

ICT as an Engine for Uganda's Economic Growth: The Role of and Opportunities for Makerere University

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The use of Information and Communications Technologies (ICT) to improve how goods are produced and services are delivered is a feature of everyday life in developed countries. If ICT is used appropriately, it has the potential to vastly improve productivity. Thus the issue for developing and least developed countries is how best to use ICT to achieve development objectives, given the operating constraints in these countries. The constraints are mainly lack of infrastructure and human capacity. It is now a known fact that ICT infrastructure readiness without adequate skilled ICT human capacity cannot lead to economic growth. In this paper we discuss the role of Makerere University and suggest opportunities for Makerere University in this area of ICT led –economic growth of Uganda.

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1. INTRODUCTION

Information and communications technologies, broadly defined, facilitate by electronic means the creation, storage, management and dissemination of information. The emphasis in this paper is on both ICT as a vehicle for communication and as a means of processing information. The communication vehicles range from: radio (analogue, digital and high frequency two-way), television, telephone, fax, computers and the Internet. Newspapers are also included; as they also often now have an electronic form on the World Wide Web.

The old types of ICT i.e. the newspapers and as well as radio and television have the advantages of low cost, requiring little skill to operate and the potential to be highly relevant to the needs of the users in

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terms of local information delivered in local languages. Their downsides are to do with the often one-sided nature of the communication and potential for censure by governments.

The new, more advanced forms of ICT include networked computers, satellite-sourced communication, wireless technology and the Internet. A feature of these technologies is their capacity to be networked and interlinked to form a 'massive infrastructure of interconnected telephone services, standardized computing hardware, the Internet, radio and television, which reach into every corner of the globe'. Four interconnected characteristics of the new, advanced ICTs are worth noting [Curtain 2004]. The first is their capacity for interactivity: the new forms of ICTs offer effective two-way communication on a one-to-one or one-to-many basis. Second, the new ICTs are available 24 hours a day on real time, synchronous or delayed, asynchronous basis. Third, ICT through its interconnected infrastructure now has a reach over geographic distances not possible even in the recent past. The fourth feature of the new ICT that is also highly significant is the continuing reduction in the relative costs of communicating, although this differs by location.

In Uganda there is a high incidence of radio ownership in low-income communities, which indicates that it is a low cost communications technology that many people can afford. There is also a relatively high incidence of mobile phone ownership in low-income communities in Uganda. TV is also important as a means of communication where people of low-incomes have access to electricity. Community ICT facilities such as community radio, and community television exist and should be encouraged as they play a significant role in preserving and providing access to cultural information and other resources. They can promote the traditions and heritage of ethnic and marginalized groups and help to keep their language, indigenous knowledge and way of life and livelihood alive and active.

The key factors responsible for the different ICT take-up rates in Africa are: per capita income, language, levels of education (illiteracy), internal digital divide within the African continent, restrictive regulatory framework, poverty and the lack of infrastructure and the rural concentration and dispersed nature of a country's population. In general, the lower a country's per capita income, the less likely its population is to have access to both old and new information and communication technologies [Curtain 2004].

There are trade offs for low-income countries in terms of devoting scarce resources to ICT and therefore there is a need to identify which kinds of ICT access deliver the best value for money in developing countries, and how the limited resources that can be spent on it can be made to best suit the particular needs of the poor [Caspary 2002]. Maximizing the use from ICT for developing countries requires an understanding not only of the opportunities ICT present, but also of the trade-offs involved – and of the particular ways in which ICT access has to be tailored if any developmental benefits are to be reaped.

