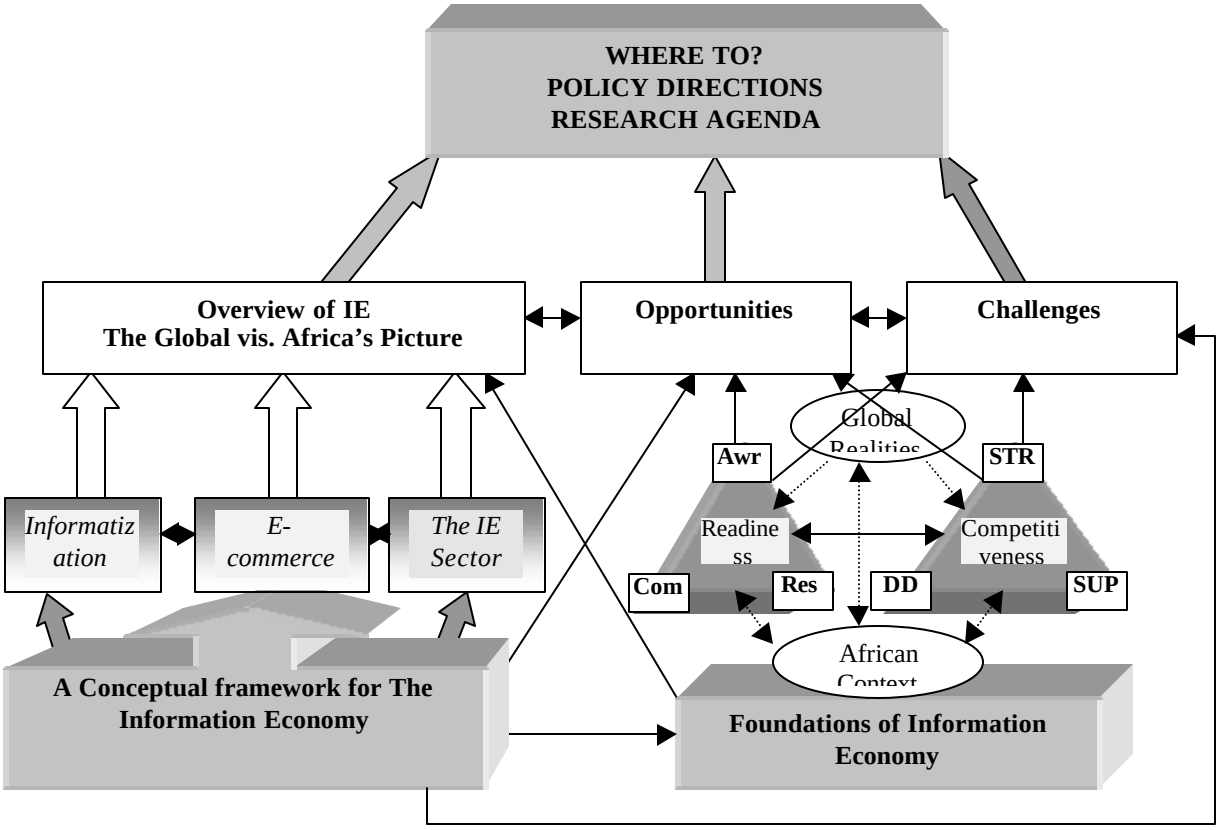
EXCUTIVE SUMMARY

Africa's *Achilles heels* are innumerable or may be not so as the enigmas and challenges we are facing emanate from our poverty if the latter is going to be considered a cause rather than an effect. While the continent is still grappling to provide its citizens with the most basic requirements of life, the rest of the world, especially the developed one, is fast heading towards a globally networked information economy (IE) and society. What does the information economy hold for Africa? What are its opportunities, challenges and impacts when in fact the continent is juxtaposed with the urgency to provide the most basic services of food, education, health, shelter, safe drinking water, etc? Is it prudent for Africa to go global, without successfully meeting its local obligations to its population by catering to their basic needs? Does Africa has a choice? Such are the nature, essence and magnitude of the questions that are haunting many involved in this discourse.

The study presented here doesn't attempt to provide answers to the above challenges and to the gamut of issues that surround these questions. Rather, it is intended to pose many questions than it actually answers and hence functions to provoke discussions and spark debates. The diagram that follows depicts what we attempted to cover in this paper.

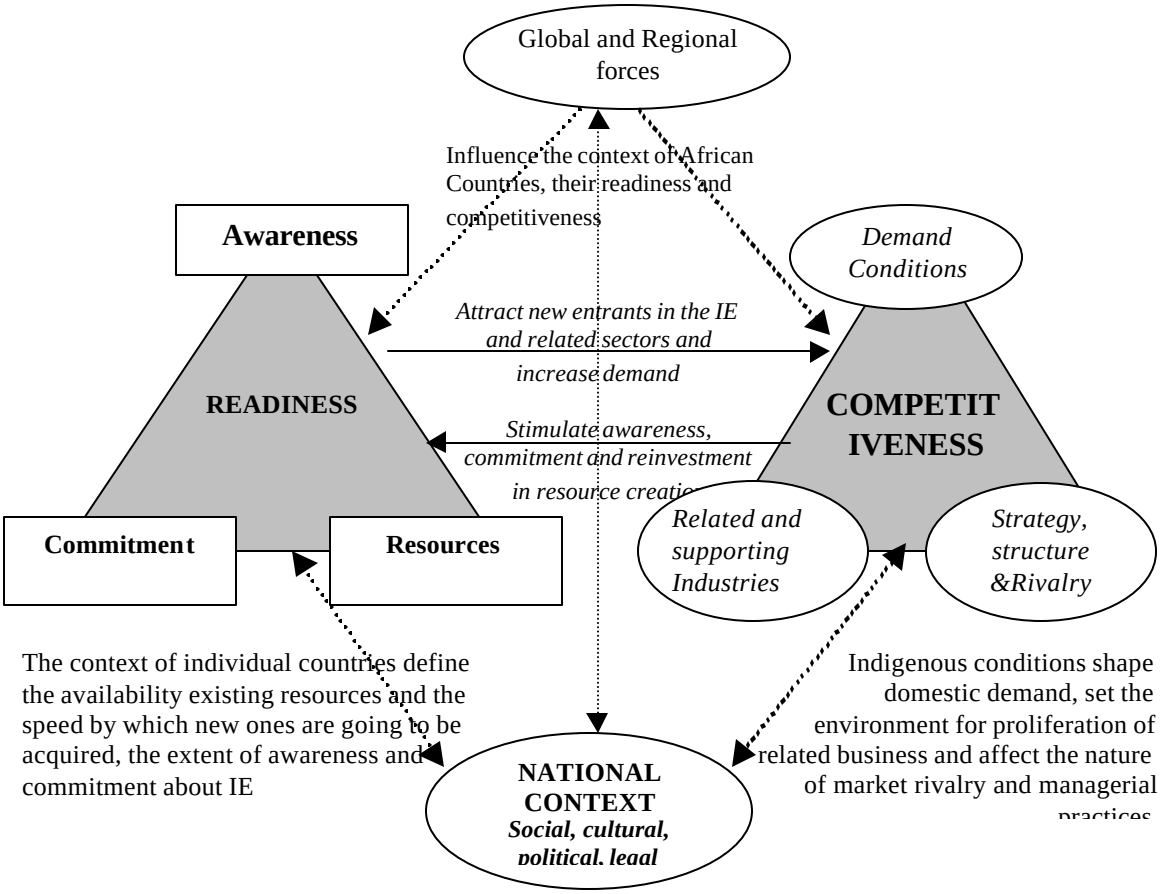


CONCEPTUALIZING THE INFORMATION ECONOMY

There are many definitions and understandings of the information economy. In its metaphorical sense, the term is used to describe the ongoing economic and social transformations following the pervasive applications of ICT. In its "sectoral" sense it represents an emerging and fast growing economic sector. These two views are yoked together and any attempt to conceptualize the information economy must have the robustness to address both. Hence we conceptualize the information economy to include the following: (1) the design, production and distribution of information and communications technology (ICT) goods, (2) the development and operation of network backbones and infrastructure and other telecommunications services (3) the design, production and distribution of software packages and application solutions (4) the design and provision of professional services (5) the design, packaging and distribution of contents (6) e-commerce related activities and (7) the informatization of the economy and society through the use of ICT and lastly the expected benefits to the whole economy from the above 7.

FOUNDATIONS OF THE INFORMATION ECONOMY

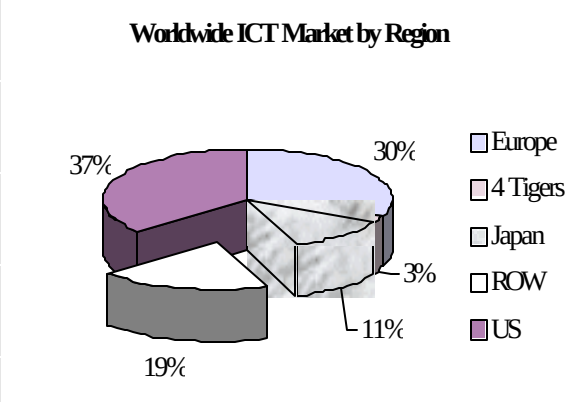
It is crucial that the long term information and communications technology strategies of African countries should focus on making the technology home grown, socially constructed element and not something alien and imported from elsewhere that is often perceived in conflict with the embedded values and norms. Being an affluent information society shouldn't only mean being a leading edge user. It requires being a leading edge producer as well and rarely does one exist without the other. Plus *a real catching up process can only be achieved through acquiring the capacity for participating in the generation and improvement of technologies, rather than in the simple use.* The following describes the foundations for the information economy



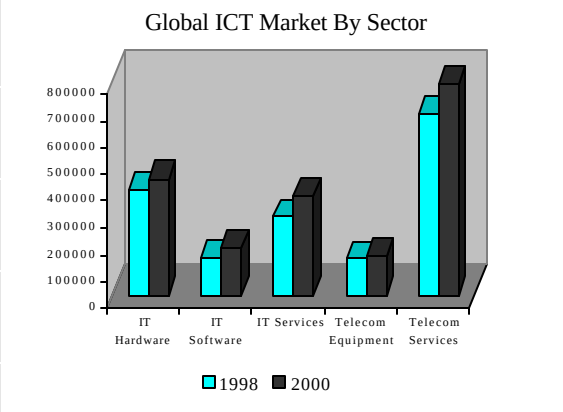
THE INFORMATION ECONOMY IN AFRICA OVERVIEW

In all the dimensions of main stream information economy sector, e-commerce and informatization, Africa is a very poor player with little informatization of its economy and society, with very small share of the world's ICT market and with an infant e-commerce experience (see the table and figures next page).

- The global ICT market has surpassed the US $ 2 trillion mark in 1999 with an annual growth rate of 10% and is expected to reach US $ 3 trillion by the end of 2004.
- Telecommunications services is the fastest growing global market (see figure next page)
- E-commerce statistics are fraught with definitional problems. But, UNCTAD estimated that countries outside OECD accounted for scarcely more than 2% of global E-commerce revenues.
- In terms of informatization, there is a big divide within the continent itself with South Africa better positioned than the rest of the continent. For example in terms of internet hosts, South Africa has as much as 10 times (almost 90%) the total number of Internet hosts in Africa distantly followed by Egypt (3.%) and Botswana in the third place with 1%. 6 countries (South Africa, Egypt, Botswana, Zimbabwe, Namibia and Morocco) account for 98% of the total number of internet hosts in the continent and the number of Internet hosts in 4 of the above SADC countries represent 94% of the total figure. The same trend with different magnitude can be observed in terms of main telephone line density, mobile density, PC density and others (see the table in the next page).



Source: EITO



Source: EITO

Informatization Indicators

	Main Tel. lines	Mobile Phones	Newspapers	Radios	Television set	Fax Machines	PC	Internet hosts
Sub Saharan Africa	11	4	12	172	44			2.32
Excluding South Africa	5	0		162				
South Africa	**100**	**37**	**32**	**316**	**125**	**3.5**	**41.6**	**34.2**
North Africa	47	1		273	124			
All Africa	**18**	**3**		**190**	**59**			
Low Income	16	1		99	57	0.2	2.2	0.10
World Average	**118**	**40**		**295**	**277**	**9.2**	**64.2**	**63.10**

Source: World Development Indicators (1999) and African Development Indicators (2000)

- Though Africa's share of the global ICTs market and spending is very small, figures from some countries indicate that the market is in fact growing and the economy is getting momentum. This follows the global trend that even if the North American market accounts for the lions share of the total ICTs spending, regions with the smallest ICTs base are outpacing the others with mature ICTs infrastructure hence indicating where the future potential market might be.

- One trend that is observed in the African Market is that despite the global trend which is dominated by software and professional services, hardware still constitutes the largest proportion accounting for as high as 60% of the total market revenues. Within the software and professional services categories, the strongest performing market segment is packaged software, which accounts for as high as 70-80% of total revenues in the sub-sector. These trends show Africa's obvious dependence on imported ICTs and the infancy of its own indigenous industry.

- The telecommunications reform and privatization drives have started to open the African telecommunications market for competition. So far 9 countries (Cape Verde, Central African Republic, Guinea, Guinea Bissau, Ghana, Cote D'ivoire, Madagascar, Sao Tome, South Africa and Senegal) have sold part of the share of the PTO (which ranges from a high of 60% in Guinea to 30% in Ghana and South Africa). More countries are expected to follow suit and some are in the process of preparing the sector for offering.

- Mobile cellular telephony has demonstrated a rather significant growth within a span of five years. Cellular services are now available in 42 countries and outside South Africa comprises about 20% of the total phones on the continent. The market ranges from pure monopoly by the PTO (in Ethiopia, Mauritius), to up to five providers as in Tanzania, 2 being most common. The service is gaining wider popularity and market.

- Though it is far from being satisfactory and is insignificant compared to the rest of the world, Internet connection in Africa is promising, showing a rise from only 12 countries in 1996 to almost all countries now. The number of service providers in the entire continent stands at about more than 367 up from 200 in 1998. The market structure varies from one where the PTOs are the sole (monopolistic) service providers (like in Ethiopia, Mauritius, Cameroon, Niger..etc) to a competition between PTO's and other ISPs (as in South Africa, Mozambique) and to a situation where the PTOs do not have any involvement (as in Egypt). Other structures also include a government authorized sole agency (in Mali) and a joint venture between PTO and commercial ISP.

- African statisticians are yet to catch up with reporting Africa's performance in e-commerce and in the whole information economy. But estimates from South Africa which has a relatively affluent e-commerce experience indicate that e-commerce is set to grow and generate a total of US 1.1 billion by the end of 2000 in South Africa only which is a significant leap from USD 84.7million in 1997. This figure is expected to reach a high of 4.1 billion USD in 2005

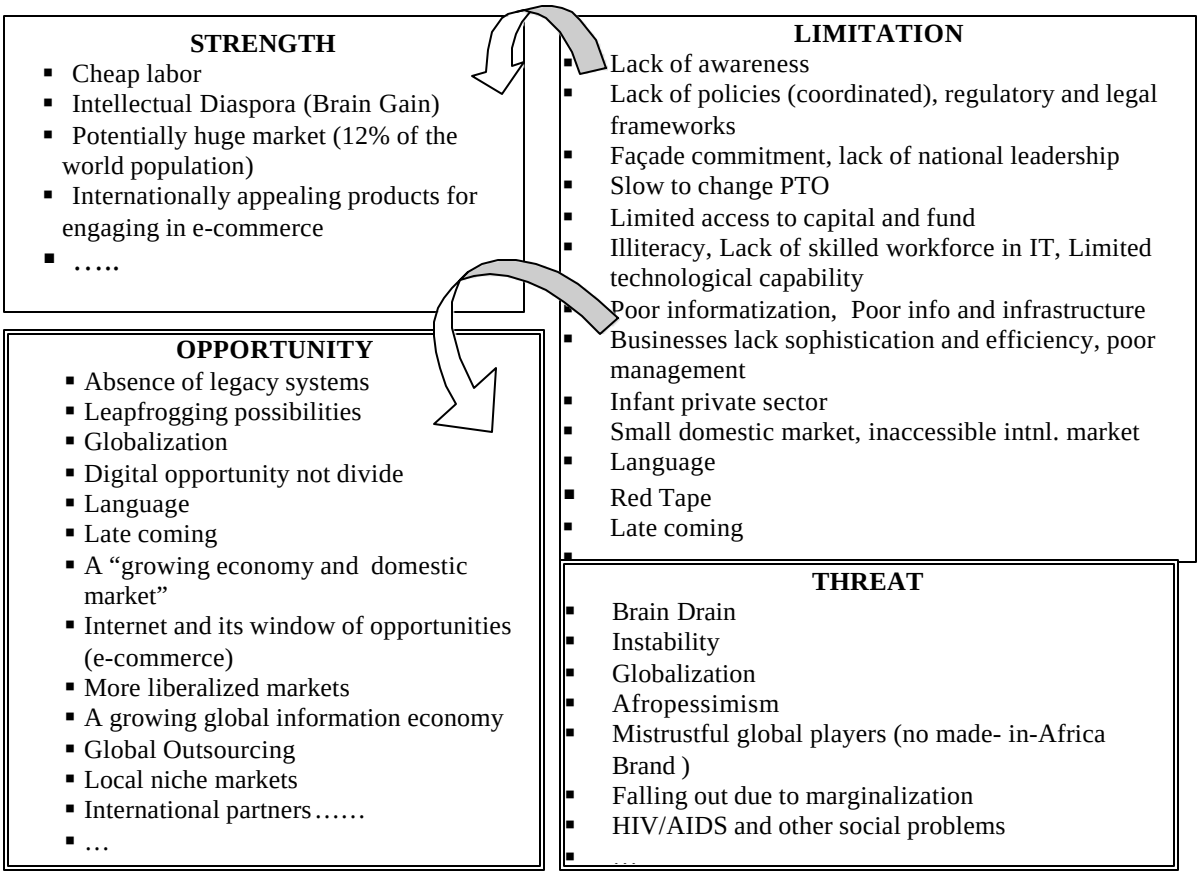
- The role of institutions in general and that of government in particular is very crucial for the development of the information economy and rather than an either government or private sector approach, best results are obtained when the two forge strong partnership and alliance.

CHALLENGES AND OPPORTUNITIES OF INFORMATION ECONOMY IN (FOR) AFRICA

Information economy does provide a window of opportunities in terms of

- Hardware (assembly- gradually builds the technological capability)
- Software (niche domestic market for application solutions due to language, tax and regulations)
- Professional services (pride in made in Africa consultants)
- Content production (the content market is untapped and Africa is still dependent on foreign sources from text books to news)
- Telecommunications services (Mobile service provision (both in urban and rural areas (following the Grameen model), running telecenters for business, internet service provision)
- E-commerce (teleservices and opportunities due to WAP)

The following diagram summarizes the opportunities and challenges of information economy for (in) Africa



THE WAY FORWARD

The AISI's vision, which is subscribed by African countries, is set to lead the continent to a sustainable information society by the year 2010. The current trend of encouraging aggressive use of ICT without an equivalent recognition and development of the information economy sector might lead to trade deficit problems as Africa continues to depend and pay dearly on hardly earned foreign currency from the black box to the skill needed to implement the black box. Being an information affluent society requires mutually reinforcing relationships between being an effective user and a capable producer. Rarely does one exist without the other. The following are outlined as major challenges that should be considered on the way ahead by African policy makers and researchers.

THE AWARENESS CHALLENGE

The information economy, its nature, structure, composition and benefit are not well recognized. There is too little policy appreciation of the value to be obtained from this emerging economy. Hence,

- Recognize the size, impact and importance of the information economy
- Recognize the role information and communications technology plays in the economy
- Recognize the importance of the information economy sector (the information industry) on its own right
- Recognize the supporting and enabling role the information economy sector (information industry) plays in improving the competitiveness of the other sectors of the economy
- **Launch sectoral, and national awareness programs on the whole aspect of the information economy**
- Promote local, national, sub-regional and regional economic learning on ICTs
- **Implement a holistic national information economy policy and strategy**

THE LEADERSHIP CHALLENGE

Experiences both from the developed and developing countries indicate that a robust government involvement in various ways is instrumental in the development of the information economy. African governments must provide leadership and lead the information economy by example.

- Move from solo dancing (sporadic initiatives) to opera (a coordinated activity of information economy that cut-across traditional ministerial levels)
- **Appoint a high level position for coordinating the national information economy activities (at ministerial level)**
- Conduct a national assessment of the information economy, its size, past and future trends and set the scenarios in terms of opportunities, challenges, and current (or easily attainable) strengths and set short-to-medium and long term goals for realizing opportunities
- **Set aside an information economy development fund to implement major opportunities identified**
- Promote the establishment of SMME's in the mainstream information economy sector and assist and guide in consortium formation
- Drive the application of information and communication technologies across government
- **Leverage the development of the local information economy through government purchasing**
- Protect locally produced software from piracy, eliminate pirated software from public institutions (especially locally produced software)
- Create an enabling political, legal, and institutional setup

THE INVESTMENT CHALLENGE

Except in a few cases (such as telecommunications, mobile and Internet services), it might be difficult to attract large-scale foreign investment in information economy in Africa. Africa's poor FDI performance, however, may not necessarily be because of unattractive return on investment but rather it is to be blamed to the lack of investment protection and security issues. A UNCTAD study indicates that returns from investment in Africa are three and two times more than the average returns attained in South America and developing countries respectively. However, without investment in the production, distribution and application of information and communications technologies, developing the information economy and society will be very challenging.

