

THE 4TH HIGHER EDUCATION FORUM, 2012

The Role of ICT in University Governance in Tanzania

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Naura Springs Hotel, Arusha.

13th – 14th September, 2012

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Abstract.

Information and Communication Technologies (ICTs) are widely deployed in Tanzanian Universities mainly for the purpose of provision and accessing information and automation of administrative processes. In this paper we review briefly the challenges faced by Tanzanian Universities in integrating ICT and the role of ICT in University governance. We also explore ICT trends which are having or likely to have impact on University business processes including teaching, research, community engagement and administration. We conclude by noting that ICTs have the potential to considerably improve University governance when properly and adequately deployed taking advantage of mobile and cloud computing applications.

Introduction

Information and Communication Technology (ICT) is now widely applied in many sectors of the economy including the Higher Education Sector in Tanzania. Many researchers for example Aiyepku et al¹ give three reasons for rapid introduction of ICT in Sub-Sahara Africa: one, the revolution in ICT has resulted in computer hardware becoming cheaper and, therefore, more widely available. Two, the substantial, value added, utility of ICT in the provision of, and access

¹ Aiyepku, W. Olabode, A. Iwayemi, I.S.Y. Ajiferuke, *Information Technology and Capacity Building for Global Environment (Africa)*, Global Environment Facility (GEF), October 1994.

to information services for improved planning and organizational management has become more widely recognized. Three, the international development agencies and donor countries have exerted significant pressure upon many governments, institutions of higher learning and other recipients of their aid, covertly and overtly, in developing countries to adapt the extensive use of ICT to improve their workforce performance and organizational management. The rapid infusion and diffusion of information and communication technology into universities in Tanzania raise important management issues for top management and the technical staff but also presents an opportunity for improved governance and robustness for these institutions.

In many studies, researchers e.g., Teo,² Derek, and Dahlman³ and Chung⁴, 2001) claim that since ICT use has made world economies more competitive and interdependent, knowledge creation and its use have become focal points for long-term development strategies. They also suggest that since ICT improves the standard of living, modernizes societies, promotes equity in education, enhances the quality of teaching and learning, and, with other technologies, is a force for change, a more diversified and flexible type of Higher Education Sector (HES) in which research, teaching, and social engagement remain rich, relevant, and accessible is needed in countries, like Tanzania, transitioning to knowledge economies. In this paper we shall attempt to review ICT integration in Tanzanian Universities and identify what role ICT is playing and can play in enhancing good governance in Higher Education Institutions (HEIs) in Tanzania.

University Governance

Governance has been defined in a number of ways. For the purpose of this Forum, University governance has been defined as “the means and processes which facilitate the functioning of a

² Teo, T. (2009). Modeling technology acceptance in education: A study of pre-service teachers. *Computers & Education*, 52(1), 302-312.

³ Derek H. C. Chen, Dahlman C. J. (2005). *The Knowledge Economy, The KAM Methodology and World Bank Operations*. The World Bank, Washington. Retrieved August 18, 2010, from http://siteresources.worldbank.org/KFDLP/Resources/KAM_Paper_WP.pdf.

⁴ Chung, F. (2001). *Key Role of Higher Education in the Development of Africa*. IICBA - Newsletter, 3(3). from <http://www.unescoiicba.org/newsletters/ByVol/EN/Vol.3%20No.3,%20September%202001%20EN.pdf>.

University in terms of making right decisions and take actions at the right time.” It also refers to both the relationships between internal and external governance structures and actors and the manner in which they influence each other. The World Bank ⁵ for example when elaborating on characteristics of good governance for national governments has listed the following”...predictable, open and enlightened policy making; a bureaucracy imbued with a professional ethos; an executive arm of government accountable for its actions; a strong civil society participating in public affairs and all behaving under the rule of law.” When the above characteristics of good governance are referred in general terms to the University management and University stake holders (students, staff, the public etc.) it is possible to see how ICTs can drive changes towards good governance in HEIs. This can further be analyzed by examining the role of ICT in promoting institutional robustness and optimal performance in the four key operational functions of a University namely research, teaching, community engagement and administration. In view of a very significant role ICT plays in governance issues, one can define e-governance as the application of ICT in the following aspects in all operational functions of a University;

- Increasing access of University community to processes of making policy/rules/procedures and to existing policies/rules/procedures.
- Interaction between University management/administration with internal and external stake holders.
- Increasing transparency and accountability in budgetary and financial management, revenue mobilization and expenditure.
- Monitoring performance of teaching/research and various projects.
- Simplification of various University processes.