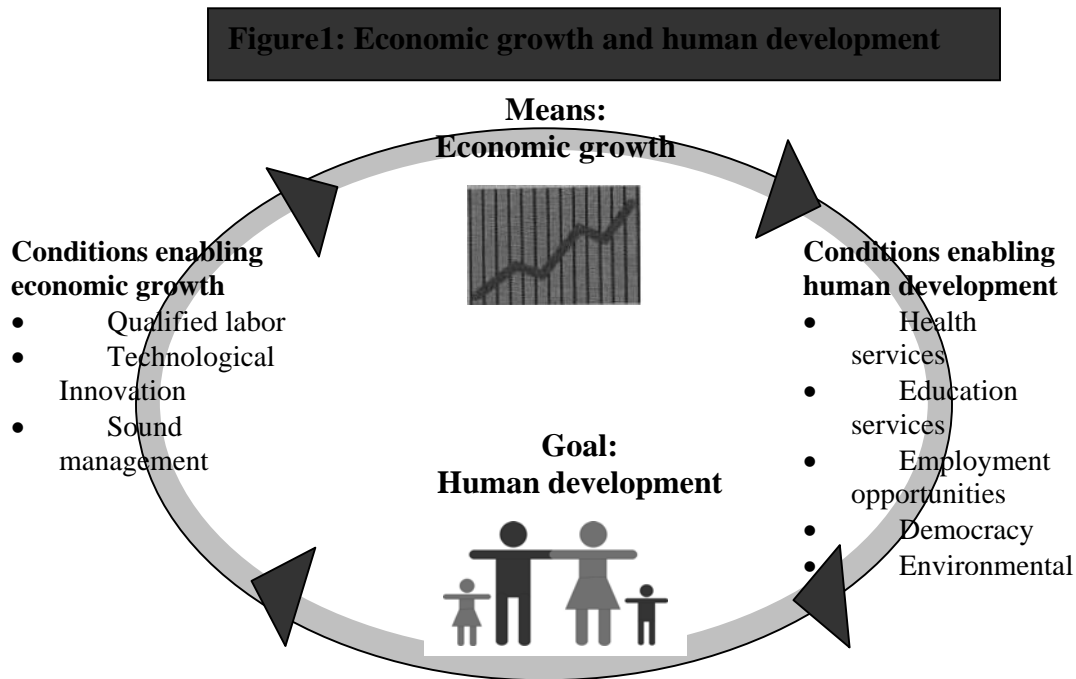
Universities should provide a vision, strategy and an enabling environment that promotes the use of information and communications technologies (ICT) in universities in particular and society in general. Through access to information and freedom of expression, citizens are able to gain civic competence, air their views, engage in discussions and deliberations, and learn from one another, all of which provide the citizen with an enlightened understanding of government action. Governance is the way power is exercised in managing a country's economic and social resources for development. ICT present opportunities for African countries to implement e-governance/ e-government. ICT can support transparency, create a public space for citizens as well as offer a readily available consultation mechanism. The Internet, distance-learning opportunities, online (electronic) learning, computerized library packages and strategic databases must be brought nearer to the isolated and poor African nations unable to integrate their economies and intellects with the powerful and respected community of states.

1.1 Development

Development means improvement of a country's economic and social conditions. More specifically it refers to improvements in ways of managing an area's natural and human resources in order to create wealth and improve people's lives. Development is sustainable when it meets the needs of the present without compromising the ability of future generations to meet their own needs. Thus, sustainable development is defined as maintaining a delicate balance between the human need to improve lifestyles and feeling of well-being on one hand, and preserving natural resources and ecosystems, on which we and future generations depend.

Growth means moving towards wealth, which means the same thing as moving away from non-wealth. Growth is usually calculated in real terms, i.e. inflation-adjusted terms, in order to net out the effect of inflation on the price of goods and services produced. Economic growth is the increase in value of the goods and services produced by an economy. It is conventionally measured as the percentage rate of increase in real gross domestic product.

The relation between economic growth and human capital (skilled labor) is illustrated by the two figures (Figure 1 and Figure 2) below adopted from Soubbotina and Seram [2003]:



1.1.1 Economic Development

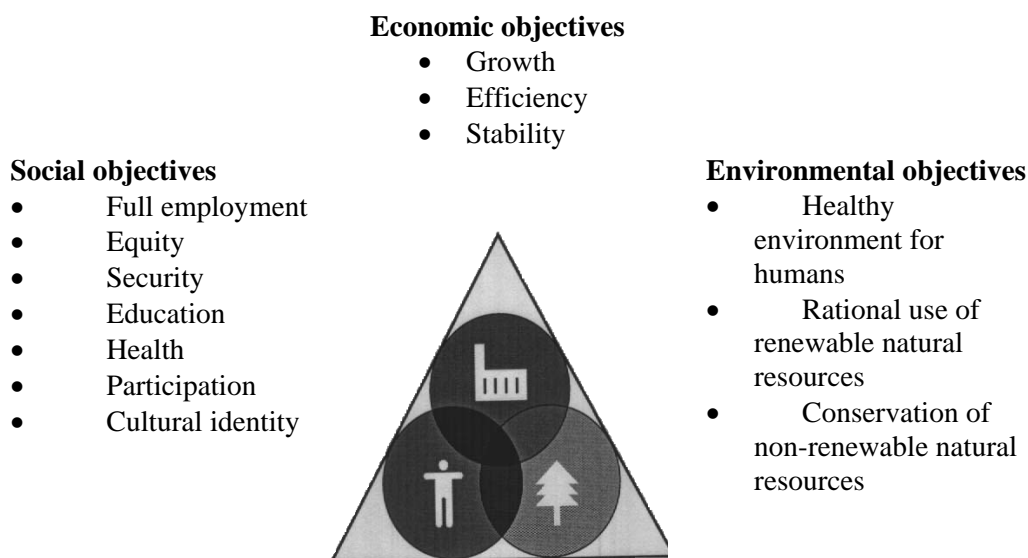
Economic development is a measure of how wealthy a country is and of how this wealth is generated (for example agriculture is considered less economically advanced than banking). Economic development is any effort or undertaking which aids in the growth of the economy.

Different countries or regions can be grouped under More Economically Developed Countries (MEDCs) and Less Economically Developed Countries (LEDCs). Development can be considered in terms of either economic or human development. Indicators are used to judge a country's level of development. The economic indicators include:

- (a) Gross Domestic Product (GDP) measures the wealth or income of a country. GDP is the total value of goods and services produced by a country in a year.
- (b) Gross National Product (GNP) is another measure of a country's wealth or income. GNP measures the total economic output of a country, including earnings from foreign investments which are not included in GDP.
- (c) GNP per capita is a country's GNP divided by its population (*Per capita* means *per person*).
- (d) Economic growth measures the annual increase in GDP, GNP, GDP per capita, or GNP per capita.
- (e) Inequality of wealth is an indication of the gap in wealth and income between a country's richest and poorest people. It can be measured in many ways (e.g., the proportion of a country's wealth

- owned by the richest 10% of the population, compared with the proportion owed by the remaining 90%).
- (f) Inflation measures how much the prices of goods, services and wages are increasing each year. High inflation (above a few percent) is believed by many to be a bad thing, and suggests a government's lack of control over the economy.
 - (g) Unemployment is measured by the number of people who cannot find work.
 - (h) Economic structure shows how a country's economy is divided between primary, secondary and tertiary industries.
 - (i) Demographics studies population growth and population structure. It compares birth rates to death rates, shows average ages, and compares numbers of people living in towns with numbers living in the countryside. (Many LEDCs have a younger, faster-growing population than MEDCs, with more people living in the countryside than in towns.)

Figure 2: Objectives of sustainable development



1.1.2 Human Development

Human development measures the extent to which people have access to wealth, jobs, knowledge, nutrition, health, leisure and safety as well as political and cultural freedom. The more material elements in this list such as wealth and nutrition are often grouped together under the heading standard of living and the less material elements such as health and leisure under quality of life. Human development indicators measure the non economic aspects of a country's development and include:

- (a) Life expectancy is the average age to which a person lives.
- (b) Infant mortality rate counts the number of babies per 1,000 live births, who die under the age of one year.
- (c) Poverty indices count the percentage of people living below the poverty level, or on very small incomes (e.g. under £1 per day).
- (d) Access to basic services measures the availability of services necessary for a healthy life, such as clean water and sanitation.

- (e) Access to healthcare takes into account statistics such as how many doctors there are for every patient.
- (f) Risk of disease calculates the percentage of people with dangerous diseases such as AIDs, malaria, tuberculosis, etc.
- (g) Access to education measures how many people attend primary school, secondary school and higher education.
- (h) Literacy rate is the percentage of adults who can read and write.
- (i) Access to technology, includes statistics such as the percentage of people with access to phones, mobile phones, television and the Internet.
- (j) Male/female equality compares statistics such as the literacy rates and employment between the sexes.
- (k) Government spending priorities compares health and education expenditure with military expenditure and paying off debts.