- Establish a preferential treatment for investment in the information economy
- **Lead the investment attraction in this sector at the highest level of government involvement by lobbying, establishing contacts, and encourage and support their realization**
- Provide investment security and guarantee and institute a reliable exit and dispute resolution mechanisms
- Reduce the complexity and bureaucratic requirements of investment licensing

- **Encourage local ICT investment and provide market guarantee such as exclusivity period, government sales guarantee, etc**
- **Encourage the development of venture capital. Assist ventures by providing business planning, entreprenuership, project management , marketing and other related training**
- Provide taxation incentives both on input and final outputs of the information industry
- Provide incentive and create mechanisms to attract the participation of the Diaspora in local investment
- Revise tax and general business rules that irk investment

THE INFORMATIZATION CHALLENGE

The use of ICT besides improving the productivity, performance and competitiveness of the economy and social players can also create local demand, which is one of the factors that determine competitiveness in the information economy. Hence, encouraging and empowering local use of ICT can provide a double edge advantage.

- **Increase the ICTs awareness of local economy players**
- Encourage and recognize innovative applications of ICTs and help in instituting mechanisms to spread best practices
- Create a national demonstration and help desks to assist SMMEs in ICTs choice, implementation and maintenance. If possible, provide motivation to encourage SMMEs' use of ICTs through various mechanisms
- Facilitate, support and encourage e-commerce applications through establishing appropriate frameworks, removing hurdles and leading by example
- **Accelerate improving the information and communications infrastructure**
- Encourage the development of low cost access technologies for addressing the need of the rural majority
- Coordinate and promote rolling out multi-purpose community centers using low cost access technologies and encourage those involved in this line of business
- **In the long term institute a directive that can require organizations to use certain minimum applications of ICTs in their engagement**

THE EDUCATION AND TRAINING CHALLENGE

In the Information economy knowledge is elevated to become the most important source of sustainable competitive advantage. Nations should turn to the cultivation of human capital athwart and cut to a bare minimum unproductive military spending. Schools and not Su 27s and Mig 29s should be the priority of Africans.

- **Institute compulsory courses in information and communications technology as early as possible into the curricula**
- Encourage local hardware shops to collect-refurbish and rollout computers that are gathering dust in most offices to high schools and elementary schools, at least where there is electricity, so that students will get exposure at an early age
- Ensure that tertiary education curricula reflects changes in the global environment
- **Expand tertiary level information and communications technology education**
- **Establish specialized institutions (like the Egyptian Information technology and South African software development institute) to prepare young cadres for the information economy in collaboration with the local private sector and other international institutions**
- Encourage, recognize, accredit and certify private institutions involved in high level ICTs training
- **Set requirements and (social) obligations for organizations to provide ICTs skills to their staff and provide incentive and motivation.**
- Institute distance, flexible and life long learning mechanisms

THE GLOBALIZATION CHALLENGE

- In all dealings with multi or bilateral agencies, to the extent possible, to the extent that Africa can bargain, follow a policy based on reciprocity, i.e., not giving away any advantages without gaining something in return
- Be selective with WTO dealings

THE RESEARCH AND DEVELOPMENT CHALLENGE

Policy makers need to understand the tsunami of changes that are either caused or enabled or facilitated by ICTs and by the emerging information economy. The vision of the African information society could be bring to fruition if appropriate policies and institutional arrangements are in place to harness key ICTs and skills

required for the socio-economic development of the continent. Future bases of competitiveness and Africa's role in the global economy urge us to attend to this issue as a matter of high importance. The effort to build an ICT capacity should be twined with a no less effort of promoting research in the area. Research could be instrumental at redressing the lack of indigenous capacity in the design, production and use of ICT. The research and development challenge ranges from establishing and setting appropriate policies and institutional frameworks to identifying research areas, prioritizing them, ensuring their conduct and dissemination of findings.

Policy and Institutional Frameworks

In terms of policy and institutional frameworks

- Establish national institutional frameworks that encourage innovation in information economy and that involves all the stakeholders (especially the private sector)
- Forge partnerships with the private sector in research and development, institute cost sharing mechanisms through matching fund arrangements and set aside national fund for research and development in ICT
- Ensure that research outputs have industry focus and leave the shelves of researchers
- Bridge the sharp schism that exists between the research institutions and practitioners so that research findings will not age on the shelves of researchers
- Encourage regional (and international) collaboration in research and development and provide the necessary institutional framework and political support for the success of such collaborations
- Cooperate and not compete in attracting international research funds
- Create mechanisms to convert the brain drain to brain gain
- Create centers of excellence in IT and recognize and award best results
- Provide incentive in the form of tax breaks for the private sector's research and development expenditure

Research Areas

Regarding research areas, priorities might depend from country to country reflecting existing researching capability and future goals. Major categories of research might, however, include: product and process development research, application research, and market research

Product and process development research

The status of this research will determine whether Africa is going to continue on downloading and being dependent on imported technology only or whether it has a chance to play proactively in the global information economy. The research in this category might range from basic research with limited application potential to the ones with immediate payoffs. Considering Africa's situation; its by and large limited researching capability and its priorities, basic research might not be a feasible way to go and research needs to be focused on those with short to medium term payoffs. Following are some potential areas

- Development of low cost access technologies to address the majority of the rural community
- Software and user interfaces development research
- Appropriate models and processes for e-commerce, community telecenters, public information points, distant education, telemedicine, teleservice, etc
- Designing, producing and packaging contents-glocalization- with multimedia focus
- Designing and developing mechanisms to utilize African indigenous knowledge

Application research

Africa's experience with information technology is little investigated. What are the impacts of the information technology on the workplace, work environment, organization (business or otherwise), industry, nation, region, etc., are not well known. By the same token, the impacts of the African culture, business environment, political setup, etc., on the development of the information economy and the implementation and use of ICTs are yet to be researched. Learning institutions and policy makers are starving for African success and failure case studies. The application research might help to unravel information in these areas and include the following in no significant order

- Analysis and synthesis of government, community and business information and ICTs and ICTs and information related literacy and training needs; identification of application areas.
- The impact of ICT on the worker, work environment and work place, human computer interactions and behaviors in the use of electronic media
- Use of ICT in improving business and government service delivery, in fighting corruption (at least the petit ones); in curbing red tapes
- Security issues related to viruses, electronic fraud, hacking, privacy, etc

- E-commerce applications
- Political, organizational, social, cultural, psychological, legal, regulatory, traditional, etc., issues in the application and use of ICT in government, organization, community and family
- Ethical, moral, legal and gender issues in the application and use of ICT
- Longitudinal studies of ICT within organizations, government and the community
- Use of advanced practices such as smart cards application
- The application and use of indigenous knowledge
- Use of community telecenters and public access points
- Globalization and the emerging information economy and their impacts nationally, sub regionally and regionally
- Case studies in all the above areas

Market research

One of the biggest challenges in Africa is lack of information about the African Market. Market research will help to prove the business case, attract investment capital, and reduce the effort required by investors and operators. This information serves as a plank from which policies and future plans could be made. It also enables national authorities to address factors that interfere with more effective practices for developing human resources and this will unravel facts and systems for the measurement and recognition of skills and abilities.

Modalities for the Implementation

The modalities for the implementation of the various research might include the following

- Ensure national policies (such as a science and technology policies or information and communications technology policies) do have adequate provisions for promoting research in the information economy
- Identify core institutions, evaluate and assess their capabilities, provide the necessary strategic orientation and build their technological and researching capability in partnership with the private sector
- Form an African Information Economy Research Consortium whose main purpose will be to coordinate and facilitate collaboration between core institutions so that repetitions will be minimized and research outputs disseminated. In addition, the consortium will facilitate international collaborations.
- Identify key Diaspora research capabilities and enlist them within the council and twin them with core institutions
- Agree on short to medium-long term research plans and frameworks and let the right hand know what the left hand is doing
- Seed- back research findings to policy makers and educational institutions to ensure economic learning from within
- Introduce home grown research degrees to build researching capability
- Establish a peer reviewed Electronic journal for publishing research outputs and institute An African IS/IT tribe par the “IS world” to collaborate on research and other issues.

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1. INTRODUCTION©

In March 2000, after visiting an African village (*Lalibela, Ethiopia*), the editor of the Red Herring Magazine[1], contends the somewhat popular orthodoxy of the role of information and communications technology (ICT) to development and argues that ICTs would not make a difference to developing countries like Ethiopia. He went further and notes that two things are wrong with the "triumphalist millenarianism" thought of poor countries leap-froging certain stages of development and "take their place in a global economy". One, he argues, "it is at odds with the reality of life in a very poor country" and two "it is at odds with economic theory". Hence, he concluded, what poor countries need is education, health, water, food, roads, foreign investment, political liberties, etc., and not information technology[2].

The above editorial stirred vociferous responses and vehement discussions mostly from and among Ethiopians at home and in Diaspora. But in his recent (June, 2000) counter response, the editor maintains that he "remains unconvinced" what information technology can do for poor countries and went on to state that "[*poor countries*] wouldn't know what to do with technology even if they could afford it" [3](emphasis not in the original).

This episode is typical of the challenge and debate that developing African countries are facing in today's fast changing global information economy. Though one can deprecate the above argument from both theoretical and philosophical vantage points, the basic question is a question that keeps haunting regularly the majority of people that are involved in this discourse. What does the Information Economy (IE) mean to Africa and African countries when in fact the same is juxtaposed with the urgency to provide the services that the Red Herring editor listed as priorities?

This paper doesn't attempt to provide an authoritative answer to the above challenges and to the gamut of issues that surround these questions. For one thing, there might not be an unequivocal answer or to use Einstein's words "even if the question is the same, the answer is different every year"[4]. For another, to do as such for the entire continent of Africa is a mammoth task that can't be achieved by a short paper designed to stimulate discussion. Hence, the purpose of this paper is to raise issues of information economy in Africa, provoke discussions and spark debates. The paper functions as opening up a series of questions rather than answers to the many challenges and of course opportunities of information economy for and in Africa.

The paper is organized in seven parts. The next section provides a brief background of the information economy and part three the conceptual framework for information economy. In part four the foundations of information economy are outlined followed by part five which assesses the status of the global and African information economy. The opportunities and challenges of the information economy in Africa in part six will lead us to the last part which highlights some policy directions and research issues.

♥ I would like to acknowledge Eliane Mwamuka for her generous assistance while preparing this material.

2. BACKGROUND

The industrial revolution brought a tsunami of changes in the global socio-economic and political landscape. It marked the gradual shift of both global society and economy from an agricultural basis to that of industrial. However, such transitions are hardly noticeable in most parts of Africa. Rather, for Africa the period marked an era of relegation and alienation to the periphery of the world system through forces both internal and external to the continent. As a result, the continent is a home for almost all of the very poor but highly indebted[5] countries. The majority of its inhabitants are living without access to basic education, clean drinking water, basic health facilities and at times even shelter and food[6]. HIV/AIDS is already causing a major social and economic calamity[7].

It is within such wide disparity in social, economic and human development (see as an example Table 1[8]) that the global environment is going through another revolution- the information revolution (Saxby, 1990; UNDP, 1999). At the peril of being a "terrible simplifier", this revolution is motored by the advancements in information and communications technology[9] and the innovative applications of such technologies in business and development practices.

Table 1: Distribution of the Ultra Rich By Region, 1997

Region	Th e225 richest people	Combined wealth US (US $ B)	Average wealth (US $B)
OECD	143	637	4.5
Asia	43	233	5.4
L. America & Carib.	22	55	2.5
Arab States	11	78	7.1
Eastern Europe	4	8	2.0
Sub-Saharan Africa	2	4	2.0
Sub-Saharan Africa excl S. Africa	-	-	-

Source: ***Forbes Magazine, 1997 (In UNDP/HDR, 1999)***

The information revolution is a global wave. It affects all countries and respects no boundaries. It permeates all dimensions of economic, social and political activities and touches social institutions, perceptions and thought processes. It is changing and challenging most of the century old traditions, assumptions and axioms of doing business, wealth creation, work organization, production philosophy and development. This on-going shift[10] and the nature of the emerging economy has many names: a post industrial economy, innovation economy, a knowledge economy, a network economy, an information economy, the digital economy, E-conomy, the new economy, etc. Whatever terminology one may prefer to describe this emerging and expanding[11] economy, the basic characteristics somewhat remain the same, that is an economy being driven by creating economic values through the production, packaging, transaction and consumption of knowledge (information) and knowledge products and the whole range of technologies to handle, process and communicate those products.

The information economy (IE) (to be consistent with the theme of this workshop, we will use this term) is full of promises of economic empowerment, leap-froging certain stages of development, equitable participation in the global market, economic growth and better and improved quality of life. Cases from Singapore, Malaysia, Korea, Brazil, India, etc., also indicate that, for those that are "ready", the economy does in fact pay handsomely. Does Africa have a place in the global information economy? What is the state of affairs of this economy in Africa? What are its effects, challenges, opportunities and impacts? Do we see evidences of John Naisbitt's paradox of "the bigger the world economy the more powerful its smallest players " working in (and for) Africa? Is Africa "down loading" only or does it have the chance to "upload" as well (to borrow President Obasanjo's words)? Little is known in

the form of formal research to sufficiently address the above questions. The purpose of this paper is hence to raise those and other issues of information economy in Africa and provide the stimuli for discussion. The paper doesn't promise to cover all the issues with the detail one may expect. Instead, we intend to focus on some pertinent and general issues and expect the workshop to develop and augment them with the necessary details.

3. CONCEPTUALIZING THE INFORMATION ECONOMY

Despite much hype both in the academic and popular media about the shift to the global information economy and the euphoria following the boom in e-commerce and e-business undertakings, no dominant analytical framework has emerged on how to define and understand the overall structure of the information economy. In addition, a rich intellectual debate is raging on what terminology to use to describe this emerging economy. Information economy, digital economy, knowledge economy, internet economy, e-conomy are some of the candidates and are in use sometimes synonymously and at other times with profound conceptual differences. This paper doesn't intend to bring that intellectual feud here but rather uses the term information economy and provides a conceptual framework that is robust enough to address most of the concerns.

We believe that the first step in attempting to define the information economy should be to build a conceptual framework and taxonomy that is complex enough to provide a practical and comprehensive conceptualization. We argue that it is relevant to view the information economy from two angles. One as a metaphor to describe the ongoing general economic and social transformation that follows the panoply of (information) technology developments and their innovative and pervasive applications in all sectors of the economy and two as an economic sector that has its own value-adding components and a complete structure. These two views are yoked together in that any framework that intends to explain the information economy needs to have the robustness to address both. This paper, however treats information economy mainly not in its metaphorical sense but in its sectoral (for the lack of a better term) sense.

Information Economy?
.
What is ECA's definition of the information economy?
What are the implications of such definition to statistical practices?

Industrial production and agriculture will continue as long as humans need food, housing, shelter, clothing, mobility, etc. But the convergence of content, computing and telecommunications has created a new economic sector[12]- the information economy sector. This sector, with an annual worldwide market value of more than 1632.85 billion USD[13] (according to EITO, 1999), is the fastest growing sector (growing at an average rate of 10% per year). It is also attributed as one of the causes for the success in the economic performance and relatively faster development of countries like Singapore and Malaysia (see Wong, 1998 and Raman and Yap, 1996).

What constitutes the structural decomposition of this sector is subject to many interpretations and analyses. Following the early conceptual foundations of Machlup (1962) and Lamberton (1971), two sub sectors: the primary information sector which consists of transactions on information goods and services markets and the secondary information sector comprising of "in-house" information and information services production were emerged (Wong, 1998). This however was a rather broader conceptualization of the information economic sector and as a result subsequent works (see the US department of commerce, OECD and Ribnson, 1996) have dropped the notion of the secondary information economic sector but differ in what constitutes the primary information sector. For US department of commerce the sector constitutes the production of electronic manufacturing, software and IT services, telecommunications and broadcasting/cable TV services, while Robinson (1996) considers computer and communications hardware and software only. OECD's understanding excludes the content industry and focuses on the processing, transmission and display of information

but still treats IT and communications services industries separately (OECD,1997). UN Economic Commission for Europe considers semiconductor industry, computer industry, software industry, telecommunication equipment industry, and telecommunication services.

More recently, following the growth of internet and e-commerce, there is also an attempt to define the internet economy and e-commerce as a complete economy with characteristics such as inputs, outputs, size, value added, efficiency and labor productivity distinct from the other sectors of the information economy (Barua and Winston, 2000)[14]**.** But some contend the notion of the Internet economy and argue that it will be impossible to talk about such a thing as the Internet will be so much a part of daily life that it will make as little sense to talk about the Internet economy as to talk about the telephone economy (Cohen et al, 2000). Predictions are that Internet will emerge as a global market place networking both small and big economies in all sectors and from all corners and there will be no slice of the economy that can be carved out of the rest and assigned to the Internet.

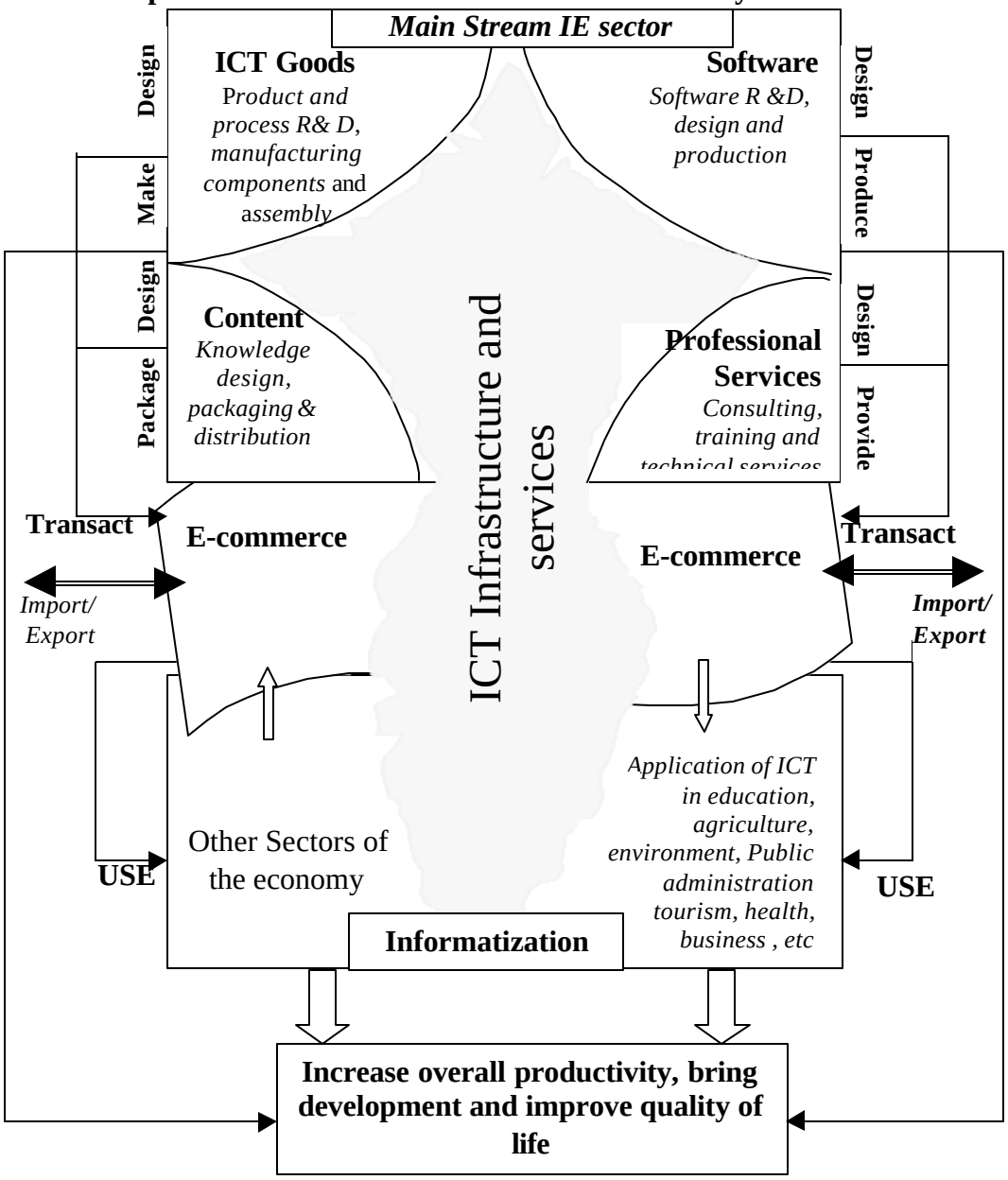
The information economy sector is an evolving sector and continues to be redefined and refined as information technology makes possible new forms of business. Internet and e-commerce beside improving the efficiency and convenience of existing businesses have spawned entirely new families of business that can fall within the information economy sector. Portal services like Africa online, trust intermediation, certification, the whole range of Internet and e-commerce service providers are few examples. Hence, attempts to define the information economy sector need to be parsimonious enough while at the same time allowing some flexibility. Through synthesis of works that have hitherto been conducted (1); taking note of the convergence of computing, telecommunications contents and professional services (2); and (3) following Wong (1998) we conceptualize the information economy to include the following: (1) the design, production and distribution of information and communications technology (ICT) goods, (2) the development and operation of network backbones and infrastructure and other telecommunications services (3) the design, production and distribution of software packages and application solutions (4) the design and provision of professional services (5) the design, packaging and distribution of contents (6) e-commerce related activities and (7) the informatization of the economy and society through the use of ICT. The framework in Figure 1 attempts to indicate how these components are yoked with each other and with the physical economy.