1.2 Two Approaches to use of ICT for Development

1.2.1 ICT as Tool to Promote Economic Growth

This focuses on ICT as a driver of the development process. This usually involves providing the poor with opportunities to receive up-to-date information or the ability to communicate more easily or achieve an enhanced ability to communicate with others. The explicit or implicit objective of an ICT-led development project such as Telecentres is often on promoting economic growth through access to better opportunities to generate income to reduce poverty.

The ICT-driven approach is often underpinned by the economic assumption that better information improves how economic resources are allocated. It is a fundamental axiom of orthodox economics that the capacity of an economy to operate efficiently depends on how well markets work. Markets operate through the adjustment of supply and demand of goods and services through prices, which send signals about the balance between these two sides of the equation. In practice, prices do vary widely not only over time but from region to region, particularly where information flows are limited or non-existent [Eggleston et al. 2002].

In poor countries, the coordination of economic activity rarely works well. In isolated rural villages in most developing countries, there are virtually no sources of information regarding market prices and other production related information. For them, 'information is poor, scarce, maldistributed, inefficiently communicated and intensely valued'. ICT and village knowledge centers offer the possibility of improving the life and well-being of rural communities; not only by enhancing markets and generating knowledge-based livelihoods, but also by furthering healthcare, education, government entitlements, social cohesion and societal reform.

The economic case for the contribution of ICT to the reduction of poverty through economic growth is summarized in Figure 3 Eggleston et al. [2002] below. The postulated relationship between access to ICT and economic growth is spelt out through a five-step process starting at the bottom of the pyramid.

The economic justification for giving the poor better access to ICT is that up-to-date and reliable information about prices and availability of resources can be more easily disseminated to areas where the poor are more likely to be concentrated. The poor receiving the information are then better able, as both producers and consumers, to participate in effective markets [Eggleston et al. 2002]. The immediate consequence should be income gains for participants, and the ability to better spend their incomes. Over the long term, enhanced access to information should enable producers to significantly improve their practices. Such improvement lays the path to economic growth.

The ICT-driven approach to development is more likely to emphasise communication as a good outcome in itself. ICT-based projects such as telecentres offering access to e-mail or the setting up of a web site as a marketing tool are favoured because they provide better access to markets through current and reliable information on prices, and offer the opportunity to promote goods. There are many publicized stories of how small traders or poor communities in low and middle income countries have gained access to wider markets through the Internet. These range from a small venture in a slum area of Nairobi selling sandals made from car tyres to the United States to use of the web pages to encourage pro poor tourism in Nepal [SNV 2007]. The poor benefit through increased demand for their products.