The main stream IE sector, i.e., the side that focuses on the design, development and movement of information and communication goods, products, infrastructure, contents and services and the corresponding benefits to an economy in the form of jobs, value added, trade balance and competitiveness is the least recognized and motivated in Africa. Most discussions in Africa seem to focus on the informatization, i.e., the application and use of ICTs only.

The “informatization” of every sector of the economy (including the information economy sector itself) and the social and economic transitions and transformations that would be possible due to the innovative applications of the technology in business organizations and practices is however only one side of the information economy. The level of informatization is essential to both the main stream information economy sector and to the rest of the sectors of the economy as it defines both the environment and domestic demand. The composition, size and pattern of growth of the domestic demand is critical both to the growth and success of the information economy. Despite globalization which is posed to render local demand as insignificant, Porter (1990) after investigating more than 100 industries in 10 different

countries (some of the industries are in the information economy sector) has found evidence that local demand conditions had some influence to success and competitiveness.

Figure 1: A Conceptual Framework of the Information Economy



In addition, the informatization of the society and the economy has already become one of the development indicators of a nation and region. Telephone and computer densities and access to Internet and contents are used in the World Bank and UNDP reports to indicate the development level (information economy) of a country and region. The information economy breakout session of ADF 1999 with the theme "Toward an African Information Economy: Indicators and Benchmarks" for example has focused its discussion on this side of the information economy and did not attempt to include the production side of the equation.

However, it is both the development of the information economy sector and the informatization of the whole economy that define the structural composition of the emerging

information economy and the two form mutually reinforcing relationships and rarely does one succeed in isolation from the other. We believe that the above analytical framework can be used to provide a comprehensive view of the value and changing role of the information economy. It indicates (1) the horizontal structural composition of the information economy (2) the generic value-adding chains that contribute to the overall economy and (3) the role of networking that provides the conduits and platforms for the functioning of the information and physical economy sectors, sectorally speaking and in the emergence of the information economy as a whole, metaphorically speaking. Plus, the strategic routes of progressing in the information economy based on global, regional and local realities and the need for the convergence of policies and initiatives of improving the information economy and following a holistic approach could also be seen from the framework.

In addition, the information economy (in both its sectoral and metaphorical senses) demonstrates some salient features (see box). These themes of the information economy indicate how the forces of globalization, digitization, network, innovation and knowledge together form the structure and nature of the emerging information economy. The fate of developing African countries in this emerging information economy is an issue that attracted a bevy of debates and discussions. Recommendations and should dos and don'ts are opulent, one need only search the ECA database to prove this. However, the bulk of the discussion (excepting telecommunications) has hitherto been focused on the issues, problems and challenges that African countries are facing to improve the low rates of ICT ingression in their economy (informatization) and seems to undermine the value-adding opportunities and challenges of the information economy sector.

Mega Themes of the Information Economy[15]

- The information economy is a knowledge economy
- The information economy is a digital economy
- The information economy is a networked economy
- The information economy is a global economy

Whether it is by accident or it is a forgone conclusion that Africa doesn't stand a chance of plugging into the global information economy as a supplier, at least for its own domestic demand, little is known on how the African information economy sector is performing. This is in contrast to discussions and research elsewhere in other developing countries. The main conceptual question to be addressed at this level, hence is that in the face of global competition and internationalization of market and considering the extant realities of African countries, does it makes sense to spawn an indigenous information economy sector?

The Dilemma!

In the face of global competition and internationalization of market and considering the extant realities of African countries, does it make sense to spawn an indigenous information economy sector?

We support the argument that some form of local information economy capacity is vital for economic development as the future is set for such type of economy. In addition, it is a commonly accepted notion that if one can afford it, there can not be better alternatives and there can not be better options for countries to ensure development than relying on indigenous capacities. Building local information economy capacity besides contributing directly to economic growth and enhancing competitiveness of the overall economy, may have the effect of attracting foreign investment due to path dependencies. That is, once an initiative is

launched to create an ICT industry it is more likely that others will follow. The task is a very daunting one and the chances of success may seem very slim but it is worth recognizing and exploring as total dependence on imported ICT (black box and skill) may result in unfavorable trade balance. At micro level, we have the case of the Grameen Bank, which has progressed from food security to software production in 10 year period, to support our argument (see Table 2).

Table 2: From Food Security to Software Export: Grameen's 10 year progress

Grameen Softwares Ltd. **1999** Develops computer software for exports	**Grameen Cybernet** **1996** Leading provider of internet services in Bangladesh
Grameen Communications **1997** Provides IT training and communication services to the rural areas	**Grameen Motsho (Fisheries) Foundation** **1994** Undertakes production, transportation, storage, and marketing of fish.
Grameen Phone **1996** Nationwide GSM cell phone network	**Grameen Bitek** **1996** Manufactures and markets electronic products
Grameen Telecom **1996** Connects village cell phone operators to the national network	**Grameen Krishi (Agriculture) Foundation** **1988** Promotes self sufficiency in food production and food secruity for the rural poor
Grameen Shakti **1996** Markets renewable energy products	

Source : www.grameen-info.org/dialogue/cover.htm (Accessed, March 24, 2000)

The following section discusses the foundations of the information economy. In addressing these foundations we are not hoping to bring a fresh case and all the issues my zero around Africa's poor economic performance and its underdevelopment. Our intention rather is to bring to the forefront and shed some light on the thus far ignored aspect of the information economy and outline future research areas.

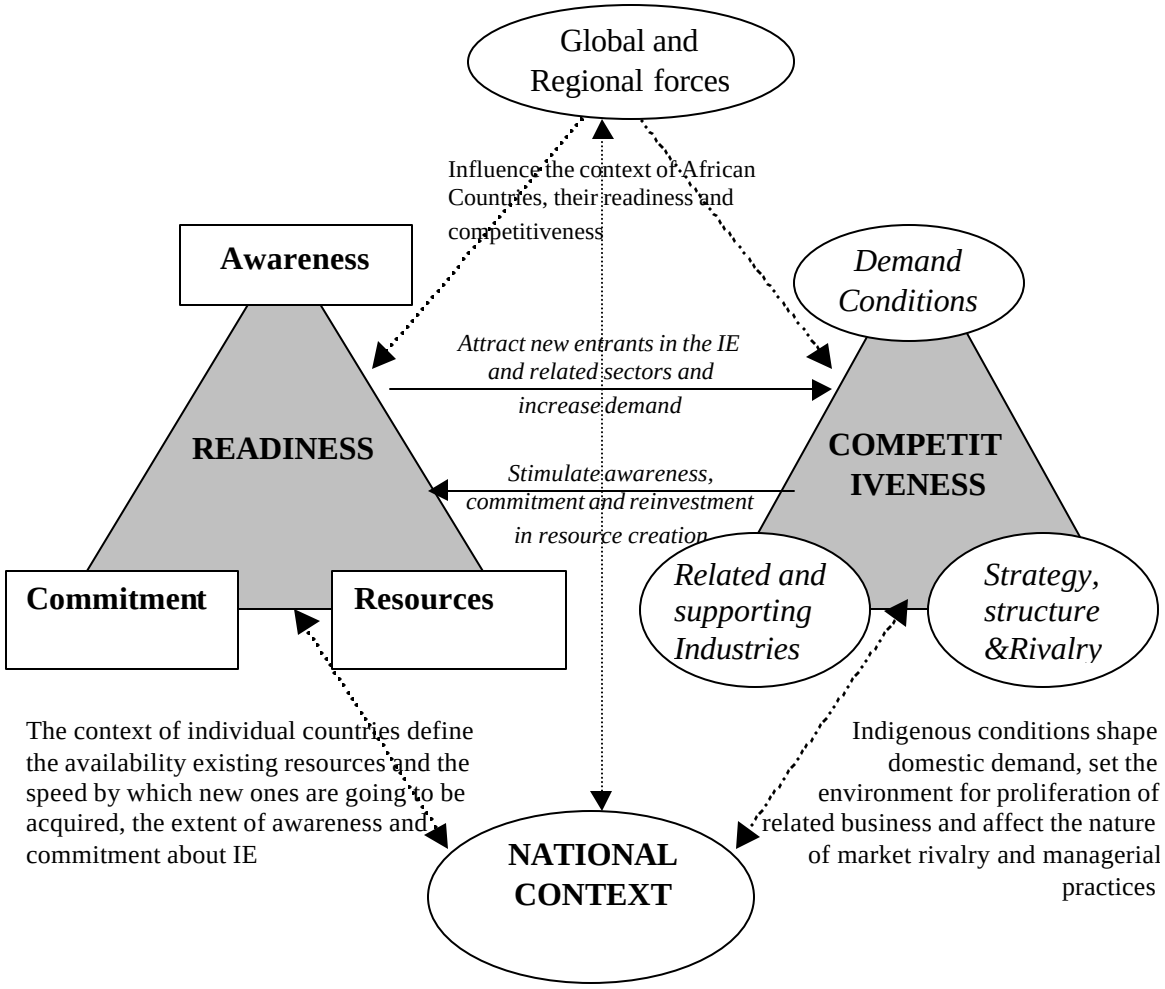
4. FOUNDATIONS OF THE INFORMATION ECONOMY

The literature is replete with rising optimism about the contributions of ICTs to economic and social well being of developing countries. Following such popular beliefs Africa is urged to implement a strategy of pervasive ICT application. Even if the possible contributions of ICT implementations to development can't be deprecated and the conceptual framework provided in Figure 1 captures such strategies as one option of hooking in to the information economy, such strategies in the long run must lead to a more proactive role of Africa in the emerging information economy. In the long term, the strategy should focus on "innovating" rather than "borrowing". It is only the adoption of innovation oriented strategy that can generate the required social behaviors and learning that are instrumental to the transformation of a social system towards higher states of improvement. It is crucial that the long term information technology strategies of African countries should focus on making the technology home grown, socially constructed element and not something alien and imported from elsewhere that is often perceived in conflict with the embedded values and norms. Such innovation-oriented strategies will cultivate an innovation oriented social system that can better assimilate the technologies and the corresponding benefits. In this line, we second Perez's argument that " *a real catching up process can only be achieved through acquiring the capacity for participating in the generation and improvement of technologies, rather than in the simple use of them"* (Perez and Soete, 1988: 459).

So the question is what does it require to participate in the generation of the information economy sector? Social, political and economic differences of individual African countries are at times so profound and every country could be a special case. In the sense that no specific country can become a model for another country and yet there is much to learn from the experiences, success and failures of others. In addition, in the sense that the information economy sector is the reflection of the level of the socio-economic development of a country and is related to the other sectors of the economy, the forces that define the development, survival, competitiveness, success and failure of the other sectors do also affect this sector. Hence to reduce the peril of repeating the discussion elsewhere and to see the arguments in perspective a framework for the foundations of the information economy is provided here (Figure 2.). This framework introduces the concept of readiness and draws from the competitiveness model of Porter (1990).

Using the framework in Figure 2, the foundations of the information economy could be analyzed from the readiness and competitiveness perspectives subject to the influences of the national, global and regional forces at macro, meso or micro levels. While readiness defines the basic requirements, competitiveness addresses the sustainability and continued performance of the sector nationally, regionally and globally.

Figure 2: Foundations of the Information Economy



4.1. READINESS

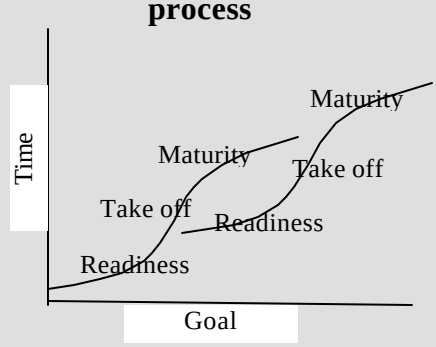
We developed the notion of readiness from the military and sports world. In Military science readiness is defined as

> *"the development and organization of a military machine with all its corollary, i.e., the quality and quantity of the military personnel, as well as the military hardware including logistics and communication network. Organization includes the ability to provide strategic leadership with supreme confidence….Quality includes the organizational readiness of military leaders and the acceptability and rational of their orders… It is a great psychological motivator' (Wondimu, 2000).*

In the sports world both FIFA (despite its dirty politics that become apparent in connection with the 2006 bid[16]) and IOC (International Olympic Committee) use readiness assessment to determine which of the competing countries and cities are capable of hosting the world cup and the Olympic respectively. In addition, participating countries and teams either in these two events or in any sports competition spend time, resource and energy to prepare themselves and be "successful". More often, poor performance is related to lack of readiness and preparation. Both in the military and sports front, readiness is affected by the extant realities of the respective countries.

Using the metaphor from the military and sports world, readiness is a goal directed continuous process, which is moving upward following the shift in the goal and previous accomplishments. In addition, readiness doesn't necessarily mean having all what it requires initially but rather defining a goal and moving incrementally and slyly up the chain. Following is a brief description of each of the components of the readiness pyramid in Figure 2.

Figure 3 : Readiness: a goal directed continuos process



4.1.1 Awareness

Awareness is one of the crucial foundations in information economy. In general, little is known about the information economy sector in Africa. Awareness shapes customer expectations, the sophistication and style of competition and also local demands for innovation and improved working practices. Lack of awareness about the potential benefits of information and communications technology is often mentioned as one of the chief problems in the implementation of ICT in African countries.

The private sector in Africa is at its infancy and mostly is constituted of survivalist and micro businesses. For example, it is estimated that this informal sector constitutes 75% of the work force in non agricultural sector and contributes on the average 41% of the GDP in Sub-Saharan Africa and 27% for North Africa (Carr, 2000). Private sector big organizations are very few (see for example Table 3 for a South African case) and in some countries the big organizations (like Air lines, banks, telecommunications, power and water authorities) with appetite for ICT are under state ownership. It has been indicated that, due to their idiosyncratic nature small, medium and micro enterprises suffer from lack of awareness about the potential uses and benefits of ICT even in the developed world (see for example APEC, 1999). Such lack of awareness both on the private and public sectors affects the domestic demand and does not provide the motivation and insight for engaging in information economy activities by others. Hence, raising the awareness and understanding of both policy makers and industry players about the use of ICTs and the potential opportunities, benefits and returns of engaging in information economy activities is an important and crucial means in spawning information economy in the region.

Table 3 : The breakdown of private sector enterprises in South Africa (1995)

SIZE	NUMBER
Survivalist [a]	194 950
Micro [b]	396 450
Very Small [c]	164 600
Small [d]	63 600
Medium [e]	3600
Large	1400
Total	836 850

Source: South Africa Survey Book, 1999/2000

a No paid employee and include hawkers, subsistence farmers and vendors
b Turnover less than 150,000ZAR, up to five employees, include minibus taxis and household industries
c Less than 10 paid employees with the upper limit of 20
d Upper limit of 50 employees
e Maximum limit of 100 paid employees

4.1.2. Commitment

The development of the information economy sector requires a strong commitment and will for collaboration between the social and business institutions that define the economy. Especially, engagement in the higher value-adding activities requires a strong bond between the public and private sectors. Considering the nature of the private sector in Africa, and following the history of information economy development in other countries, emphasis should be placed on the commitment of government and the public sector and the role they have to play both on the demand and the supply sides of the game. Figure 4 provides a framework that describes how institutions including governments, international agencies, professional trade and industry associations, research and other social institutions affect the information economy.

Figure 4: Dimensions of Institutional Intervention

	SUPPLY PUSH	DEMAND PULL
INFLUENCE	**Knowledge Building** Funding of research, Projects **Deployment** Provision of education services **Subsidy** Funding development of prototypes Encouragement of capital markets to support R&D activity Provision of tax benefits for investment in R& D **Innovation Directive** Direct institutional operation of production facilities for innovation	**Knowledge Deployment** Training programs for individual and organizations to provide base of skilled talent **Subsidy** Procurement of Innovative products and services Direct or indirect suppression of substitute products and services **Mobilization**
REGULATION	**Knowledge Deployment** Require education and training of all citizens **Subsidy** Reduction in general liabilities for organizations engaging in innovative activity Modification of legal, administrative or competitive barriers to innovation and trade **Standards** Establishment of standards under which innovative activity might be encouraged **Innovation Directive** Establishment of requirements for investment in R& D by organizations	**Subsidy** Procurement support for products and processes that facilitate adoption and use **Standards** Require particular products or processes to be used in any work for the institution Require conformance with other standards that essentially mandate use of particular products or processes **Innovation Directive** Require that specific innovative products or processes be used at all times

Source: King et al , 1994

The commitment of African governments to influence and regulate both the demand and supply sides of the information economy is critical for the development of the information economy. The information economy sector development in the United States is a classic case where the government played a very significant and heavy handed role in both dimensions of Figure 4 (see Cohen et al, 2000). The government invested heavily in technology development and in the creation of a pool of highly trained scientists and engineers to facilitate the development of the sector. The semi-conductor (transistor) was developed at Bell Atlantic labs, which was then a heavily funded and subsidized research arm of the publicly regulated telephone monopoly. The first civilian application of computer (UNIVAC) also came from the government agencies like the Census. Following the Korean war, the military demand for more advanced computing is believed to have won IBM its first ever contract (worth in millions of US Dollars) of delivering a computer and further projects by the US military filled the assembly lines of computer manufacturers. Even the Internet was the result of a government-funded project.

In East Asia, Japan, Republic of Korea and Chinese-Taipei developed a very successful semi-conductor industry through extensive collaboration between firms and government (Dale, 1998). The governments of these countries (through their different arms) were involved in initiating the industry through public sector research institutes (as in Chinease Taipei) forming a research and development consortium, shifting government funds into the joint effort (Japan and Korea) and allocating different aspects of the work involved to different companies (Japan). The result is that all these three countries have developed a successful semi-conductor industry, now ranging respectively to second, third and fourth places in the world. Though one can not establish causality between the involvement of the state and the success of these countries, the role that the state played on both sides of the supply and demand dimensions and in leveraging the sector to new levels of technological sophistication can not be downplayed. This story of the commitment of the government to play an active role and its successful outcome is widely documented in the literature. The involvement ranges from market reserve in Brazil (Cassiolato and Baptista , 1996, Duncan and Krueger, 1994) to central planning of the sector in Malysia, Romania, and China (Raman and Yap, 1996; Grundey and Heeks , 1998; Heeks, 1998). From encouraging multinationals to invest in the IT sector as in the case of Singapore and Indonesia (Wong, 1998) to subsidizing and offering various incentives to encourage the development of export oriented information economy sector in India and Pakistan (Heeks, 1998; Nidumolu and Goodman, 1993; Hassen, 1998). In this respect even the debatable market reserve policy of Brazil and Romania, which was practiced at the expense of local customers are reported to have cultivated a very good information economy platform for latter liberalization of the sector in the 90's.

Nixing "Free Marketing" !

"…advocates of the free market approach are suffering selective amnesia. America built its IT industry on government money pumped in during critical early growth years in the 1940s, 50s and 60s. Those preaching market forces today do so only because their industry is now fully-established and because the market-only approach means more sales and less competition for US software products…developing countries should ignore the selfishly motivated calls of the free marketers and install a flexible but coordinated set of government promotional interventions." (Heeks, 1998)

Words of Caution !

Governments shouldn't overdo their Involvement. But then where is the bottom line? What type of government?

4.1.3. Resources

Resources are probably the most important dimensions of readiness and that of information economy. Though commitment and awareness affect the speed by which resources are to be acquired and developed, lack of resources frustrate managers and leaders who are advanced in awareness and commitment. Resources differentiate organizations and countries in fundamental ways (Collis et al, 1997, Porter, 1990) and affect the ability of value that an organization or country can create (Jarvenpaa and Leidner, 1997). Though there are different ways of classifying resources and the term can generically be used to represent a wide variety of other factors including for example commitment, when it comes to information economy, the most fundamental resources include technological capabilities, human resource, information and communications infrastructure and financing.