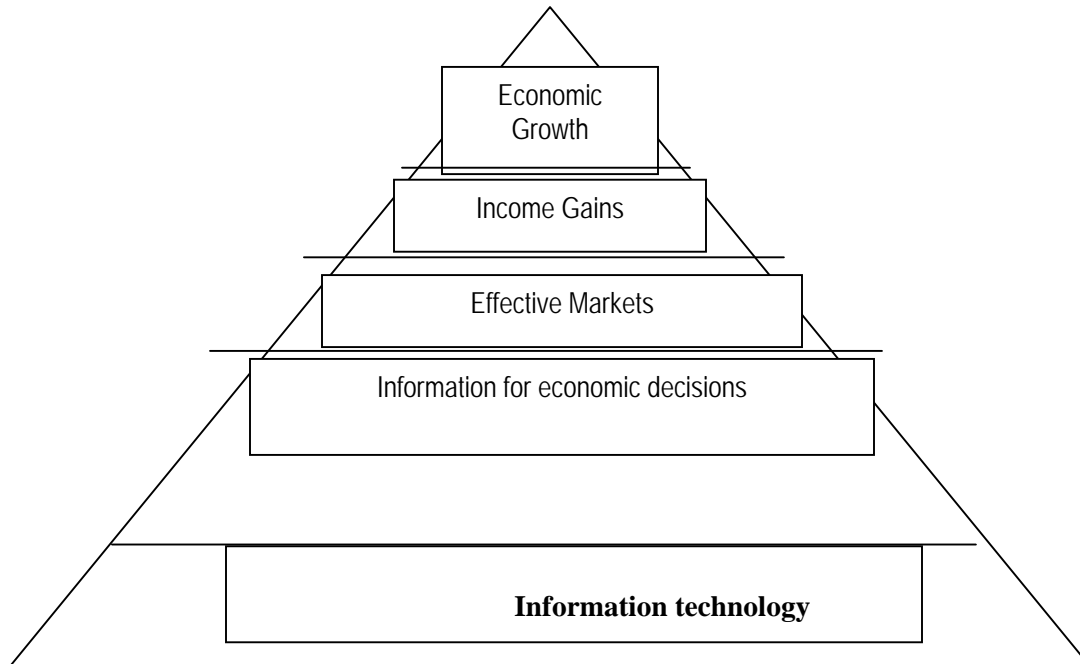


Figure3. The Purported relationship between ICT and economic growth, adopted from Eggleston et al. [2002].

1.2.2 Use of ICT in Support of Development

Here ICT plays a supporting or supplementary role to meeting a primary objective in development projects. This approach first clarifies the development goal the project is addressing; works out what the information and communication needs of the target group are and then looks to a cost effective way that ICT and other media can play in managing information and providing channels of communication [Heeks 2002]. This approach starts with a more multidimensional perspective on poverty reduction, acknowledging the importance of better access to services such as education and health. Access to government services in a transparent way with low transaction costs is another way in which ICT can play a key supporting role in development. The role of the poor themselves in defining their own information needs is a key characteristic of this approach.

2. ROLE OF MAKERERE UNIVERSITY

2.1 Human Capital Development

For any meaningful development to take place, a critical mass of human capital and in this particular case ICT human capital is mandatory. People with ICT skills and knowledge now drive the service industry world over. As of 30th October 2006, the Faculty of Computing and IT (CIT) had a total of 5560 students (5000 undergraduate and 560 postgraduate students including 54 PhD students) distributed in four academic departments of Computer Science, Information Technology, Information Systems and Networks. There are other students undertaking short courses. By 2008 CIT will have about 10,000 diploma and degree students in this area alone. In preparation for high student enrollment in this area, Makerere University is currently putting up the largest computing centre in Africa. Once completed it will accommodate over 12,000 students at any one time. CIT is posed to serve as the number one ICT human capital producer and sustainer not only in Uganda but also in the neighboring regions. The one advantage of the graduates from CIT is that they follow internationally recognized curricula [Shackelford et al.2005].

The Faculty of Computing and IT at Makerere University has designed and implemented programs in computing disciplines [Baryamureeba 2007]. For example:

- The programs under the Department of Computer Science include a PhD in Computer Science, M.Sc. in Computer Science, Postgraduate Diploma (PGD) in Computer Science, B.Sc. in Computer Science, Diploma in Computer Science and Information Technology, and Computer Science as a sub-program (as part of the B.Sc. Degree Program) in collaboration with Faculty of Science.
- The programs under the Department of Information Technology include a PhD in Information Technology; Master of Information Technology with options in Information Technology Management, Information Security, Internet and Service Delivery, and Internet and Web Computing; PGD in Information Technology; and Bachelor of Information Technology.
- The programs under the Department of Information Systems include a PhD in Information Systems; M.Sc. in Information Systems with options in Computer Information Systems, Management Information Systems, Information Systems Management, and Internet and Database Systems; PGD in Information Systems; Bachelor of Information Systems (*proposed*) to begin in 2007/2008 academic year.
- The programs under the Department of Networks include a PhD in Software Engineering; M.Sc. in Data Communications & Software Engineering with options in Data Communications Engineering, Network and System Administration, and Software Engineering; PGD in Data Communications & Software Engineering; PGD in ICT Policy and Regulation; is run under Nettel@Africa program [NETTEL 2007]; B.Sc. in Computer Engineering (*proposed*) to begin in 2007/2008 academic year; and B.Sc. in Software Engineering (*proposed*) to begin in 2007/2008 academic year. The Department of Networks will soon be split into three departments: Department of Software Engineering, Department of Computer Engineering and Department of Data Communications and Computer Networks.
- The Faculty of Computing and IT also runs several short courses of duration 1-8 months which include Certificate in Computer Applications (CCA); International Computer Driving License (ICDL); Oracle Certified Associate (OCA); Oracle Certified Professional (OCP); Cisco Certified Network Professional (CCNP); Cisco Certified Network Associate (CCNA); IT Essentials I & II; and Microsoft Certification: MOS, MCDBA, MCSE, MCSA, and MCSA.