Technological capability can be defined as the compounded ability, skills and experiences of a society and other supporting processes and institutional efficiencies to undertake a broad range of tasks related to a given technology. The tasks depending on the level of maturity and technology affluence of the society might range from simple usage of the technology to that of innovative production. Following Grundey and Heeks (1998), a range of technological capabilities on the continuum of use to production could be identified. These include

- *Non production operational capabilities:* this involves activities like using and choosing the technology and training others to use the technology
- *Non-production technical capabilities:* refers to installing and troubleshooting the technology
- *Adaptation without production:* modifying the finished product to meet local consumer needs
- *Basic production:* copying technology, assembling technology, full production using existing products and processes
- *Minor production modification:* modifying the product and the production process during production to meet consumer needs
- *Production redesign:* redesigning the product and production process to meet local and regional/global consumer needs and transferring a production process to other producers.
- *Innovative production:* developing a new product and production process to meet local and regional/global consumer needs and transferring a production process to other producers.

The level and spread of technological capabilities related to ICT in a given society and/or easy access to the desired capabilities through import and other arrangements (such as "virtual alien") affect the development of the information economy sector. Such capabilities are at the nexus of the foundations and determine what the society can and can not do. Generally, the ICT related technological capability of Africa is limited to the first three categories in the above list, with few countries demonstrating levels four and five.

A plethora of information is available on the importance of ***information and communications infrastructure*** and we can not make a fresh case out of it. The information and communication infrastructure is both an "opportunity" and a "necessity" in the information economy. It is an opportunity in a sense that its development is part of the information economy and can attract investment. It is a necessity in that well developed, high quality, affordable and accessible info and infrastructure is at the nexus of the foundations of the information economy. Though the info and infrastructure provide a bevy of opportunities in the other sectors of the economy, the information economy sector has a special case on this resource. For example, it is difficult to run the software industry and e-commerce without a sizeable, reliable and pervasive telecommunications link both domestically and internationally.

Information economy draws heavily on well-trained and skilled ***human capital.*** Unlike some economic sectors, which can do somehow with semi-skilled and unskilled labor, the information economy requires a trained labor. Even the software industry, which is relatively characterized by "low skill", requires a graduate with in-depth technical experience. Athwart development of human resources with emphasis on the technical education is an important success factor. For example, the relatively large number of technical graduates (Mathematicians and Engineers), who were easily converted to software developers have given India an edge over other countries to exploit the global software market (both in the

form of body shopping, virtual alien and subsidy). In this regard, establishing national institutions, which are dedicated to producing ICT cadres, is an essential undertaking.

Financing start ups and expansion of existing firms involved in information economy activities will directly affect how well the opportunities of the information economy will be converted in to reality. High-value adding information economy activities require huge investment and funding in research and development activities[17]. This has to come either from government sources or multinational private investors or a joint partnership between the two. While Singapore owes its success in securing the finance to develop its information economy to the private investment from the multinational corporations, elsewhere in other East Asian countries the story is that of a government's involvement in financing the sector especially in high value-adding areas.

Low-value adding activities do also have their own financial requirements. However, the formal banking sector due to its tradition of non-risky business and collateral requirements may be out of the reach of many who want to engage in such information economy related businesses. As a result, the availability of other secondary sources of funds such as from venture capitalist, and other micro-lending services, like the famous Grameen Bank, is an essential motivator for the startup, promotion and growth of low level information economy activities. The availability, cost and maturity of stock and equity markets do also affect access to finance. The success of the US information economy besides heavy handed states involvement owes it in part to the emergence of the Silicon Valley as the leading innovation and IT financing plank.

The President's Entreaty!

"Money would help bridge a growing digital divide between the world's rich and poor. Unfortunately,… Africa appears as a sick person suffering continuous agony, constantly maintained through international aid,"

(Alpha Oumar Konare)

In addition to the above, the importance of other resources such as uninterrupted and stable power supply, and related services and the efficiency of the economy in general are relevant foundations for seeding information economy related business.

In general, the dynamics of the forces of readiness provide the basis and foundations for kicking off the information economy. But the sustainable performance of the sector in addition to readiness depends on the dynamics of the competitiveness forces and on the availability of conducive environments. As indicated in figure 2, the dynamics of readiness factors influence and in turn are influenced by the determinants of competitiveness. Following is a brief description of the competitiveness dimension[18] of the foundations of the information economy

4.2. COMPETITIVENESS

Reconciling the conflicting definitions of competitiveness is a major challenge as competitiveness is one of the central preoccupations of governments, international development agencies and academicians. There are some fundamental differences between the micro and macro economic analyses of competitiveness. Macroeconomic analysts and policy makers view competitiveness in terms of economic growth, health in the national economy, ability to attract investment, good governance and openness, labor market, infrastructure and institutional development, etc. Others like Porter argue that wealth is governed by productivity; and individual firms and not nations compete. Hence, having a conducive environment is a necessary but not sufficient condition and the drive should focus

on raising productivity and innovativness of the economic players. This paper does not intend to bring that feud here and for that matter both the approaches could be valid. Rather, here, to facilitate the discussion of the foundations of the information economy, we follow Porter's (1990) work and intend to cover the other environmental conditions that are required to ensure competitiveness under the influence of the context of developing countries as described in Figure 2. In this line we support Kalema (2000).

> *" a fundamental question is whether African business face unique competitive challenges, requiring African-oriented business strategies. Likewise, we need to examine whether African leaders must adopt African-specific policies to promote competitiveness. The author believes that the elements of competitive strategy and firm behavior are just as applicable in Africa as they are elsewhere. Therefore, firms and industry sectors need to master and apply these principles which have worked well for other enterprises in other countries. What is different about Africa, however is the context in which those universal principles have to be applied" (Kalema, 2000: 8).*

The success and growth of the information economy both locally and globally depends on its competitiveness. Porter (1990) defines the determinants that make firms competitive in his work and proposes a competitiveness diamond. These forces are interrelated and together form a dynamic system. Porter's fourth determinant (factor condition) is here treated under the readiness pyramid and hence evidencing the co-influence and mutual reinforcement between readiness and competitiveness. Following Porter (1990) the individual forces that define the pyramid of competitiveness can be defined as follows.

4.2.1. Demand Conditions

Demand refers to domestic demand for the product and services of the information economy. The informatization and computerization of the economy and the society will influence domestic demand. In the words of Porter

> *" Home demand conditions had some influence in nearly every industry we studied. While home demand, through its influence on economies of scale, can confer static efficiencies, its far more important influence is dynamic. It shapes the rate and character of improvement and innovation by a nation's firms. Three broad attributes of home demand are significant: the composition (or nature of buyer needs) of home demand, the size and pattern of growth of home demand and the mechanisms by which a nation's domestic preferences are transmitted to foreign markets. The significance of the latter two is contingent on the first. The quality of home demand…is more important that the quantity of home demand in determining competitive advantage (Ibid:86)*

4.2.2. Related and Supporting Industries

Related and supporting industries and their clusters refer to the economic players whose activities impact on the ability of the information economy sector to thrive and deliver value. Such clusters depend on the nature of the industry such as software, hardware, services and e-commerce that one has in mind. For example, for the software industry, the communications and infrastructure operators provide supporting services. E-commerce requires a sizeable computer base and accessible and affordable networks. In general, supporting industries in the information economy might include suppliers, communities of interest, higher learning institutions and technikons and value adding intermediaries. One striking remark here is that the information industry itself can serve as an engine and source of competitiveness to other sectors of the economy as it is becoming evident that most other sectors depend one way or

the other on information and communications technology. Porter describes the importance of the presence of related and supporting industries as follows

> *The presence of supporting industries … creates advantages in downstream industries in several ways. The first is via efficient, early, rapid and sometimes preferential access to the most cost-effective inputs…. Mere access or availability of machinery or inputs, however is not the most significant… [as]…inputs are available on global markets and availability is much less important than how effectively inputs are utilized….The most significant than access are coordination…innovation and upgrading (PP 102-103).*

4.2.3 Structure, strategy and rivalry

Structure, strategy and rivalry refer to the strategic decision and actions of individual firms involved in the information economy and the nature of competition among the firms involved in the sector. Developing dynamic capabilities through organizational level structure and strategy has been proved to contribute to the success of the information economy even when resource and contextual factors are adverse (see for example Javernapp and leidner, 1998). There is no universally appropriate management system and the way in which firms are managed and choose to compete is affected by national circumstances. As a result, parity between the management practices and modes of organization favored by the national environment and the sources of competitiveness strength in the sector needs to be maintained as part of a competitiveness strategy (Porter, 1990).

Both the pyramids of readiness and competitiveness and the individual determinants of the pyramids represent mutually reinforcing systems. The effect of one determinant is contingent on the state of others. Advantage through and between the pyramid is necessary for spawning a successful and sustainable information economy. However, the prevailing context of countries also affects both competitiveness and readiness. What is to be referred as context is subject to many interpretations but taking in to consideration the discussion hitherto and in view of relevance to information economy, three factors such as: political stability, culture and legal and regulatory frameworks deserve our call.

4.3. POLITICAL, CULTURAL AND LEGAL CONTEXTS

A stable political environment is no less significant than any of the factors discussed so far. In fact, it won't be an overstatement if it is to be argued that in a continent like Africa where the economy and the political systems are inseparable, stability is the *sine-qua-non* of development. Stability affects a nation's preoccupation, its commitment, capability to create resources, attractiveness as a destination for foreign investment, motivating domestic investment, continuity of development plans and policies, cultivation of human and social capital and almost everything else except instability. Stable political environment has widely been recognized as a requirement for the smooth diffusion

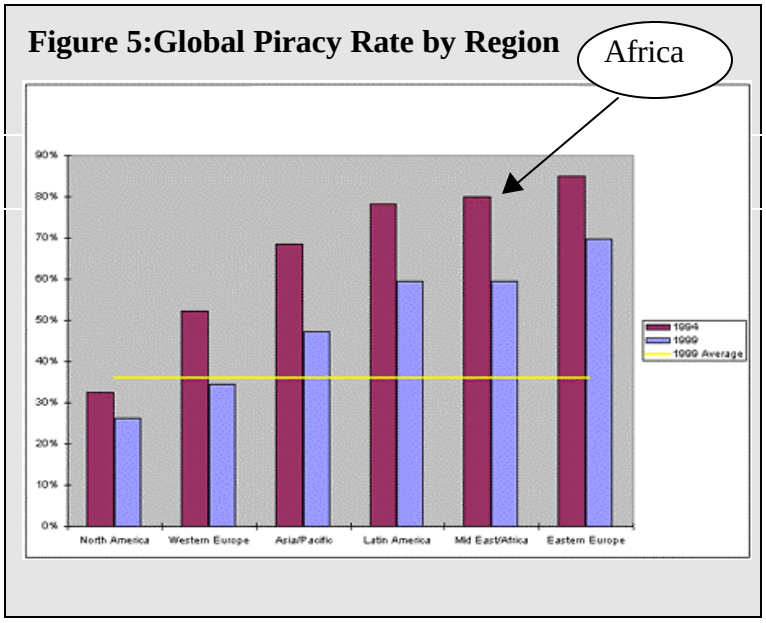
A Continent Bloodied By Its Own Children!
"...political instability led to a situation in which huge amounts of resources both monetary and human had to be diverted from economic development to maintaining the political status quo…A more direct consequences of this turmoil is that it disrupts national development plans as each new government that came to power had to go back to the drawing boards to hammer out their own workable economic strategy. This created a vicious circle in which very little development was being achieved and left the continent practically where it started. (Kasongo, 1993)

of computer based information systems (Adullah, 1999); for operating information centered business in developing countries (Javrnepaa and Leidner, 1998); and for achieving considerable success and development in the information economy sector (Raman and Yap, 1996; Wong, 1998). The recent African competitiveness report compiled by the Harvard Institute for International Development also indicates that stable political climate was the main determinant of whether countries moved up or down the league table.

Another contextual factor is ***culture***. Culture has been at the center of the debate for many discussions and is subject to a plethora of interpretations. Without going to the details of what to consider culture and what to not, we would like to address the most visible aspect of culture that may affect the information economy, i.e., language. Among the factors that make India as a favorable hub for the global software outsourcing market (both body shopping and virtual alien), the ability of its programmers to program in English is one. Companies based in the USA and Europe, including giants like Microsoft now depend on Indian programmers without language being a barrier. The software and content markets are highly influenced by the predominance of English language. Hence, the local demand for software could be affected by its ability to consume contents written in English. This could be a blessing in disguise, as it might, on the other hand, open a niche market and demand for locally produced software in a situation where English is not the language of the economy and serves as a natural protection to the industry.

Legal and regulatory frameworks do also serve as a foundation for the information economy. The future of e-commerce, for example is dependent on the robustness of the legal and regulatory frameworks to sufficiently address issues of privacy, security, certification, electronic signature, intellectual proprietary rights, etc. Moreover, the development of the software sub sector also depends on the availability and functioning of intellectual proprietary and copyright laws to protect the industry against piracy. Piracy is a global phenomena and according to a recently (May 2000) released report by the Business Software Alliance (BSA) it stands at US 59 billion dollars. Currently, more than one out of every three software applications installed in the world is pirated (a revenue loss of US 12 billion in 1999 only). But globally, the trend is showing a decline and in the past five years piracy has fallen down 13 percentage points from the 1994 level of 49 percent. According to BSA, Africa is second to Eastern Europe in terms of rampant software piracy (see Figure5). Though in the short run piracy provides access to those who can not afford and hence would be excluded from the benefits of using the technology, it does have a long-term negative impact. First, it squeezes the existing local demand and adversely affects competitiveness. Second, such practice will discourage creativity and software development in the future. It may be difficult or for that matter impossible to stop piracy but some measures, which are

Figure 5:Global Piracy Rate by Region



directed to fight at least commercial piracy, are important foundations in the information economy. Such protections might encourage joint venture and other cooperative agreements with foreign-owned firms hence improving access to technology, capital and export markets.

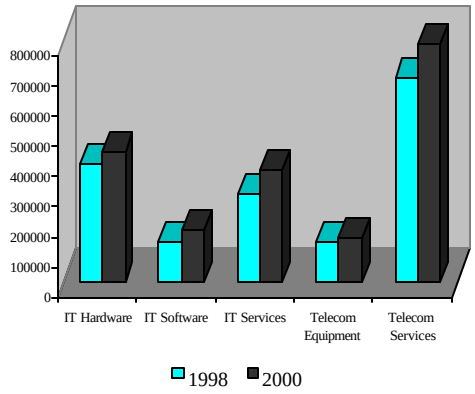
In the preceding two sections, we have provided frameworks for understanding the information economy and for describing the requirements for spawning a sustainable information economy sector. We have thus far restricted the reference to Africa to few selected occasions. The analytical frameworks we have developed in the preceding two sections will now be used to provide an overview of the African information economy, and discuss opportunities and challenges. This is however neither a comprehensive nor a complete coverage of the topic, but rather is indicative as it will be based on cases and experiences of few countries for which data is available and accessible.

5. THE INFORMATION ECONOMY IN AFRICA: OVERVIEW

5.1. THE BIG PICTURE

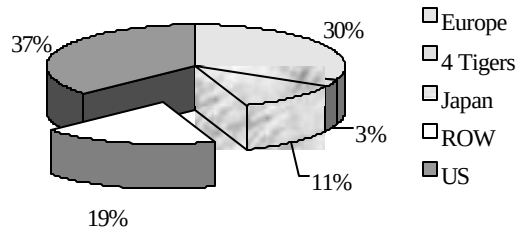
Statistical authorities both in the developed and developing world are slow in responding to and capturing the information economy. In addition, divisions in the conceptualization and understanding of the information economy have compounded the problem of assessing the exact size of this emerging sector. Having that difficulty in mind, according to EITO (2000) (European Information Technology Observatory) reports[19], the global ICT market which includes *IT hardware, IT software, IT services, telecommunications equipment and telecommunications services* for 1998 was 1632.85bn US dollar. This amount is expected to grow by more than 17 % to 1916.86bn US dollars by 2000. Another report released by World Information and Technology Services Alliance (WITSA) in June 2000, however, indicated that the global ICT[20] market has surpassed the US $ 2 trillion mark in 1999 with an annual growth rate of 9% and is expected to reach US $ 3 trillion by the end of 2004. Figure 7 indicates that in 1998, more than 81% of the worldwide ICT market was in Europe, USA, Japan and the four Tigers, leaving the rest of the world with a very low 19 percent. In addition, Figure 6 shows that the telecommunications service market constitutes the largest portion (more than 41%) of the global ICT market. Moreover, according to WTO statistics, in 1998, 20 countries[21] accounted 89.5% of the total IT products imported worldwide with USA only importing 22.4% while the percentage share of the rest of the world was a very low 4% (See figure 8).

Figure 6: Global ICT Market By Sector



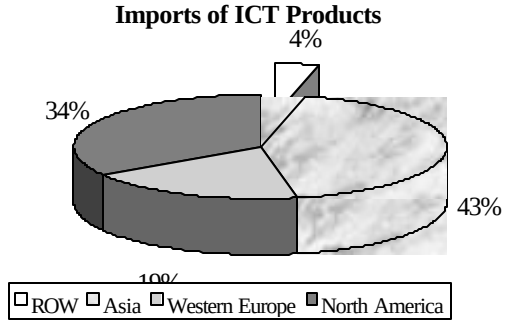
Source: EITO

Figure 7: Worldwide ICT Market by Region



Source: EITO

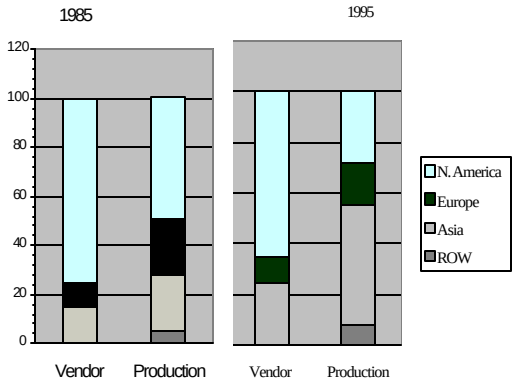
Figure 8: Regional Breakdown of World Imports of ICT Products



Source: WTO

The global trend in ICT production and marketing also indicates a shift from one that is dominated by North America in the 1980s to the emergence of new players in the 1990s, especially a significant presence of countries from Asia. For example, Figure 9 indicates a steady decline in the production of computer hardware in North America (from 50% in 1985 to 28% in 1995) while the share produced in Asia grew from 23% to 47% in the same period. This is following the global trend of outsourcing as US companies shifted their production to Asia for the benefit of low cost labor. However, the North American companies still account for 65% of the world's computer sales and the remaining 35% is shared by Asia and Europe leaving the rest of the world without such companies.

Figure 9: Company vs. Country Position in the Computer Industry

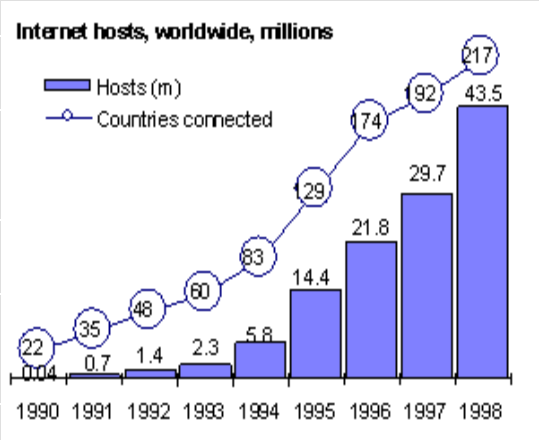


Source: (Kraemer and Dedrick, 1998)

N.B. Vendor refers to headquarters of company selling the product and production to where the product is made

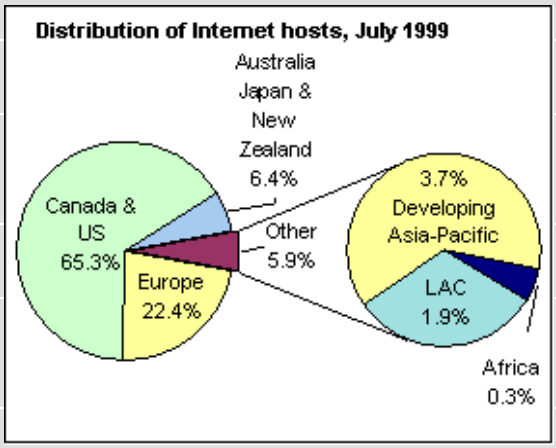
The big picture in the informatization aspect also indicates that even though there is a general growth and in some cases like that of the Internet, the growth is characterized as little short of phenomenal, a considerable disparity between the high income and low income regions is observed. Especially, compared to the rest of the world and even those in the developing world, Africa's progress is very slow. The following two figures[22] (Figures 10and 11) indicate the growth in the internet and its regional distribution.

Figure: 10



Source: Taken From ITU, 1999

Figure: 11



Source: Taken From ITU, 1999

Table 3 and the corresponding Figure 12 highlight the extent of informatization of the global society. These indicators are commonly used among the development circles to describe the "penetration of the information economy" and the information age in the global society. The indicators include access to media technologies like that of radio, television set and cable TV, access to communication and computing technologies including internet, mobile services, computers, fax machines, telephone main lines and access to main stream content like newspapers.

The World's Priorities? *(Annual expenditure in billions of USD)*	
Basic education for all,	6
Cosmetics in the USA	8
Water and sanitation for all	9
Ice cream in Europe	11
Reproductive health for all women	12
Perfumes in Europe and the USA	12
Basic health and nutrition	13
Pet foods in Europe and the USA	17
Narcotic drugs in the world	400
Military spending in the world	800

Source: UNDP, 1999

Is the divide between the poor and rich bridgeable? Yes and NO!

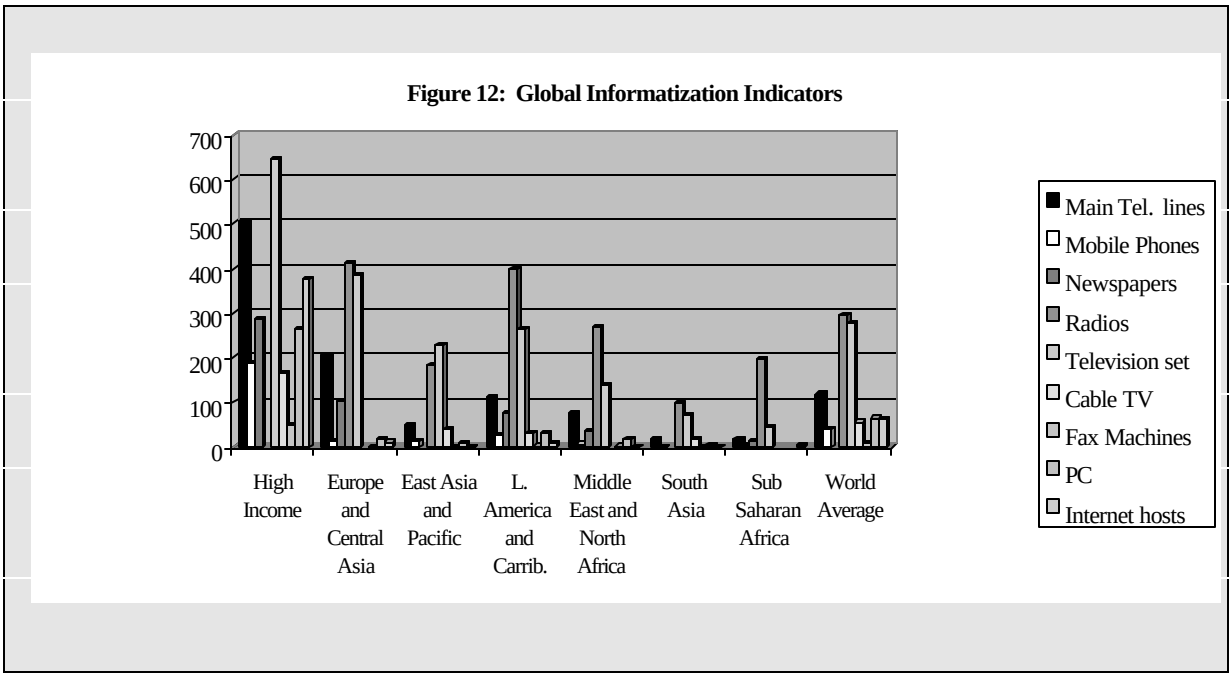
In all aspects of these indicators a huge gap is observed between high income and low-income groups indicating the extent of the digital divide. Actually the so-called digital divide should not be a surprise as it clearly demonstrates an already existing difference in some of the backbones of the "bricks-and-mortar" economy (like electricity and roads). In addition, the gap is also considerable amongst low-income groups with South Asia and Sub Saharan Africa dragging behind in almost all of the indicators from the rest of the developing world.

Table 4: Global Indicators of Informatization[♦]

	Main Tel. lines	Mobile Phones	Newspapers	Radios	Television set	Cable TV	Fax Machines	PC	Internet hosts
High Income	506	189	287		647	165.3	49.7	264.4	374.89
Europe and Central Asia	204	13	104	411	384		1.1	17.7	10.55
East Asia and Pacific	50	11		184	229	39	0.4	7.4	0.60
L. America and Carrib.	110	26	74	398	264	31.3	1.9	32.8	7.65
Middle East and North Africa	75	6	37	268	140		1.5	15.4	0.23
South Asia	18	**1**		**99**	69	16.4	0.2	2.1	**0.11**
Sub Saharan Africa	**16**	4	**12**	196	**44**				2.32
World Average	**118**	**40**		**295**	**277**	**55.4**	**9.2**	**64.2**	**63.10**

Source: World Development Indicators, 1999

♦ All the indicators are per 1000 people except internet hosts which is per 10,000 people and reflect the status in 1997 and 1998 for Internet hosts.



The other aspect of the information economy which scores a phenomenal global growth is e-commerce. E-commerce mean many things to many people. It is subject to a plethora of views and definitions with some groups strongly arguing for a difference between e-commerce and e-business. The differences in defining e-commerce range from a difference of which network platforms to include as e-commerce platforms (proprietary, non proprietary, open, closed, internet, intranet, extranet, etc) to the complexity of the applications and the business functionality they support (ranging from basic business communications using as simple a tool as e-mail to sophisticated applications like EDI,CRM, SRM, Auction, e-procurement, etc., that actually virtualizes the whole business process in real time. In addition, despite the environment and domain (i.e., business, consumer, government) e-commerce might take a variety of business models ranging in complexity, functionality, target audience, etc., from brochureware to e-storefront, trust and infomediation, infrastructure provision and a closely tied virtual communities of interest (see for example Hartman et al 2000). One of the major problems that follows such wide conceptualizations of e-commerce and lack of consensus in the views is reflected in the figures that describe the size, growth and composition of e-commerce. Generally, there is a lack of reliable and internationally comparable statistics that measure the level, growth and composition of e-commerce. However, recently, due to the ubiquitous diffusion of the Internet, at least in the developed world, the Internet and other TCP/IP based networks like intranet and extranet are commonly accepted as benchmarks for e-commerce.

Categorically speaking, e-commerce growth parallels the growth in the Internet. Hence, e-commerce is mainly a North-American and European phenomena with the United States accounting for more than 93% of online revenues, according to UNCTAD. The same source estimated that in 1998, the rest of the world outside OECD countries accounted for scarcely more than 2% of global revenues from e-commerce. To get a glimpse of the global picture of e-commerce (and the variation in the statistical figures[23]) and its expected impact consider the following paragraph and see Tables 4 and 5.

"In march 1999, ITU reviewed the estimates of electronic commerce revenues. The figures reveal projections for business to business transactions in the period 20001/20002 ranging between US$100 billion and US $400 billion. Corresponding revenues from business to consumer transactions are much smaller with again a large spread of projections from US $ 25 billion to US$ 90 billion in 2001/2002. These figures relate to the expected values of actual transactions, that is Internet based sales, and produce a low end projections of some US$ 125 billion in the next two years and a high end projection of about US $ 500 billion. Since at present a major function of electronic commerce as actually used by many economic agents is to facilitate the search for information, a broader estimate of the impact of electronic commerce would include the estimated value of transactions which are initiated online, though concluded in more traditional ways. Here, the high-end projections for 2001/2002 suggest that the figure might be of the order of US$1.23 trillion, meaning that roughly 40 % would be transactions fully completed online and about 60% would correspond to deals facilitated by the Internet but not concluded on it" (UNCTAD, 1999).

Table 5: Estimates of E-Commerce Sales Compared to Various Benchmarks

	1996/7	2000/2	2003/5
Esti. Revenue in US $ billions	26	330	1000
As % of US Catalogue sale	37	309	780
As % of US credit card purchase	3	24	54
As % of direct marketing	2	18	42

Source: OECD, 1998

Table 6: E-commerce Impact on Various Distribution Costs (US $/ transaction)

	Traditional system	Tele. Based	Internet Based	Savings (%)
Airline Ticket	8.0		1.0	87
Banking	1.08	0.54	0.13	89
Bill Payment	2.22 to 3.32		0.65 to 1.10	71 to67
Term Life Insurance policy	400-700		200-350	50
Software Distribution	15	5	0.20 to 0.50	97 to 99

Source: OECD, 1998

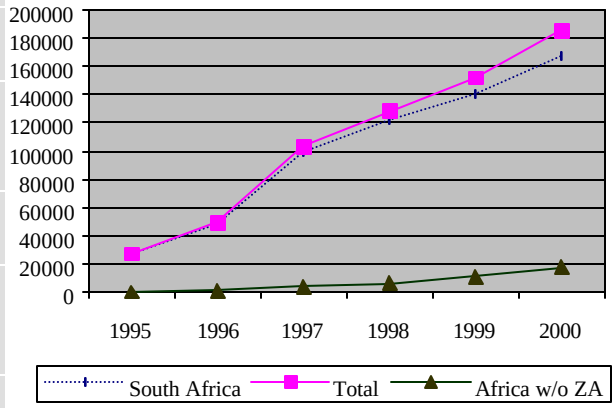
5.2. THE CASE OF AFRICA

The discussion in the preceding section paints a birds-eye view of the global information economy. Especially it is indicated that very few powerful players, who are also economic groups with high informatization indices and e-commerce experience, dominate the global market for the information economy. This asserts our earlier suggestion that being a leading edge user requires being a leading edge producer as well. The gap between the African and the rest of the world's indicators is very huge and frustrating. Africa's share of the global information economy market is insignificant and e-commerce activities and applications are yet to be seen. Though the preceding discussions might be suffice in outlining Africa's position in the information economy, an insider look of the continent uncovers some additional insights that are hidden in the generalizations.

5.2.1. Digital Divide within the Continent?

In terms of informatization, especially Internet hosts and telephones lines (both fixed and mobile) a very significant regional difference can be observed in the continent. Though the number of Internet hosts in the entire continent shows a "significant growth" from 27,296 in January 1995 to 185379, in January 2000, and almost all countries are connected to the Internet, the picture excepting South Africa is very bleak (see Figure 13). According to data from the ISC, the number of Internet hosts in the entire African continent grew by more than 679% between January 1995 and January 2000. However, during the same period the growth rate for the entire continent outside South Africa was a very low 125% while in South Africa the number grew by more than 620%. Now, South Africa has 10 times the number of Internet hosts (more than 90% of Africa's total) than the rest of the continent distantly followed by Egypt (with 3% of the total figure).

Figure 13: Internet Hosts Growth In Africa



Source: ISC

Table 7 summarizes the remaining informatization indictors by regional sub categories. The figures tell that South Africa has a very good profile from the rest of the continent in terms of informatization.

Table 7: Africa's Informatization Indicators (1997)[24]

	Main Tel. Lines	Mobile Phones	Newspapers	Radios	Television set	Fax Machines	PC	Internet hosts
Sub Saharan Africa	11	4	12	172	44			2.32
Excluding South Africa	5	0		162				
South Africa	**100**	**37**	**32**	**316**	**125**	**3.5**	**41.6**	**34.2**
North Africa	47	1		273	124			
All Africa	18	3		190	59			
Low Income	16	1		99	57	0.2	2.2	0.10
World Average	**118**	**40**		**295**	**277**	**9.2**	**64.2**	**63.10**

Source: World Development Indicators (1999) and African Development Indicators (2000)

5.2.1. ICT Hardware and Software

As in elsewhere, the statistical system in the continent has yet to catch up with reporting the main stream information economy sector and relevant indicators have to be worked out. Official statistics are not available (or at least we haven't come across on any) and most countries are not reporting their activity in the ICT sector (except for telecommunications) separately and use the old systems of primary, secondary and territory classifications[25]. It

♦ All the indicators are per 1000 people and reflect the 1997 status except internet hosts which is per 10,000 people and reflects the 1998 status.

appears that the sector is lost within the manufacturing, commercial (whole sale and retail trade) and service sectors. Following are few cases (Mainly from South Africa and other countries like Egypt, Morocco, Tunisia) that provide an overview of the main stream information economy sector.

Though Africa's share of the global information market and spending is very low, figures from some countries indicate that the market is in fact growing and the economy is getting momentum. This follows the global trend that even if the North American market accounts for the lions share of the total ICT spending, regions with the smallest ICT base are outpacing the others with mature ICT infrastructure hence indicating where the future potential market might be.

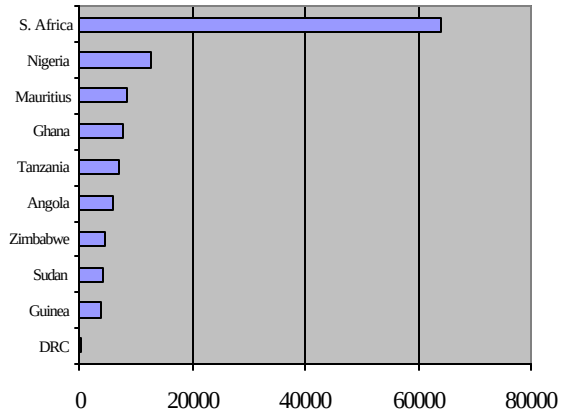
One trend that is observed in the African market is that despite the global trend which is dominated by software and professional services, hardware still constitutes the largest proportion accounting for as high as 60% of the total market revenues. Within the software and professional services categories, the strongest performing market segment is packaged software, which accounts as high as 70-80% of the total revenues in the sub sector. This trend shows Africa's obvious dependence on imported ICT and the infancy of its own indigenous industry. Plus, this may imply something about the nature and complexity of ICT applications and use in Africa (see Table 8 for the summary of some of the ICT market figures in Africa). But when shifting to the percentage growth of the components of the ICT market, the path follows the global trend and indicates that ICT services are the fastest growing followed by software products. In terms of the telecommunications market, the US department of commerce has estimated that US telecommunications equipment exports to Sub-Saharan Africa for 1998 was 206 million USD showing a 39% rise from the preceding years. Figure 14 shows the largest 10 export markets for US telecommunications equipment and services during 1997. In addition, excepting South Africa, where the financial and manufacturing sectors are major ICT consumers, in most other countries, the public sector remains the most important user of ICT.

Table 8:ICT Market in selected African Countries

	Egypt (1995)	Morocco (1998)	S. Africa (1997)
ICT Market (in US mil.)	400.8	300	9690
%of hardware market	65	55	40
Expected % growth	35 (bln 96-98)	17	17
No of companies	714 (98/99)	512	

Source : SAITS, ITS

Figure14 : US Telecommunications export to selected African countries in '000 USD (1997)



Source: SAITIS

South Africa[26] is by and large the biggest market of ICT in the continent followed by North Africa. The South African ICT market has been experiencing a relatively high growth path both in terms of real value and ratio to the GDP, with annual real growth rates closing to 10%.

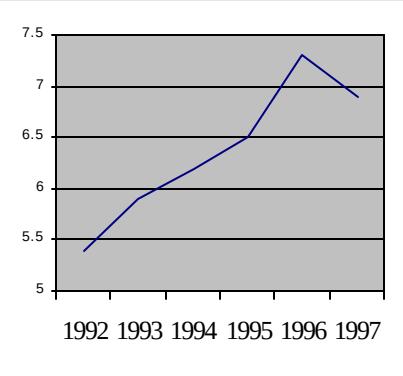
It is estimated that by the end of 2003, the combined market for IT hardware, software and services excluding telecommunications will more than double the 1998 size and is estimated to reach a high of 6.6 billion USD. Table 9 illustrates the revenue from the South African ICT market and Figure 15 shows the growth of IT/GDP ratio.

Table 9 : IT Spend in South African IT Industry (in millions of USD)

	IT spend					
	1992	1993	1994	1995	1996	1997
IT Hardware	1227	1321	1558	1525	1631	1717
IT Software	287	330	386	456	633	669
IT Services	876	938	1100	997	1202	1472
Office Equipment	131	138	170	158	148	155
Internal	1212	1295	1328	1446	1485	1526
Telecomms	2666	12847	3023	4068	4185	4149
Total IT Spend	6400	6869	7564	8649	9283	9690
IT/GDP Ratio (%)	5.4	5.9	6.2	6.5	7.3	6.9

Source: SAITS, 2000

Figure 15: IT/GDP ratio of South Africa



Source: SAITS, 2000

The obvious dependence of Africa on imported ICT is evident from the South African experience. For example, in 1998, imported and redistributed software accounted more than 92% of the total revenues from the software market and almost all of the revenues from the application development tools market, hence indicating the technological capability and sophistication of the local software industry. The industry is limited to reworking, customizing and local integration of internationally designed packages (SAITS, 2000). However, 3% of the 1995 software revenues were generated from exporting mainly imported packages and a limited amount of locally produced software. In terms of IT hardware, more than 95% of revenues by local distributors are from imported products and components. As a result, rather than a component manufacturing industry, PC assembly industry has flourished partly due to the loophole in the import tariff laws which used to allow components to be imported as spares at a zero tariff rates (Hodge and Miller, 1996). Such indigenous capabilities have allowed South Africa to export its locally assembled PCs to the rest of the continent, which in 1995 accounted for 35% of the total export in the sector. Due to earlier policies directed at encouraging local production and market guarantee of locally produced products, the South African telecommunications equipment industry has a better performance and skill base with imports in a non-cellular sector accounting under 40% of the industry revenues in 1995.

> "What is undoubtedly true is that the South African IT industry has been effectively created through multinational support and the industry is very dependent on their continuing participation."
> (SAITIS, 2000: 8)

5.2.2. Telecommunications and Related Services

The telecommunications reform and privatization drives have started to open the African telecommunications market, which was mostly run under PTO monopoly, for competition. So far 9 countries (Cape Verde, Central African Republic, Guinea, Guinea Bissau, Ghana, Cote D'ivoire, Madagascar, Sao Tome, South Africa and Senegal) have sold part of the share of the PTO (which ranges from a high of 60% in Guinea to 30% in Ghana and South Africa). More

countries are expected to follow suit and some are in the process of preparing the sector for offering.

Mobile cellular telephony is another area within the telecommunications services sector, which has demonstrated a rather significant growth within a span of five years. Cellular services are now available in 42 countries and outside South Africa comprises about 20% of the total phones on the continent. The market ranges from pure monopoly by the PTO (in Ethiopia, Mauritius), to up to five providers as in Tanzania, 2 being most common. The service is gaining wider popularity and market.

Another telecommunications related service is the growth in ISPs. Though it is far from being satisfactory and is insignificant compared to the rest of the world, Internet connection in Africa is promising, showing a rise from only 12 countries in 1996 to almost all countries now. This has primarily opened Internet service provision as a new form of business and revenue generation. The number of service providers in the entire continent now stands at about more than 367 up from 200 in 1998. The market structure varies from one where the PTOs are the sole (monopolistic) service providers (like in Ethiopia, Mauritius, Cameroon, Niger..etc) to a competition between PTO's and other ISPs (as in South Africa, Mozambique) and to a situation where the PTOs do not have any involvement (as in Egypt). Other structures also include a government authorized sole agency (in Mali) and a joint venture between PTO and commercial ISP.

5.2.3. E-commerce

In terms of E-commerce, though most organizations have established a web presence; e-mail is slowly being diffused throughout the continent and storefronts mostly targeting overseas market are scarcely scattered throughout the continent, figures estimating e-commerce revenues in Africa are not easily available except in a few countries. Thus far no study, known to this author, has been conducted to assess the diffusion of e-commerce and except intuition and gut feel (which may not actually be very far from the reality) e-commerce is yet to emerge in Africa. However, from the little that is known it can safely be deduced that e-commerce also follows the general patterns in informatization and ICT market making South Africa with a relatively affluent e-commerce experience within the continent.