Many African countries (e.g. South Africa, Ghana, Rwanda, Uganda, Kenya) have developed ICT-led socio-economic development strategies. However, without a critical mass of ICT professionals in these countries these strategies will only remain on paper. It is the critical mass that will lead to several innovations and patents that are a prerequisite for development. Also the critical mass will ensure stable workforce, easy retention of staff and generally affordable skilled human capital. This in the long term will lead to low costs of production, which will attract multi-national companies and lead to high tax collections, as is the case in China and India.

2.2 Research Development

No country or company can grow without investing heavily in research. For example Microsoft Inc. and Cisco Systems Inc budget for millions of dollars for research every year and through their foundations invest a lot of money in private sector-university partnerships. For example Cisco Systems Inc. runs Cisco Systems University Research Program worth millions of dollars and twice every year researchers from Universities around the world compete for research funds in priority areas to Cisco Systems Inc. research strategy. Countries like USA, Canada, Finland and China to a name a few, are investing heavily in research. For example, in 2005 China accelerated Science and Technology (S&T) expenditure by 25% increase compared to 2004, at the same time Research and Development (R&D) expenditure alone grew by 20% and R&D workforce surpassed a million. Makerere University Faculty of Computing and IT is posed to spearhead research in Computing and ICT since its advantaged by high graduate student population, hosts both an Annual International Conference on Computing and ICT Research and an International Journal of Computing and ICT Research [Baryamureeba 2007]. The cutting edge (multidisciplinary) research will lead to innovations/ patents, which could foster private sector competitiveness in the long run.

2.3 Contribute Towards a Literate Community

Most of the rural communities have a wealth of indigenous knowledge but because they cannot read and write they are normally termed as illiterate. Makerere University will work towards a literate society especially in ICT by customizing search engines and operating systems in local languages and designing user-friendly computer interfaces. This will strengthen the community outreach function of the University. In addition Makerere University will ensure that all graduates leaving the University are computer literate and have both basic and advanced ICT skills.

2.4 Local Content Development

The area of generation of local content in Uganda is still untapped. There is need to generate local content that can be put on the web and also used in e-learning. There is need to preserve and disseminate indigenous knowledge through creation of online databases.

2.5 Incubation and Innovation Centre

Makerere University Faculty of Computing and IT is one of the largest computing faculties in Africa. Universities have and will always serve as the best and cheapest incubation centres for many products. Makerere University in partnership with the Government of Uganda is taking advantage of the graduates from this faculty and other faculties to incubate and rollout ICT outsourcing in areas like data and call centres, software development and customization, and e-service delivery. The faculty is about to complete a 12,000 sq metres computing building [Baryamureeba 2007] that will provide space for the centre activities. Former students will be given a fully equipped computing facility of at least 1000 computers within this building to explore ideas and incubate them under the supervision of Makerere University staff and later start spin off companies. Some of the advisors to the students will come from the Department of Software Development and Innovations, an autonomous unit within the Faculty of Computing and IT and ICT Consults Ltd, the consulting arm of the Faculty of Computing and IT at Makerere University [Baryamureeba 2007]. The Faculty of Computing and IT will also partner with the private sector on some of the initiatives and this is expected to facilitate two-way knowledge transfer. It will also open up an avenue for development of commercial products from the prototypes developed by the students. Transformation of staff and student research and prototypes into commercial products adds value to research and also provides an opportunity for the University to generate income.

3. KEY OPPORTUNITIES FOR MAKERERE UNIVERSITY

3.1 Software Industry

The term East Asian Tigers refers to the economies of Hong Kong, Taiwan, Singapore, and South Korea. They are also known as Asia's Four Little Dragons. These countries and territories were noted for maintaining high growth rates and rapid industrialization between the early 1960s and 1990s. The growth of these economies was mainly from exports. In the early 21st century, with the original four Tigers at or near to fully developed status, attention has increasingly shifted to other Asian economies which are experiencing rapid economic transformation at the present time. The four Tigers share a range of characteristics with other Asian economies, such as China and Japan, and pioneered what has come to be seen as a particularly "Asian" approach to economic development. Key differences include initial levels of education and physical access to world markets (in terms of transport infrastructure and access to coasts and navigable rivers, which are essential for cheap shipping).

Africa and in particular Uganda has the opportunity to accelerate development using ICT as an engine of economic growth. One strategic area is software development. Microsoft Inc., IBM, Google and Yahoo for example are among the richest companies in the world and contribute a lot of taxes to governments around the world. What is interesting is that most of the world's successful companies like Microsoft Inc., Cisco Systems, IBM, Sun Microsystems, Yahoo and Google trace their roots at education institutions. Makerere University being a premier University in Uganda and in the region holds key to spur the software industry and lead to spin off companies that could accelerate economic growth. Luckily by 2008 Uganda will have the highest ICT Human Capital Index in Africa making it an attractive investment destination for ICT companies. This is on the assumption that the other factors like political stability will be

favourable to foreign direct investment and local investment. However, it must be noted that as much as countries like Uganda would like to attract foreign investors, no country in the world has ever developed on the basis of foreign investors alone; there need for a strong local private sector. Makerere University will work towards a stronger local private sector industry focussing on software solutions.

3.2 Education Industry

ICT should enable universities to operate 24/7 via online tutors who could operate from their homes, thus providing employment from home. Many universities across the globe provide education to thousands of students off campus (online) for several awards ranging from certificates to degrees in different disciplines. Phoenix University [Phoenix 2007] is one example of a University that offers online diploma and degree programs. ICT present opportunities for lifelong learning in Africa. ICT present students with an opportunity to register and receive information online. The largest repository of information is the Internet and as of today thousands of journals and books are available online. Governments are looking at education as an Industry and many universities are aggressively recruiting international students on the online degree/diploma programs. Makerere University will take advantage of ICT to run online academic (diploma and degree) programs and expand distance education by introducing tele-education (tele-education is the application of telecommunication systems (the use of ICT) to provide distance education). Makerere University will rollout tele-education in Eastern Africa under the auspices of the African Union.

In addition to running core programs in computing and ICT, Makerere University will run crosscutting computing courses for all the students in the University to enable them integrate ICT in their disciplines.

There is also the opportunity to use the modern computing facilities [Baryamureeba 2007] being put up to conduct ICT skills training and awareness to local governments, students in pre-University education institutions (primary, secondary and tertiary institutions), the public and private sectors. Makerere University also plans to encourage other academic institutions in Uganda including Universities to outsource computing training from Makerere University since many universities in Uganda do not have either sufficient computing facilities or human capacity to impart the right skills to the students. This way the University expects to generate income from these occasional or short -term or part-time or modular students.

3.2.1 *Midnight University*

In a bid to provide education for all especially in ICT, Makerere University Faculty of Computing and IT started midnight classes in professional courses like Cisco Certified Network Associate (CCNA), International Computer Driving License (ICDL) and Certificate in Computer Applications (CCA). All these courses are available online. With the growing emphasis of tele-education and e-learning Makerere University is exploring the opportunity of becoming a 24/7 University and open its doors to thousands of people across the globe. In light of this Makerere University is currently training several online tutors in all the disciplines offered at Makerere University. Makerere University Faculty of Computing and IT is involved in setting up government owned e-learning centres countrywide.

The Midnight University will give an opportunity to students to study from their homes if they have a computer connected to the internet or use the facilities at the University at night and be able to be tutored by lecturers from either their homes or on campus at night. This flexibility will make it possible for many Ugandans and others to access education. The Midnight University will also benefit from the African Diaspora especially the Ugandan Diaspora since when it is midnight in Uganda its in the afternoon in North America and morning in Asia. It is possible to exploit the time differences and use the Diaspora to participate in the educational activities in Uganda.