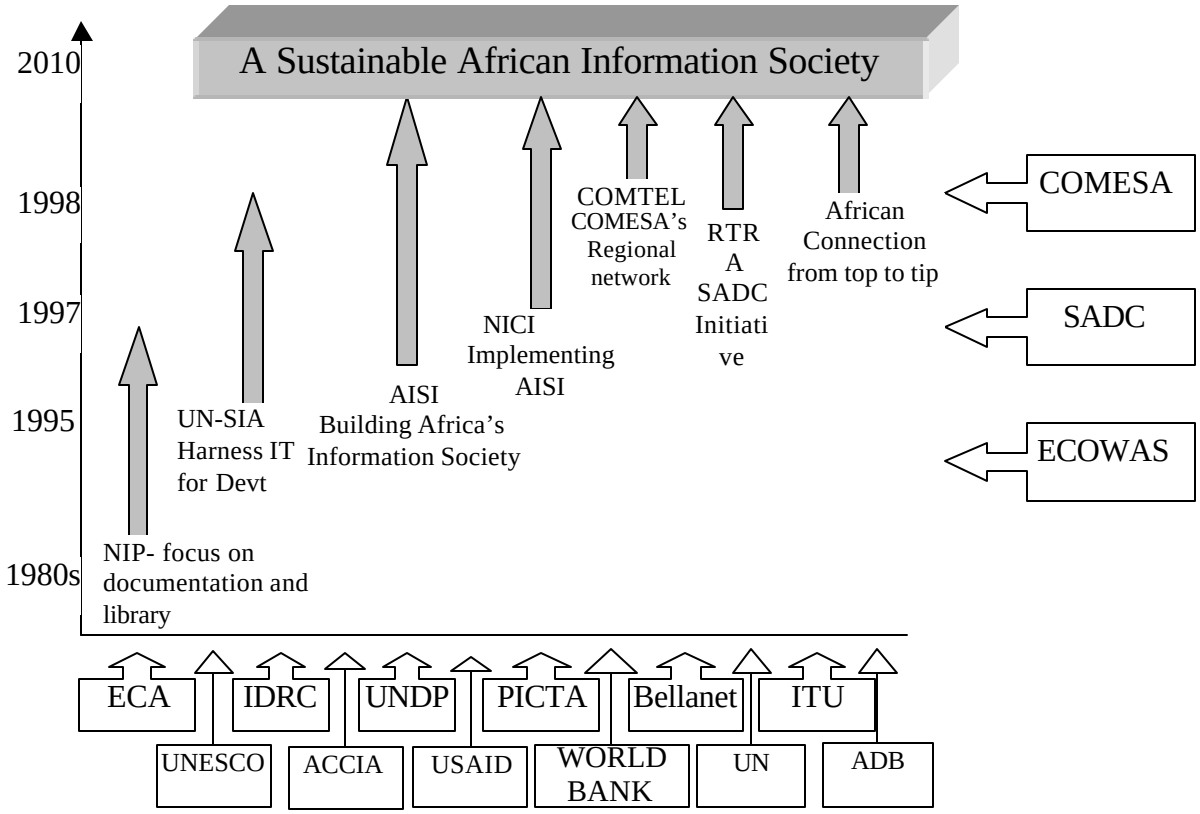
Even in South Africa, despite a relatively ubiquitous internet diffusion within the business community[27], the uptake of e-commerce is criticized to be very slow with more than 44% of companies not seeing e-commerce as a strategic business imperative at this stage preferring a "wait and see" approach, according to a study conducted by BMI-T. It is expected that South Africa's e-commerce will generate a total of US 1.1 billion by the end of 2000 (with USD 657 million from B2B and USD 444 million from B2C) which is a significant leap from US 84.7 million in 1997. This figure is expected to reach a high of 4.1 billion USD in 2005. In the past, the South African e-commerce market was dominated by B2C segment and B2B is expected to exceed B2C for the first time by the end of this year. In addition to the low level of informatization in the rest of the continent, access to payment technologies like that of credit card (which is only operational in 12 Sub-Saharan African countries) rules out domestic B2C initiatives until reliable and affordable payment technologies are introduced.

5.2.4. Role of institutions

The African private sector business is constituted of mainly survivalist and micro enterprises that have but limited appetite and capability for leading the technological development of the continent. As a result, the role of institutions in general and the government in particular are

of paramount importance in inducing meaningful changes in the economy. But, the curse of the matter is that African governments and other social institutions are generally in bad shape and are not sufficiently prepared to shoulder such responsibilities. For the last couple of years, building national information and communications infrastructure and improving the informatization indices have been (and may continue to be as far as distant future) the main preoccupations of most African countries. In this respect, ECA and other sister organizations have been at the forefront of promoting the causes of building National Information and Communications Infrastructure (NICI) and assisting member countries in the formulation of NICI plans, policies and strategies within the framework of the African Information Society Initiative (AISI). Thus far the progress of implementing NICI is rather very slow and laden with a number of complications and problems. Since the whole processes of NICI and AISI, including its current status and problems encountered are sufficiently documented elsewhere within ECA, it will be no more than a gratuitous repetition discussing it here. However Figure 16 depicts the various continental and regional initiatives and the institutions involved.

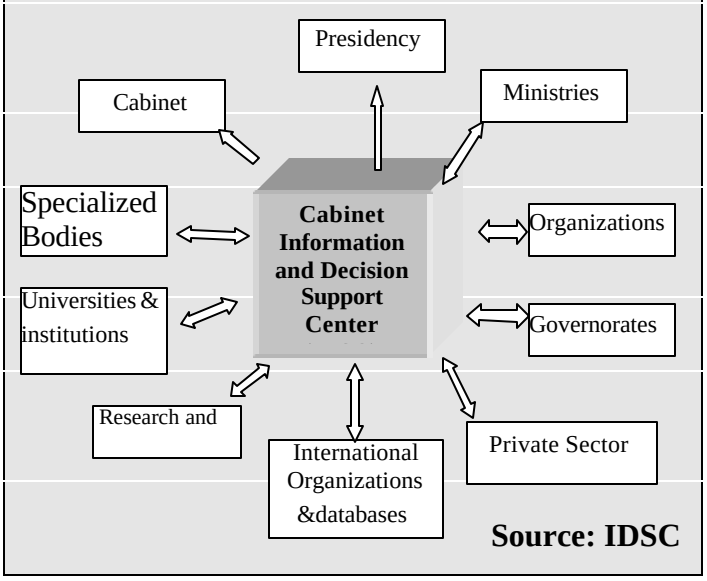
Figure 16: Continent Wide and Regional Initiatives Related to the Information Economy in Africa



Besides regional and sub-regional wide initiatives, different countries have been taking different courses depending on their own philosophy of economic development. But there is a general lack of awareness and commitment on the part of the government about the information economy, which has led to sporadic policies and lack of coordination across the various sectors. This for example has been mentioned as one of the chief problems that is hampering the implementation of NICI policies and strategies. Though the current preoccupation of the continent in general is improving its information and communications infrastructure, individual countries have been adopting different policies and approaches to establish their presence in the emerging information economy.

Some like Egypt and Mauritius were involved in both supply push and demand pull strategies targeted at influencing and regulating the information economy. Others, like South Africa were focused more on regulating the supply side but influencing the demand aspect. For example, Egypt's much hailed Cabinet's Information and Decision Support Center (IDSC), which was by and large a success story (see Amoako-Gyampah and White, 1996) was instrumental in brining all the stakeholders including the Presidency and Cabinet together under its banner and hence securing the highest level of commitment as early as 1985 (see Figure 17). The IDSC was also instrumental in re-engineering Egypt's public sector and services (with now more than 1400 centers); spawning indigenous ICT capabilities, developing human resources (through its Information Technology Institute) and all in all positioning Egypt at a better competitive position in terms of information economy both within Africa and the Middle East.

Figure 17:IDSC's General Framework



Source: IDSC

In Mauritius (which is leading the African competitiveness index following only Tunisia), the government is playing all the roles of investor, regulator and consumer. As an investor the government established the State Informatics Ltd (SIL), the Central Informatics Bureau (CIB), State Informatics Training Center (SITRAC); and the National Computer Board (NCB) in 1989 with one of the objectives being the production of Software for export (Duncan and Krueger, 1994). As a regulator, a number of facilitating polices were introduced including removal of customs duty from a number of computer equipment and a loan policy at a low interest rate for individuals to purchase computers. As a consumer, the CIB and SIL were entrusted with the responsibility of looking over the computerization requirements of the public sector and the actual computerization of the government services respectively, with SITRAC providing the required training to man both the public sector and the other institutions. Here one can see the state playing a role on all plains of the institutional framework (Figure 4). The software export drive was not however a major success due to lack of skilled personnel to fill the job (Duncan and Kruger, 1994).

In South Africa, the government's role was mainly focused on regulating the sector, in influencing demand through its various projects directed at the public sector such as schools, public services and regional and local administration, in knowledge building, deploying and funding various research and development activities. Recently also the government established the Houwteq IT and telecommunications software training and development center, though the future plan is to convert it to a private university. However, there has been considerable government intervention in the early days (until the early 1990's) of the telecommunications equipment industry. The publicly owned South African Posts and Telecommunications (SAPT) used to provide exclusivity of supply and a market guarantee (minimum number of purchases per year). This has succeeded in motivating local production

and gradually establishing a technological capability and base, which is evidenced in the market performance of the non-cellular telecommunications equipment manufacturing sector compared to the total ICT revenues. In addition, recent initiatives like info.com 2025, Internet 2000 (offering access to the internet to more than 1000 schools), smart card applications[28] for public transport and other social services, and the e-commerce policy debate are some of the activities that the government is busy with which affect all aspects of the information economy.

In general Table 10 summarizes some of the initiatives taken by the governments of Egypt, Morocco, Mauritius, and South Africa in influencing and regulating the demand and supply sides of information economy including e-commerce (the list is neither complete nor comprehensive but indicative). Though at this stage it is difficult to talk about causality between these different initiatives and the relatively well advanced positioning of these countries in the information economy, compared to the rest of the continent and in some cases the developing world in general, the role the different initiatives played and expected to play can not by any means be undermined.

Table 10: Summary of National Initiatives Related to the Information Economy

Country	Initiative
South Africa	▪ Sanction a South African Information Technology Industry Strategy base line study ▪ Established a State Information Technology Agency which provide IT services exclusively to the public sector ▪ E-commerce policy discussion paper and audited its law for compatibility for e-commerce ▪ Info.com 2025 with the aim of establishing a networked information community that empowers people and make South Africa globally competitive ▪ The innovation fund was launched in March 1998 ▪ Commissioned a Foresight study to scan international IT trends and local status Set aside an innovation fund accessible to NSI and promote an information society ▪ Houwteq IT & telecommunications software training institute ▪ Partial Privatization of Telekom ▪ National Industrial Participation Program ▪ Instituted National system of innovation (NSI) ▪ Universal Service Agency: a telephone within 30 minutes
Egypt	▪ Linking 200 Governorates with Internet ▪ Electronic commerce Institute (pilot project) Educational, Technical and R&D. ▪ Established Electronic Commerce Information Technology Node in cooperation with European commission to accelerate E-commerce (EECITN) ▪ National Workshop of E-commerce ▪ Launched the Egyptian Initiative for E-commerce ▪ Pilot project of TACC (Technology Access Community Centers) ▪ Sinai valley
Morocco	▪ A state secretariat for IT, The CSTI (Comite de suivi des technologies de l'information) to develop strategy ▪ An academic network linking research centers and universities ▪ National IT R&D through public
Mauritius	▪ In the process of formulating national IT strategy plan ▪ Bills to facilitate e-commerce ▪ Launch Government Information Infrastructure (GII) ▪ Set the SITRAC, SIL, CIB, NCB
Tunisia	▪ Launch internet caravan's 1999 to increase e-commerce awareness ▪ Launch the Tunisia e-shopping center pilot project ▪ Set national commission for e-commerce and EDI in 1997 with the aim of establishing an electronic commerce strategy and infrastructure

The discussion hitherto has provided an overview of the global information economy vis Africa's current position. Though currently Africa is not a significant player within this emerging economy, the global trend offers a number of opportunities and Africa is striving, so far with little luck, to follow the trend. The challenges and limitations that the continent is facing are enormous. Ironically, the same challenges and threats that hinder Africa's progress provide it with opportunities. Thus, Africa's problems should not be a source of despair but rather that of motivation for a better future and a reminder to policy makers that there is still a lot to be done. The following section discusses the opportunities and challenges of the information economy in Africa. Since the informatization aspect is well documented elsewhere, to avoid gratuitous repetitions we will refrain from making direct reference to it and focus on the main stream information economy sector including e-commerce.

6. CHALLENGES AND OPPORTUNITIES OF INFORMATION ECONOMY IN AFRICA

Africa's economy is by and large factor based, which is dependent on the export of natural products like coffee, cacao, and mineral resources like diamond. Such heavy dependence has made the economy sensitive to world economic cycles and exchange rates and vulnerable to the loss of factor advantages. But still Africa's attractiveness (opportunities of business in Africa) in the global market is mainly described based on factor conditions (consider for example Table 11).

Table 11: Opportunities and Challenges of Doing Business in Africa

Opportunities	Challenges
▪ Oil and gas (Angola and Libya) ▪ Mining (West and Central Africa); ▪ Privatization's (South Africa and Nigeria); ▪ International trade (oil producers and SADC); ▪ Infrastructure (pipelines, roads, telecommunications); ▪ Stock exchanges that are mushrooming in many countries ▪ Using educated English and French speaking African nationals ▪ And leisure (big game + beaches + golf + climate + satellite + Internet + cell + low cost structure = huge telecommuting opportunity).	▪ Lack of quality information about Africa ▪ Fluctuating currencies ▪ Bureaucratic red tape, which is slowly getting easier to wade through ▪ Graft and corruption, as much a fault of the non-Africans who pass the brown paper bags as the poor and often unpaid civil servant who accepts the bag ▪ Nepotism ▪ Wars and unrest, ▪ Lack of local capital ▪ Monopolies such as marketing boards, state trading firms, foreign exchange restrictions, trade taxes and quotas and concentration on limited commodities ▪ lack of infrastructure, though in areas such as telecommunications and energy, Africa is able to use new technologies to leapfrog more advanced economies
Source: Mebendi web site: [Accessed 12 July, 2000]	

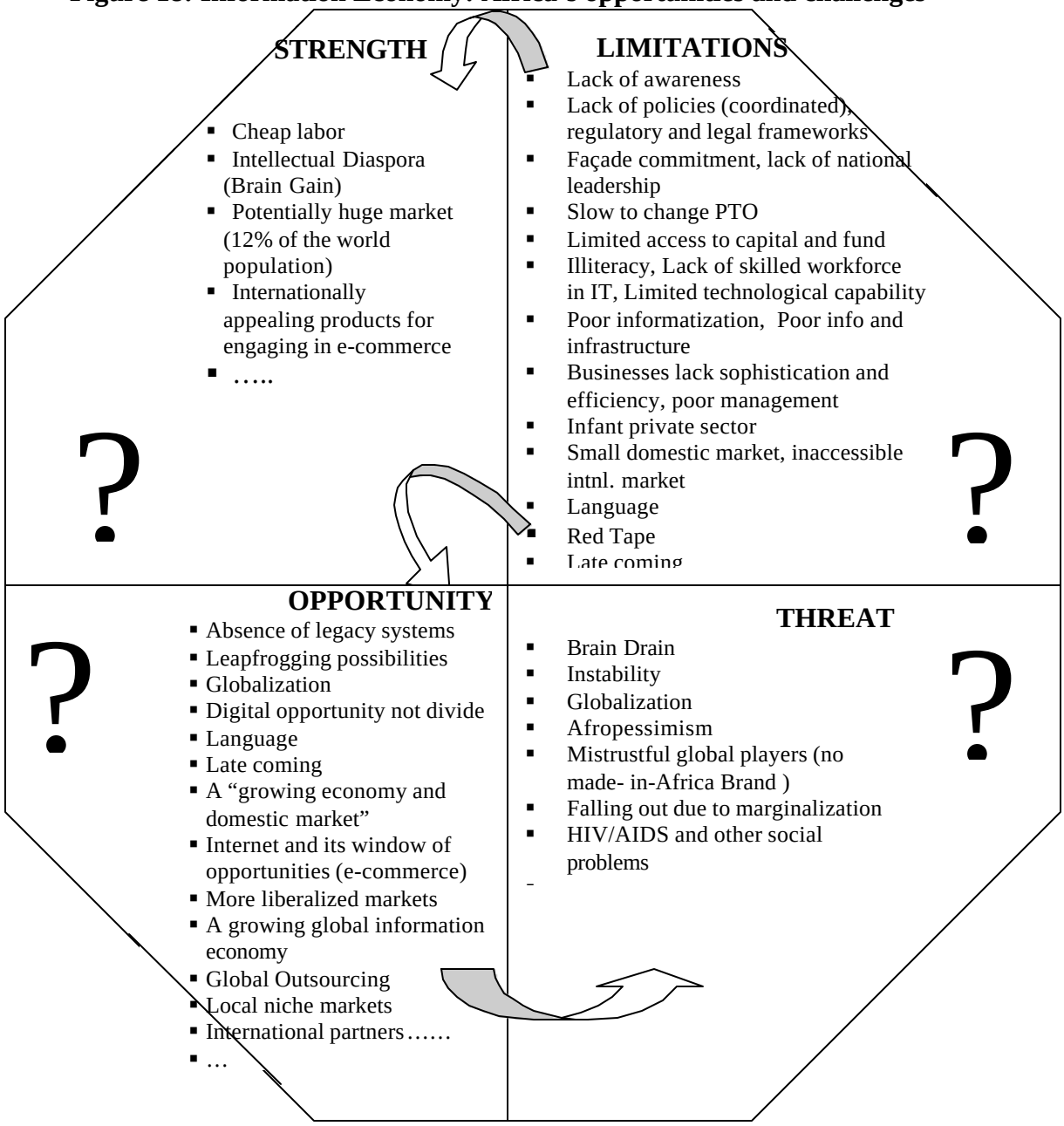
Even if basic factors remain as advantages all the time, information economy normally requires an economy driven by innovation and investment. The ability of a nation and its firms to invest aggressively or attract foreign investment and the spread of innovativness within the economic and social system are among the important ingredients to plough an information economy.

Though different African countries are at different stages of development and with different technological capability, infrastructure or readiness[29] and though the enablers and inhibitors for engaging in the various niches of the information economy differ, the following diagram (figure 18) summarizes the strength, limitations, opportunities and threats of information economy in Africa. The list could be endless but we have basically used the foundations of the information economy (i.e., readiness, competitiveness, the context of African countries and global forces and realities) to highlight the different scenarios.

The information economy does provide a number of potentials for improvement and opportunities for development conditional that countries perform well in building their readiness and maintain their competitiveness. Using the framework on Figure 1, there are different entry options and paths to follow to log into the information economy, the most obvious being through informatization (use). The other possibilities could range from a low-value adding activity such as redistributing imported ICT to a very high and challenging task of innovating and designing ICT and to the innovative use of internet with cutting-edge e-commerce models. Even if African countries share the same AISI vision, there doesn't exist a

ready-made formula that can be applicable athwart. Each individual country is a special case and needs to follow a path that can best suit its vision, plans and strategies. But if African countries are up to the AISI vision, which is aiming to build a sustainable information society by the year 2010, then some form of local information economy is more than a necessity. In addition, the information economy sector, i.e., local capacity to provide hardware, software, professional and e-commerce services beside generating revenues directly does also play a supporting role to the other sectors of the economy as they are increasingly becoming ICT dependent. At the peril of simplifying the case, it seems the following are some of the options for participating in the supply side of the information economy with a possibility of domestic and export market orientation.

Figure 18: Information Economy: Africa's opportunities and challenges



6.1. THE HARDWARE OPTION

The global trend and the hardware industry is characterized by reliance on standardized components, decentralized production structure, high up-front costs, high risk, capital intensity, established standards, highly trained labor, customer lock in, etc. The economic dynamic seems to use ICTs to fuse the skilled work force of the developed world with the unskilled and relatively cheap labor of the developing world. This mode allows the skilled components to be made in the first world and shipped to the third world to be assembled with low skill components that have been made there.

Table 12: Drivers and Inhibitors for the Hardware Option

DRIVERS	INHIBITORS
▪ Component base manufacturing ▪ Assembly line possibility ▪ Technology devt ▪ Building human resource ▪ Creation of qualified jobs	▪ Capital ▪ Technological capability ▪ Infrastructure ▪ Economy of scale ▪ Inaccessible foreign market ▪ Fast changing technology ▪ Lack of supporting industry

Judging from the South African and Egyptian experiences, Africa's participation in the high value-adding hardware industry in the near to distant future seems out of the picture. In simple terms, Africa is neither ready nor competitive in this area and may even have difficulty in attracting foreign investment that was instrumental in developing this industry elsewhere. But with appropriate policy initiatives and encouragement of domestic players, an indigenous computer assembly line is a possibility. For example in Ethiopia an investor has followed this path and has applied for a license to assemble computers locally. But the pioneering initiative (1997) by another entrepreneur was not a success. Though there are a number of factors that have contributed to the failure, chief among them was that the domestic market was not ready to welcome the locally assembled computer as it is a "no name" (compared to the much established international brands of IBM, DELL, etc) and also surprisingly due to its low cost. In the words of the entrepreneur

> *"Ironically, Ethiopians seem to be suspicious, of anything that is inexpensive. It was kind of surprising that a society that is not much economically endowed is hesitant about buying inexpensive products when supplied to them, which is in contrast to the experience of other countries, where the cheaper the product the more the demand. I remember one occasion when a certain lady asked me whether the computers are "Solomon" (Ethiopian for a second hand product)" (Addis Tribune, 1998)*

All in all, high-value adding component based hardware options both in computing and communications may not be a feasible, attainable and viable choice despite its promises of technology development, formation of human resource and creation of qualified jobs. Africa in general may not have the resource in terms of research, capital and human power to build a high value adding component-based hardware industry in the foreseeable future. Excepting the telecommunications sector, so far there is no major FDI flow in to any part of the continent targeting this sector. Under these circumstances, with hand on heart, the best one can dream in terms of Africa's future in hardware is an assembly line, which in the long run may lead to some form of peripheral work.

6.2. THE SOFTWARE OPTION

Software (system software, packaged tools and application solutions)[30] is often cited as one of the most attractive and plausible entry-options for developing countries' participation in the information industry. The software market and industry are characterized by limited up-front cost, less capital intensity, relatively less skilled labor, less standards, monopoly, brand loyal

market, lower entry barriers, and more importantly remote coding (offshore and virtual aliens). In addition, the software industry, especially the offshore component depends heavily on well-developed and advanced infrastructure (with broad band capacity to handle videoconferencing) and free stuff is ubiquitously littered, at least on the net. Over the recent years, figures of software export from the developing country to the developed country are eye-catching and enticing. By 1998 it was estimated that developing countries have exported software worth 3billion USD to the developed West (Heeks, 1998). But a closer look to the industry reveals the deceptiveness of the headline figures as the net earnings (minus cost of body shopping and cost of imported hardware and software) are estimated to be 40% of the gross figures (Ibid). Plus India's experience, whose software industry demonstrates a phenomenal growth and who is leading the rest of the developing world in software production indicates that the headline figure is not quite what it seems. India's software export is mainly on body shopping and remote coding and despite its early start into the industry, India is yet to emerge in the packaged software market. But one thing that the Indian experience proved is that domestic demand may not necessarily be essential in becoming competitive in the software industry, though it is often criticized that the Indian software industry has done very little to contribute to the improvement of the local business (due to its export orientation).