3.3.2 *Engage the African Diaspora*

More than 10,000 Africans are senior experts in Science and Technology and innovations in developed countries. There is need for Makerere University in particular and African Universities in general to tap into this skilled human resource with the aim of transferring high-end skills and knowledge to the local experts on the African continent. With ICT it is possible to turn brain drain into brain gain and in the end have brain circulation. The African Diaspora in the area of ICT/ Science and Technology hold key to

Africa's development and should team up with the local scientists in the area of innovations, e-supervision of graduate students, e-tutoring, e-learning, tele-education and tele-medicine. Thus African governments must put incentives such as dual citizenship, centres of excellence and attractive salary packages in place so as to attract the Africa's best brains just like China and India did and continue to do. The advantage is that with the use of ICT they do not have to be physically in Uganda.

3.3 Consultancy

The Faculty of Computing and IT at Makerere University has the cream of the ICT Consultants in the country and has been providing consultancy services to the different sectors through its consultancy arm ICT Consults Ltd [ICT 2007]. As both multinational and national companies setup business in Uganda, the demand for local consultants is going to increase. There will be need to outsource Information Technology services like network and system administration services from outside the companies.

Universities world over get most of their finances from the private sector and a case in point is Stanford and Harvard. So it is in the best interest of Makerere University to place a key role in nurturing private sector growth by providing supportive human resource and creating an environment for spin off companies from University incubation and innovations centres. ICT Consults Ltd has been giving on the job consultancy training to continuing and former graduates of Makerere University Faculty of Computing and IT and as a result these trainees have established some successful spin off ICT companies within Uganda and neighboring countries.

Policy development. In most African countries including Uganda, enabling policies in the ICT sector, telecommunications sector and other related sectors are still lacking or restrictive. Makerere University has developed a knowledge base in this area and is ready to provide these services to the Government of Uganda and the region through consultancy and research.

3.4 Private Sector-University Partnerships

ICT provide opportunities for Universities to engage in business with the private sector and increase on the tax base. Makerere University has already put in place an investment policy to enable such partnerships and joint ventures.

3.5 Outsourcing Services

The other opportunity for universities in the area of outsourcing is data and call centres business, software development and customization, customer care and support. The Government of Uganda has approved Makerere University Faculty of Computing and IT as the lead institution in incubating and rolling out data and call centres in Uganda. Makerere University in partnership with the Government of Uganda and the private sector is going to set up commercial data centres and call centres at Makerere University and across the country. The data and call centres at Makerere University will benefit from the computing facilities and bandwidth at night when most of the students are not utilizing the resources. This may lead to optimal utilization of resources.

Makerere University plans to offer remote (offsite) and onsite ICT services like network and system administration, information/ data processing and backup data centres to both local and international companies. The specialized human resource now exists in the Department of ICT Services and the Department of Software Development and Innovations within the Faculty of Computing and IT, ICT Consults Ltd and the Directorate for ICT Support at Makerere University.

3.6 Telemedicine

Telemedicine means using various forms of telecommunications/ ICTs to deliver health services across a distance, re-creating a clinical environment to provide patients with basic information and specialists with clinical advice enabling them to operate on the patient. Makerere University in liaison with Mulago National Referral Hospital in Uganda will undertake telemedicine rollout in Eastern Africa under the auspices of the African Union. Makerere University Faculty of Computing and IT is partnering with the College of Health Sciences at Makerere University to provide commercial telemedicine services to the Uganda community, especially those in low-income communities but with access to ICT.

3.7 University Management

Makerere University sees information systems offering an opportunity to down size administrative staff and make the administrative services faster and more efficient. Makerere University commissioned an integrated information system comprising of the Academic Records Information System, Finance Information System, Human Records Information System and the Library Information System in January 2007. We hope that this integrated system will help the University to cut on administrative costs and provide timely and efficient services. Other academic institutions and government departments that have not yet adopted ICT in management may learn from the local good practices of using ICT in management.

4. CONCLUDING REMARKS

In this paper we have discussed the relationship between ICT and economic growth. The role of Makerere University in enabling ICT as an engine for Uganda's economic growth has been discussed. We have stressed the importance of University-private sector partnerships as the major formal channel for two-way knowledge transfer. Lastly we have proposed opportunities Makerere University can exploit in this new area of ICT-led economic growth and generate income.

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