There are quite a number of mutually compatible alternatives for Africa's role in the software industry provided that Africa overcomes the chief impediments: skill and infrastructure (not only of information but also of reliable electricity supply). But, currently the software development skill in most of the continent is at its infancy[31] and can fall into category "*Initial" as per the* US Software Engineering Institute's scale. But, some of the alternatives for Africa include,

- Domestic Application tools and solutions
- Export oriented application tools and solutions
- Onsite service and off shore work

Though the basic challenge remains the same in all of the above cases, the toughness of the challenge, areas of intervention, and chances of success might differ from one strategy to another. In the case of domestic oriented packaged application tools, the African market is fast wrapping up in to a Microsoft world and even if one overcomes the problem of human skill, infrastructure and capability, the competition in this area is going to be very tough and in the short to medium term success might not be anywhere near. But the African software industry can tap the niche on application solutions. Language, expense of imported software, legal and tax systems might provide "natural protection" for this type of industry. The slow but raising penetration of ICT applications in Africa can provide the motivation and the demand necessary to plough such industry. The biggest

Table 13: Software Piracy in Africa

Country	1999 piracy rate	Retail revenue lost to piracy in USD millions	
		1999	1994-99
Egypt	75%	33.2	94.0
Mauritius	70%	1.3	7.9
Kenya	67%	0.4	2.1
Nigeria	67%	3	17.7
Rest of Africa	67%	67.8	655.7
Morocco	64%	5.3	32.1
South Africa	47%	84.1	448.7
Africa Total	56%	195.10	1258.2

Source: BSA, 2000

challenge for the domestic oriented software industry (or for that matter one that is shrinking to miniscule proportion the limited market for imported packages), despite skill and info and infrastructure, is piracy (see Table 13). Rampant piracy is not an exception but rather seems the rule. Even if piracy is a global phenomena (and stands at US 59 billion, according to (BSA)), Africa's participation in the global forums and treaty organizations that are attempting to enforce intellectual proprietary and copyrights is very limited.

Export oriented software tools and applications are also another option for the African software industry. The South African and Egyptian (and even for that matter the world's software elephant-India) experiences demonstrate that, in the medium to long future, Africa's emergence as a capable packaged application tools exporter is very unlikely. Despite skills shortage, high value-adding software industry research and development activities are very expensive and stand more than the compounded annul budgets of African countries. The South African (SADC niche) and Egyptian (Arabic language and Mid-East niche) experiences indicate that with appropriate policy and other supports Africa could explore and develop its software building capability using the export oriented application solutions strategy.

The offshore (virtual alien) and onsite (body shopping, whose future seems gloomy following improved communications technology, remote systems implementation and ASP) options which draw very heavily on availability of abundant human resources and relatively well developed infrastructure may not also be a short term possibility. For example, in 1998/99 it was estimated that more than 25,000 professionals were involved in the 500+ software companies in India and annual output from India's educational and training institutes was approximately 5000 (Duncan and Krueger, 1994). Compare this with the total number of 964 professionals employed in the IT industry; total output of 2016 diploma and degrees awarded by south African territory institutions in computer science, data processing and electrical engineering in 1996 and the 28,671 computer related positions in the entire South Africa (SAITIS, 2000). Without going into detail, this demonstrates that the offshore and body shopping options might not be very likely in the short to medium term. Plus, even if the human resources and communications issues to tap this growing component of the software market are resolved, the task of proving Africa's capability in software production and attracting investment might turn out to be more demanding than putting in place the infrastructure and building the human resources. In general, Figure 19 summarizes the inhibitors and drivers of the software options for Africa.

Figure 19: Drivers and Inhibitors for an African Software Industry

Domestic Oriented Software Industry

Drivers	Inhibitors
▪ Small but growing market ▪ Niche market ▪ Home grown solution ▪ Low cost ▪ Natural protection ▪ Building local capacity ▪ Customization ▪ Cost of imported software ▪ …	▪ Piracy ▪ Venture capital (start up capital) ▪ Africa wrapped up in Microsoft ▪ Distrustful local market ▪ Foreign software preference ▪ Hardware vendors an maintenance ▪ Low level of ICT use ▪ Human resource ▪ Infrastructure Stable ▪ electricity supply ▪ lack of incentives

Body Shopping and Virtual Alien

Drivers	Inhibitors
▪ Outsourcing Global skill gap ▪ Low cost ▪ Low wage ▪ Regional niche market	▪ No Established skill ▪ No track record ▪ Infrastructure...broad band ▪ Mistrust ▪ Risk perception ▪ Client attitude ▪ Language ▪ Culture ▪ Late comer ▪ Cost of marketing ▪ Dearth of Market information ▪ …

Export Oriented Software Industry

Drivers	Inhibitors
▪ Global outsourcing ▪ Growing market ▪ Niche market for application solutions ▪ Catering for SMME needs ▪ Less capital intensity outside packages ▪ Lower wages ▪ Technology development ▪ Human resource building ▪ Employment creation …	▪ Capital intensity ▪ High development and marketing cost ▪ Brand loyal market ▪ Tough quality and competitiveness ▪ Skill base ▪ Infrastructure ▪ English proficiency ▪ Dearth of Market information ▪ Mistrust ▪ Late comer ▪ Inaccessible Package's market ▪ No track record ▪

6.3. PROFESSIONAL SERVICES

Though the distinction between professional services and applications solutions is somewhat fluid, here we refer by professional services to include consulting, design, system integration, training, technical service and technical support functions. This could be a starting point for most countries information industry provided that the human resource issues are resolved. But even here the preference of local clients in awarding most of their contracts to international consultants is a major problem. Though this might be done in the interests of reliability and quality and can be justified on risk minimization basis, dependence on imported professional skill is at the expense of domestic economic learning and indigenous capacity building. In addition, the jet-in-install-jet-out style of international consultants without basic skill and technology transfer (except the black box) has been one of the major stumbling blocks in

systems implementation in most parts of Africa. Hence, the development of the professional services sector requires intervention, pride in made-in-Africa brand and taking risks even at the expense of initial setbacks.

6.4. CONTENT (KNOWLEDGE) PRODUCTION

With the convergence of content with computing and communications, it has become abundantly clear that Africa is poor in terms of local content. Especially, the diffusion of the Internet and its benefit might be seriously affected if the content industry fails to catch up and provide meaningful, targeted and relevant content. This might be why President Obasanjo preferred to play with the words of down loading and up loading in his response to the priority of Internet to Nigeria. As it stands now, Africans are the last to hear what is happening in their own village and even to know important issues that are relevant to their well being. It is not uncommon for local media agencies to quote foreign sources for an event that has happened just stones throw distance from where their head office is sitting. African students are equipped with what is happening in the US and Europe than in their own country by the time they leave schools and colleges. We teach our students based on Barclays and London and New York stock exchange experiences and not Kenyan or Johannesburg cases. We prepare students to work in Addis but with IBM, Microsoft, Cisco and Dell cases. These are all problems related to the low levels of content production, packaging and more significantly dissemination.

Moreover, currently the majority of Africa's content is produced, packaged and distributed from elsewhere, mainly targeted for a foreign audience and the trend of content production (especially in the media circle) is making Africa look like hell on earth and hopeless. Except in a very few cases, Africa's development initiatives, progresses, improvements, hopes, etc., do not win the hearts of the reporters and hit international headlines. Rather the continent is continuously painted as one wallowing with wars, tribal conflicts, cult killing fields, famine, crime, etc. Our contention is that, yes all the previously listed things do exist in Africa and they are part of the social dynamics, like any other society. But Africa is not only those things and there are also some good things worth reporting. This trend of painting Africa as a hopeless continent is making the continent as if it is inimical to investment and affects its competitiveness. Hence content production and dissemination should be considered as a niche worth exploring.

> We are a continent driven by hope and not despair and resignation to a cruel fate . Those who have nothing would perish if the forces that govern our universe deprived them of the capacity to hope for a better future (Thabo Mbeki's speech on the 13th International AIDS conference)

6.5. TELECOMMUNICATIONS SERVICES

Telecommunications services stream is one of the growing market both globally (with a CAGR of 10.1%) and continent wise. A wide variety of mainstream and auxiliary services are packaged under the telecommunications services category: main line telephone operation, mobile services, phone shops, operation of community centers as business, etc. In most parts of Africa, telecommunications (both back bone and service) has been the milk cow for the government revenue and often the largest single contributor to the GNP generating even by world standard's above the average profits per line (due to monopoly and high tariffs). Despite the intense pressure to rollout the sector and open the market for competition, telecommunications reform (regulation and privatization) is rather very slow and the national telecom operators (who in most cases were also the regulator) enjoy monopolistic rights in

most parts of Africa. This is in part due to the strategic importance of telecommunications services and the need to distribute access equitably (though currently most of the 70% rural Africa is out of telephone reach) which may not necessarily be congruent with the interest of investors. So far, only 9 countries (Cape Verde, Central African Republic, Guinea, Guinea Bissau, Ghana, Cote D'ivoire, Madagascar, Sao Tome, South Africa and Senegal) have opened their market through transferring parts of the share (which ranges from a high of 60% in Guinea to 30% in Ghana and South Africa) for a strategic foreign investor. The arrangement involves giving the investors exclusivity period in key service areas and in return they are expected to ramp up the network infrastructure.

Besides pressure from the major development financiers to open up the African telecommunications market, two things might affect the future attractiveness (market value) of the sector. First, the world's appetite for telecommunications companies seems to have reached its peak; offerings are getting harder to do successfully and prices are getting keener- a late comer disadvantage. For example, when Guinea went the path of privatization in 1995, Telekom Malaysia paid the Guinea government about USD 6900 per line. A year later, South Africa managed to get only USD 987 per fixed line from Thintana Communications, which is a consortium hold by Telekom Malaysia and SBC International (BMI-T, 1998). Second, even if recent technologies, notably wireless access are expected to lower costs, the cost of developing African telecommunications infrastructure is a very expensive venture. Consider the following

> *The World Bank estimates that the developing countries need about $60 billion a year to pay for network infrastructure expansion and modernization. In the rest of the world that would buy about 60 million lines; according to World Bank and ITU figures, it would buy a quarter of that in Sub-Saharan Africa. Just recently Telekom SA said it will spend $ 11,950 million over five years to install 2.8 million new lines and convert 1.25 million existing lines to digital operation. This is an average of $ 4270 per new line (BMI-T, 1998: 47).*

Such telecommunications development costs might disinterest potential investors and chase away the much-needed foreign investment in the sector, which in turn affects national competitiveness. Plus, even if in some countries there are hundreds of thousands of waiting subscribers, this demand is mainly concentrated in the urban areas and the PCI of the majority of the rural population, who mostly are not as affluent as their urban counterparts may limit the revenue per line, i.e., limited economies of scale to attract investment in infrastructure. Such is also the challenge facing the most praiseworthy goal of universal access-universal service for all. Mccarthy Tetrault, a Canadian based communication consultant summarized the major problems related to African PTO privatization and suggested some solutions (see Table 14).

Table 14: Problems arising from introducing competition

Problem	Solution
Loss of ability to cross-subsidize socially desirable services	Use operator license fees for direct subsidies Impose public service obligations as part of operating licenses
Cream skimming Cherry picking Duplication of Services/facilities Loss of economies of scale/scope Umbrella pricing, i.e., new (foreign) operator comes in below regulated price but above local incumbent's cost of production	Rebalance tariffs to force incumbent to lower prices towards its cost of providing the service
Predatory pricing in competitive markets by protected operator	Permit competition in all segments Introduce strong regulatory mechanism Insist on unbundling and cost based pricing Insist on cost-based interconnect charges
Loss of proceeds of privatization due to competitive domestic market	Trade off immediate direct returns against longer term indirect returns from economic growth, higher direct and indirect tax inflows, less unemployment

Source: BMI-T, 1998

With the promise of low cost of providing access and with the possibility of generating more revenues per subscriber line, cellular services operation could hold a very bright future for Africa, especially for attracting foreign investment and democratizing access to rural communities. Especially in the latter case as can be learned from the Grameen village phone drive, rural telephone service could be very profitable. In the Grameen case, rural mobile services bring in 3 times as much revenue as urban cellular phones. For example, one competing telecom operator in Bangladesh, reports having revenue from 12,000 urban cellular lines equal its revenue from 1,500 rural lines. Plus, current developments in the wireless applications protocol (WAP) and m-commerce will make operating on mobile services a valuable venture. In addition, m-commerce will force financial services (such as bill clearing) to converge with communications services and can create windows of opportunities for third generation businesses such as "communication and finance service providers" (CFSP).

6.6. BUSINESS ORIENTED TELECENTERS

Operating telecenters for business is another niche that holds a promising return in Africa. It has the advantage of democratizing access to the rural areas and the participation of women and youth as they can run such facilities from a village. The basic idea could resemble the internationally acclaimed Grameen[32] village phone model except in this case in addition to voice telephony the center can provide a variety of services. With WAP enabled mobile phones and appropriate local content and user interface developments, this could be a very promising venture that can go a long way to making rural communities beneficiaries from the fruit of ICTs. The communal nature of African society provides the necessary social setting to expand such services. Such services (with varying business models) are already functioning in Zambia, Ghana and South Africa. In Ghana, for example the center receives e-mails, prints it and local boys use bicycles to deliver the message. Stable electricity supply and language issues are primary concerns in expanding such business models. What we need for such services is 10s and 100s of Mohammed Yunus or Kedija and a government who is committed to encourage or even share the initial risk of such entrepreneurs.

6.7. INTERNET RELATED SERVICES

Even if currently there are only 10 countries with 5000 or more subscribers and 26 with more than 1000 subscribers and the demand is shrinking in some countries (due to high connectivity cost), once internet reaches its critical mass and public awareness increases, this will open an additional market for more ISPs. With new value definition, internet service providers can also play a proactive role in speeding up the diffusion of internet. For example in Kenya, where Internet access fee is one of the most expensive (more than $150 a month) in the continent (next only to Angola), Wananchi.com offers full internet access for a tenth of that price. The idea is that cutting prices may bring Internet within the reach of most people and motivates more Internet cafes and Internet based businesses. Then, Wananchi is hoping to design and host web pages and provide other related services for these new users and generate value from these activities.

6.8. E-COMMERCE

E-commerce is believed to bundle a window of opportunities for Africa. The future also seems to be set for Internet based e-commerce to emerge as a global market place and as a mechanism through which governments, businesses and consumers engage in delivering their services. Internet and e-commerce beside incubating entirely new forms (families) of business opportunities have also the potential of improving the speed, efficiency and quality of conducting the most traditional forms of businesses. Two documents- the post ADF'99 summit Electronic Commerce in Africa and E-commerce in Africa: an assessment of status and strategies (Jensen, 1999) paint the current status of e-commerce and capture some of the opportunities and challenges of e-commerce in the continent. The following niches and opportunities are identified

- Online and offline teleservices
- Diaspora targeted marketing
- Government E-procurement
- Business to consumer (targeting overseas markets)
- Business to government and institutional market
- Infomediation services like portals, etc

The papers also identified challenges in the following areas

- Information and communications infrastructure
- Legal and regulatory issues for security
- Access technologies including computers, radios, wireless devices, television sets…
- Human resource development, training
- Payment technologies
- Fulfillment services (air fright, warehousing and distribution)
- Socio-cultural issues, etc

The following are recommended (especially in the post ADF summit report) in order to promote e-commerce and create an "e-friendly environment"

- Promoting improvements in telecommunications infrastructure and accessibility
- Promote improvements in e-business related legal, regulatory and tax environments
- Promote the creation of a consumer accessible electronic payment systems
- Promote the development of local, regional and international fast package delivery systems
- Strengthening e-commerce information, training and education structures in all aspects related to e-business

- Identifying, researching and disseminating information on potential market niches for African e-entrepreneurs
- Developing effective e-business mentoring twining and intermediation mechanisms
- Supporting the creation and development of Africa based local, regional, international, and especially Diaspora focused internet portals
- Facilitating the creation of Africa based regional, national and international institutional electronic markets
- Promoting the participation of SMEs, etc

The above two documents provide a good assessment of the existing picture and highlight what it requires to develop e-commerce and e-business practices in Africa. While endorsing the above two documents and in the interest of avoiding unnecessary repetitions, we would like to focus on one or two points that may have been implied in the above documents but not so explicitly stated in connection with e-commerce.

High value-adding e-commerce is not about following rules. Rather it requires setting new rules and breaking them as fast as possible before anyone does. It involves new value propositions and definitions and moving up the food chain. In the short-term, export-oriented-service-based e-commerce priorities might turn out to be feasible, but experiences inform our council that the long term strategy should focus on improving local appetite, willingness, and commitment to assimilate with new ways of doing things. 70% of Africa's population is rural and any e-commerce initiative that can tap this potential may have a bright future. In this respect, attention should be shifted from considering existing technologies and models as absolute dynamics to alternative technologies and models. Much of the opportunities of e-commerce may remain barren wishes if the interest is to follow western based business models, models that have proved to work in the context that is quite different from the African experience.

Due to economies of scale and as a matter of interest such alternatives might not be imported ready-made and need to be encouraged to grow from Africa's own backyard. Developing the local software industry might contribute a lot in this regard. For example an "oculus" based system using palm pilots linked to a global positioning system has been developed at UCT and commercialized by an entrepreneur currently for environmental protection and farming but with little success. The main problem is funding to develop the system further and willingness to use it. What is most enticing about this experiment is however the concept and basic idea behind it. Since the system was developed based on images and icons rather than words, it was intended to be handled by people with no or very little functional literacy in a training that requires as short a duration as one hour. With appropriate customization and further development such cutting-edge ideas can be used to provide market information and other information related services to the rural community with least cost.

Another challenge related to e-commerce is the business know-how and processes of African businesses. This might have an impact par the amount of the infrastructure in affecting the future of e-commerce in Africa. Following the market hype and connecting to the internet and establishing a web presence may only give a façade picture and may not bring the desired result unless the back-office processes of African businesses and government bureaucracies are reengineered (or even overhauled) to operate with the efficiency that e-commerce demands. Those who have online shopping experience would stand to witness that an item that took only 24 hours to be ordered, packaged and shipped to Africa from as far a place as

one can tell requires more than a week to be cleared from a local post office. With this type of business inefficiency it is very challenging to develop e-commerce in Africa.

The effort to introduce e-commerce to SMMEs should differentiate between new and emerging netpreneurs from entrepreneurs who want to enable their business with access to some form of e-commerce facilities. Then, e-commerce should be approached not as an additional technology but as a package that wraps up all (or at least most of) what these different players might require in order to succeed in their respective business. The nature, educational level, product offerings, and problems of these different players might be different and might require a somewhat targeted approach.

To sum up this section, with the converging and cross-cutting nature of ICTs, information economy provides windows of possibilities and it is easier to become overloaded with a bevy of opportunities. This runs a risk of spreading too thinly the meager resources of the continent without scoring any sizeable results in any of the engagements. It will therefore be prudent to identify and focus on a few key areas, which define priorities suitable to the realities and demands of each country and sub-region. As a way forward for policy and research we would like to highlight the following few points.

7. WHERE TO

The AISI's vision, which is subscribed by African countries, is set to lead the continent to a sustainable information society by the year 2010. The current trend of encouraging aggressive use of ICT without an equivalent recognition and development of the information economy sector might lead to trade deficit problems as Africa continues to depend and pay dearly on hardly earned foreign currency from the black box to the skill needed to implement the black box. The international price for its natural products is nowhere to offset the amount the continent is spending on ICT. Being an information affluent society requires mutually reinforcing relationships between being an effective user and a capable producer. Rarely does one exist without the other. Based on the frameworks built in this paper the following are outlined as major challenges that should be considered on the way ahead by African policy makers and researchers.

7.1. THE AWARENESS CHALLENGE

The information economy, its nature, structure, composition and benefit are not well recognized. There is too little policy appreciation of the value to be obtained from this emerging economy. Hence,

- Recognize the size, impact and importance of the information economy
- Recognize the role information and communications technology plays in the economy
- Recognize the importance of the information economy sector (the information industry) on its own right
- Recognize the supporting and enabling role the information economy sector (information industry) plays in improving the competitiveness of the other sectors of the economy
- Launch sectoral, and national awareness programs on the whole aspect of the information economy
- Promote local, national, sub-regional and regional economic learning on ICTs
- **Implement a holistic national information economy policy and strategy**

7.2. THE LEADERSHIP CHALLENGE

Experiences both from the developed and developing countries indicate that a robust government involvement in various ways is instrumental in the development of the information economy. African governments must provide leadership and lead the information economy by example.

- Move from solo dancing (sporadic initiatives) to opera (a coordinated activity of information economy that cut-across traditional ministerial levels)
- **Appoint a high level position for coordinating the national information economy activities (at ministerial level)**
- Conduct a national assessment of the information economy, its size, past and future trends and set the scenarios in terms of opportunities, challenges, and current (or easily attainable) strengths and set short-to-medium and long term goals for realizing opportunities
- **Set aside an information economy development fund to implement major opportunities identified**
- Promote the establishment of SMME's in the mainstream information economy sector and assist and guide in consortium formation
- Drive the application of information and communication technologies across government

- **Leverage the development of the local information economy through government purchasing**
- Protect locally produced software from piracy, eliminate pirated software from public institutions (especially locally produced software)
- Create an enabling political, legal, and institutional setup

7.3. THE INVESTMENT CHALLENGE

Except in a few cases (such as telecommunications, mobile and Internet services), it might be difficult to attract large-scale foreign investment in information economy in Africa[33]. Africa's poor FDI performance, however, may not necessarily be because of unattractive return on investment but rather it is to be blamed due to lack of investment protection and security issues. A recent UNCTAD study indicates that the rates of return on investment made by US companies operating in Africa were the highest in the world with an average return rates of 32.4% in 1996. This figure is three and two times more than the average return attained in South America and developing countries in general respectively. However, without investment in the production, distribution and application of information and communications technologies, developing the information economy and society will be very challenging.

- Establish a preferential treatment for investment in the information economy
- Lead the investment attraction in this sector at the highest level of government involvement by lobbying, establishing contacts, and encourage and support their realization
- Provide investment security and guarantee and institute a reliable exit and dispute resolution mechanisms
- Reduce the complexity and bureaucratic requirements of investment licensing
- Encourage local ICT investment and provide an investment guarantee such as exclusivity period, sales guarantee, etc
- Encourage the development of venture capital. Assist ventures by providing business planning, entreprenuership, project management , marketing and other related training
- Provide taxation incentives both on input and final outputs of the information industry
- Provide incentive and create mechanisms to attract the participation of the Diaspora in local investments
- Revise tax and general business rules that irk investment

7.4. THE INFORMATIZATION CHALLENGE

The use of ICT besides improving the productivity, performance and competitiveness of the economy and social players can also create local demand, which is one of the factors that determine competitiveness in the information economy. Hence, encouraging and empowering local use of ICT can provide a double edge advantage.

- Increase the ICTs awareness of local economy players
- Encourage and recognize innovative applications of ICTs and help in instituting mechanisms to spread best practices
- Create a national demonstration and help desks to assist SMMEs in ICTs choice, implementation and maintenance. If possible, provide motivation to encourage SMMEs' use of ICTs through various mechanisms
- Facilitate, support and encourage e-commerce applications through establishing appropriate frameworks, removing hurdles and leading by example
- Accelerate improving the information and communications infrastructure
- Encourage the development of low cost access technologies for addressing the need of the rural majority

- Coordinate and promote rolling out multi-purpose community centers using low cost access technologies and encourage those involved in this line of business
- In the long term institute a directive that can require organizations to use certain minimum applications of ICTs in their engagement

7.5. THE EDUCATION AND TRAINING CHALLENGE

In the Information economy knowledge is elevated to become the most important source of long run sustainable competitive advantage. Nations should turn to the cultivation of human capital athwart and cut to a bare minimum unproductive military spending. Schools and not Su 27s and Mig 29s should be the priority of Africans[34].

- Institute compulsory courses in information and communications technology as early as possible into the curricula
- Encourage local hardware shops to collect-refurbish and rollout computers that are gathering dust in most offices to high schools and elementary schools, at least where there is electricity, so that students will get exposure at an early age
- Ensure that tertiary education curricula reflects changes in the global environment
- Expand tertiary level information and communications technology education
- Establish specialized institutions (like the Egyptian Information technology and South African software development institute) to prepare young cadres for the information economy in collaboration with the local private sector and other international institutions
- Encourage, recognize, accredit and certify private institutions involved in high level ICT training
- Set requirements and (social) obligations for organizations to provide ICT skills to their staff and provide incentive and motivation.
- Institute distance, flexible and life long learning mechanisms

7.6. THE GLOBALIZATION CHALLENGE

- In all dealings with multi or bilateral agencies, to the extent possible, to the extent that Africa can bargain, follow a policy based on reciprocity, i.e., not giving away any advantages without gaining something in return
- Be selective with WTO dealings

7.7. THE RESEARCH AND DEVELOPMENT CHALLENGE

Information and communications technologies are set to cause changes in the way we learn, do business, entertain, deliver services and govern or in general in all aspects of social and economic life. Policy makers need to understand the tsunami of changes that are either caused or enabled or facilitated by ICTs and by the emerging information economy. The vision of the African information society could be bring to fruition if appropriate policies and institutional arrangements are in place to harness key ICTs and skills required for the socio-economic development of the continent. Future bases of competitiveness and Africa's role in the global economy urge us to attend to this issue as a matter of high importance. The effort to build an ICT capacity should be twined with a no less effort of promoting research in the area. Research could be instrumental at redressing the lack of indigenous capacity in the design, production and use of ICT. The research and development challenge ranges from establishing and setting up appropriate policies and institutional frameworks to identifying research areas, prioritizing them, ensuring their conduct and dissemination of findings.

7.7.1. Policy and Institutional Frameworks

In terms of policy and institutional frameworks

- Establish national institutional frameworks that encourage innovation in information economy and that involves all the stakeholders (especially the private sector)
- Forge partnerships with the private sector in research and development, institute cost sharing mechanisms through matching fund arrangements and set aside national fund for research and development in ICT
- Ensure that research outputs have industry focus and leave the shelves of researchers
- Bridge the sharp schism that exists between the research institutions and practitioners so that research findings will not age on the shelves of researchers
- Encourage regional (and international) collaboration in research and development and provide the necessary institutional framework and political support for the success of such collaborations
- Cooperate and not compete in attracting international research funds
- Create mechanisms to convert the brain drain to brain gain
- Create centers of excellence in IT and recognize and award best results
- Provide incentive in the form of tax breaks for the private sector's research and development expenditure

7.7.2. Research Areas

Regarding research areas, priorities might depend from country to country reflecting existing researching capability and future goals. Major categories of research might, however, include: product and process development research, application research, and market research

7.7.2.1. Product and process development research

The status of this research will determine whether Africa is going to continue on downloading and being dependent on imported technology only or whether it has a chance to play proactively in the global information economy. The research in this category might range from basic research with limited application potential to the ones with immediate payoffs. Considering Africa's situation; its by and large limited researching capability and its priorities, basic research might not be a feasible way to go and research needs to be focused on those with short to medium term payoffs. Following are some potential areas

- Development of low cost access technologies to address the majority of the rural community
- Software and user interfaces development research
- Appropriate models and processes for e-commerce, community telecenters, public information points, distant education, telemedicine, teleservice, etc
- Designing, producing and packaging contents-glocalization- with multimedia focus
- Designing and developing mechanisms to utilize African indigenous knowledge

7.7.2.2. Application research

Africa's experience with information technology is little investigated. What are the impacts of the information technology on the workplace, work environment, organization (business or otherwise), industry, nation, region, etc., are not well known. By the same token, the impacts of the African culture, business environment, political setup, etc., on the development of the information economy and the implementation and use of ICTs are yet to be researched. Learning institutions and policy makers are starving for African success and failure case studies. The application research might help to unravel information in these areas and include the following in no significant order

- Analysis and synthesis of government, community and business information and ICTs and ICTs and information related literacy and training needs; identification of application areas.

- The impact of ICT on the worker, work environment and work place, human computer interactions and behaviors in the use of electronic media
- Use of ICT in improving business and government service delivery, in fighting corruption (at least the petit ones); in curbing red tapes
- Security issues related to viruses, electronic fraud, hacking, privacy, etc
- E-commerce applications
- Political, organizational, social, cultural, psychological, legal, regulatory, traditional, etc., issues in the application and use of ICT in government, organization, community and family
- Ethical, moral, legal and gender issues in the application and use of ICT
- Longitudinal studies of ICT within organizations, government and the community
- Use of advanced practices such as smart cards application
- The application and use of indigenous knowledge
- Use of community telecenters and public access points
- Globalization and the emerging information economy and their impacts nationally, sub regionally and regionally
- Case studies in all the above areas

7.7.2.3. Market research

One of the biggest challenges in Africa is lack of information about the African Market. Market research will help to prove the business case, attract investment capital, and reduce the effort required by investors and operators. This information serves as a plank from which policies and future plans could be made. It also enables national authorities to address factors that interfere with more effective practices for developing human resources and this will unravel facts and systems for the measurement and recognition of skills and abilities.

7.7.3. Modalities for the Implementation

The modalities for the implementation of the various research might include the following

- Ensure national policies (such as a science and technology policies or information and communications technology policies) do have adequate provisions for promoting research in the information economy
- Identify core institutions, evaluate and assess their capabilities, provide the necessary strategic orientation and build their technological and researching capability in partnership with the private sector
- Form an African Information Economy Research Consortium whose main purpose will be to coordinate and facilitate collaboration between core institutions so that repetitions will be minimized and research outputs disseminated. In addition, the consortium will facilitate international collaborations.
- Identify key Diaspora research capabilities and enlist them within the council and twin them with core institutions
- Agree on short to medium-long term research plans and frameworks and let the right hand know what the left hand is doing
- Seed- back research findings to policy makers and educational institutions to ensure economic learning from within
- Introduce home grown research degrees to build researching capability
- Establish a peer reviewed Electronic journal for publishing research outputs and institute An African IS/IT tribe par the “IS world” to collaborate on research and other issues.

8. NOTES

1 Red Herring Magazine is a magazine published since 1993 to help business leaders using technology to build or expand their businesses. It focuses on providing " a forward-thinking, analytical look at technology companies and industries, and evaluates technology as a strategic asset"

2 Pontin, Jason (2000) From the editor: The wretched of the earth, [internet] Accessed March, 16, 2000, available <http://redherring.com/mag/issue76/mag-from-76.html>

3 Letters section of Red Herrings magazine, Accessed July, 8, 2000. Available in < http://www.redherring.com/mag/issue79/mag-letters-79.html

4 It is reported that Albert Einstein gave graduate physics students the same exam questions as in the previous year's test and when commented about that, he reportedly replied "that is okay, the answers are different this year"

5 According to the OECD between 1982 and 1990, total resource flows to developing countries amounted to US 927 billion. This amount included all official multilateral and bilateral aid grants by private charities, trade credits and direct private investment and bank loans. During the same period developing countries remitted US 1.35 trillion to the creditor countries in debt service (I.e., interest and principal) alone. This amount doesn't include other outflows such as dividends, royalties, repatriated profits and unpaid raw material exports.

6 According to recent statistics, the continent's illiteracy rate is 43% (showing a 13 % improvement since 1985); Only 47 % of the population (mostly the urban population) has access to safe water and sanitation facilities (World Bank, 2000).

7 Figures released on the 13th annual conference on AIDS (July 9-14, 2000) estimate that of the 34.5 million people infected with HIV/AIDS world wide, 70% of them are in Africa South of Sahara. In addition, it is estimated that "By 2003, Botswana, South Africa and Zimbabwe will be experiencing negative population growth of one to three percent" and it could take up to 50 years for these countries population to recover. Africa needs more than 3 billion USD per year in its campaign against HIV/AIDS and HIV/AIDS might slash the wealth of some African countries by as much as 20%

8 Also it is indicated that the three richest people have assets that exceed the combined GDP of the 48 least developed countries. The 15 richest have assets that exceed the total GDP of Sub-Saharan Africa. It is also estimated that the additional cost of achieving and maintaining universal access to basic education for all, basic health care for all, reproductive health care for all women, adequate food for all and safe water and sanitation for all is roughly $40 billion a year. This is less than 4% of the combined wealth of the 225 richest people in the world (UNDP, 1999).

9 This has been described in the following terms by Saxby (1990: 34) "in sharp contrast with the range of possible causes of the take off of the industrial revolution, the transformation from the industrial economy through the post industrial service economy to information economy can be attributed to a single cause: the spectacular technological advances produced following the post war development of the computer (emphasis not in the original). However, the management guru Peter Drucker argues that "major historical events rarely have just one cause and just one explanation". He rather argues that a serious of interrelated factors are causes for such events and even the omission of one of those factors would matter.

10 For further understanding of this shift, one might refer to Daniel (1973) The Coming of Post industrial society; Krishan Kumar (1978) Prophecy and Progress: The Sociology of Industrial and Post Industrial Society; Manuel Casteils (1996) The Rise of Network Society ,US Department of Commerce (1996) The Emerging Digital Economy; Dele, Neef (1998) The Knowledge Economy; Cohen et al (2000) Tools for Thought: What is New and Important About the E-conomy.

11 Though the recent global performance of the tech-heavy stock market has sent the euphoria to skepticism and glee to gloom and has been considered as a turning point in the new economy.

12 According to Cohen et al, (2000: 4-5) "There has been many such leading sectors in the past, the air transport in the 1960's television in the 1950s automobiles in the 1920s organic chemicals in the 1890's railroads in the 1870's and so on. Yet they did not change the standard dynamic of economic growth: they defined it….But what we are experiencing is not just a decade long boom as technology opens up new possibilities in a leading sector of economic growth: we are experiencing something deeper and border… The current technological revolutions are making tools for thought… [affecting] every single economic activity "

13 This figure includes IT hardware, IT software, IT services, telecommunications equipment and telecommunications services

14 Brua and Winston (1999) defined the internet economy as a collection of IP based networks, software applications and the human capital that makes the networks and applications work together for online businesses and agents (corporations and individuals) who are involved in buying and selling products and services in direct and indirect ways. Based on this definition they have developed a four-layer hierarchical structure for the internet economy. These are Internet infrastructure, applications, intermediaries and online transactions. The first two belongs to physical infrastructure for e-commerce and applications infrastructure, which includes software applications, consulting, training and integration services. The last two categories belong to the economic activity, which involves online intermediaries that provide match making, trust and brokerage services and the whole range of online storefronts.

15 For a complete description of these themes, one may refer to Don Tapscott's (1995) The Digital Economy: promise and peril in the age of networked Intelligence.

16 In fact FIFA's decision and the way things were cooked up for that decision was accepted with bitterness and bewilderment at least in this part of the world. Many considered the recent decision as a fresh indication of sidelining Africa from the spaces of globalization. Others were forced to question the sincerity of global organizations' commitment to the development of Africa and to really consider Africa as a continent to reckon with. FIFA's decision, at least for the time being, clearly demonstrated that it is not ready, even when Africa's readiness was so close, to trust Africa. The choice for FIFA was "innovation and trusting a new continent or sticking with the established football countries". Unfortunately, it favored an established and developed economy and awarded the event to Europe (for the 10th time) and Germany (for the second time). This decision was considered as "setback to Africa's place in the face of globalization".

17 For example, according to a recent report from CNET news the software giant Microsoft taps 4.4 billion USD for Web and Wireless research only .

18 A complete description of the dynamics of competitiveness can be referred from Porter's (1990) book of the Competitive Advantage of Nations.

19 The Data is available from http://www.fvit-eurobit.de/PAGES/EITO/figures99/index.htm

20 WITSA refers by the phrase Information and Communications Technology to computer hardware, software, and services (consulting, training, systems development and integration, etc) telecommunications hardware and services, office equipment and internal IT spending –IT employees salaries, equipment depreciation and the internal portion of IS spending budget (From the executive summary of the Digital Planet 2000: The Global Information Economy)

21 These countries in decreasing order of their % share of the world wide import are USA, Germany, Singapore, United Kingdom, Japan, Hong Kong China, France, Malaysia, Canada, Netherlands, Korea, Republic of, Taiwan, China, Italy, Thailand, Mexico, Australia, Sweden, Spain, Belgium, Luxembourg. With USA being the highest at 22.4% and Belgium/Luxembourg with 1.1%.

22 These two figures are copied as is from the executive summary of ITU's publication : Challenges to a Network : Internet for Development (October, 1999), Available from http://www.itu.int/

23 The US Department of Commerce predicts that electronic commerce will account for more than $70 billion in sales in the year 2000. Forester Research more optimistically projects that over $327 billion will change hands by 2002, while WAITS project Internet purchase to reach $ 2.5 trillion by 2004.

24 For a more detailed discussion of the informatization indicators, refer to "The Status of African Information Infrastructure" By Mike Jensen, A report presented to the first meeting of the Committee on Development Information (CODI), Available from http://www.un.org/depts/eca/adf/codipap1.htm [Accessed 18/10/1999]

25 For example in South Africa, where the International Standard Industry Classification system (ISIC/ SIC) is commonly used, statistics South Africa uses the following classifications in its reporting: agriculture, forestry and mining, construction, manufacturing, transport and communication, whole sale trade, retail trade, finance, insurance and real estate, services and public administration.

26 Data for the analysis of the South African case was taken form the reports of Information Technology in South Africa: the-state-of-the-art and implications for national IT policy and the SAITIS both of which depend on the BMI-Techknowledge report.

27 It is estimated that excluding micro and survivalist companies there will be approximately 320000 internet connected companies in south Africa by the end of 2000. It is estimated that by the end of 2001 87% of the smaller companies (50 employees or less) will be online which is a relatively higher percentage even when compared to the USA, where at the end of 1999 the figure stands at 61.5 %

28 For example the governments initiative to use smart cards for wide range of applications and the general acceptance of smart cards especially in public telephone and mobile services have attracted a 45 million ZAR investment in smart card production plants which is expected to bring home 1 billion ZAR revenue from smart card export and is intended to make South Africa major smart card supplier in the world.

29 For example, the SAITIS baseline study (based on the Foresight study) performed a SWOT analysis of the south African information economy and have come up with the following scenario

STRENGTH	WEAKNESS
▪ Accelerated role out of infrastructure ▪ Education and learning in the IT field ▪ Pockets of excellence in some areas ▪ English-ICT's lingua franca ▪ Government will to introduce IT facilitated public sector services ▪ Existing IT infrastructure ▪ IT costs are relatively low ▪ South Africa's IT leadership in Africa ▪ South Africa's international IT links ▪ IT is new driver of the economy	▪ Inequitable access ▪ Lack of National IT strategy ▪ Low level of literacy and education ▪ Inadequate IT skills Base, worsened by the brain drain ▪ IT Phobia and elitism ▪ Poor government services hamper IT roll-out ▪ Industrial age management is still being used in the IT age ▪ Small local market ▪ Poor technology transfer ▪ International luck of clout in IT ▪ Poor conditions for investors ▪ IT precipitated antisocial behavior
OPPORTUNITIES	THREATS

Emerging information society Accelerated roll-out of telecommunications infrastructure Policies to foster an information society IT enabled learning/education training Distance education National policy to stimulate IT development Public Services delivery through IT Transformation of government using ICTs Software development to address developing world problems Indigenous knowledge exported via ICT's Less legacy infrastructure than the developing world International links solve several IT Weaknesses Various ways of financing IT operations SMMEs: the future of the IT industry Work patterns are more flexible ICTs can enhance security and safety	IT worsens disparity in the information Society Lack of IT skills in the labor force outside the IT sector Education funding is low Distance education is not a mature medium Government inefficiencies-too sluggish for the fast moving IT sector Government policies may lead to job loses Redundant and inappropriate technologies Globalization favors the developed world A weak economy is further threatened in a global information society New social problems arise

30 Conventionally, system software include operating systems, compilers, languages, and data communication; packaged application tools covers generic packages like word processing, email, spreadsheet, business graphics, database management, and application solutions involve the development of integrated software for key business processes.

31 The US Software Engineering Institute has developed a five point scale of classifying the maturity level of software firms: Initial, Repeatable, Defined, Managed and Optimizing. Initial represents ad hoc processes. Repeatable involves defining and following basic management practices while Defined refers a situation where the technical practices are defined and enforced. The last two –managed and optimizing requires fully defined process and a mechanism for controlling performance and the capability to measure results, prevent errors and instituting a feedback mechanism to identify areas for improvement.

32 Grameen Telecom's Village Phone pilot project currently involves 950 Village Phones providing telephone access to more than 65,000 people. Village women access micro-credit to acquire digital GSM cellular phones and subsequently re-sell phone calls and phone services within their villages. Grameen Telecom staff have announced that when its program is complete, 40,000 Village Phone operators will be employed for a combined net income of $24 million USD per annum. The bigger picture of Grameen's micro lending services now has more than 2 million clients and covers 39, 346 villages. For more detailed information visit the following two sites- www.telecommons.com/villagephone and http://www.grameen.com

33 For example, between 1990 and 1997, foreign direct investment to developing countries grew from US 25 billions to more than 150 billions. By 1997, the share of Sub Saharan Africa remains at a staggering 4 billions only

34 For example on his recent speech to the OAU, ECA's executive secretary has indicated that average per capita spending on education in Africa declined from $41 in 1980 to $25 in 1995 in real terms. However data from international institute of strategic studies indicate that the military spending of African countries is increasing both nominally and as the percentage of the GDP.

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