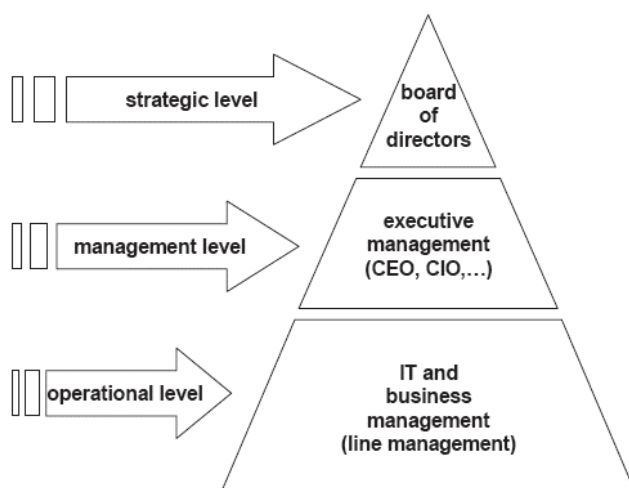
ICT cuts across every aspect of the University and given the fact that ICT related costs and risks are high, management decisions with regard to ICT deployment should be carefully considered. In principal they should not be made solely by those responsible for deploying the technology

⁵ World bank 1994: Governance; The World Bank’s Experience

nor those who will be its primary users. This is indeed why apart from mainstreaming the role of ICT in University governance (e-governance), HEIs need to focus also on putting in place ICT governance structures and respect them: to ensure that plans are developed and priorities set collectively; to ensure that all ICT related actions taken are consistent with university wide shared values, strategies and objectives; to ensure that risks are properly mitigated; and to ensure that investments made return the value expected.

ICT Governance in Universities in Tanzania

ICT governance involves policies, plans, projects and priorities. It defines roles, who does what in ICT and when, who advises those who make decisions and how and where that advice is provided.⁶ It avails opportunity to all to contribute to decision-making and provides University wide oversight, coordination and facilitation. ICTs are increasingly becoming one of the strategic and critical resources for a university next to financial and human resources. ICT governance is seen to be situated at multiple levels in the organization i.e. strategic level where the board and related higher bodies are involved, management level with involvement of executives and operational level with ICT and business management (Fig.1). This implies that at all these levels, business and ICT people need to be involved in the ICT governance process and be made to understand their individual roles and responsibilities.



⁶ Rick Bunt. ICT Governance at the University of Saskatchewan

Fig.1. Three layers of IT Governance responsibility⁷

The main challenge in Tanzanian universities as far as ICT governance is concerned is to ensure alignment of the University objectives and the objectives of the ICT organization (i.e. ICT Directorate, Computing Centre etc.). This is termed as Business Alignment (BA). BA denotes the formalized and goal-oriented cooperation between top management, business operations and ICT management. ICT management must interact with stakeholders (decision-makers, service providers, end users, etc.) within all the functions of ICT management, control and monitoring (MCM)⁸. BA is the principal and most important control mechanism for a University's ICT operations.

The other challenge revolves around ICT service Management. The primary objective of Service Management is to ensure uninterrupted business operations. This requires a reliable and well-documented service environment, standardized end user solutions with secured support, strict compliance with governance processes, as well as adequate knowledge of information systems and hardware. The problem here is for universities to recruit and retain skilled ICT technical staff. For certain ICT services, universities purchase services from a specialised service provider. In this case, ICT Organization's primary responsibility is planning services, ensuring business continuity and managing services roll-outs in cooperation with the service provider. However in most cases in our universities, ICT services are provided by an internal organization, which should assume the same roles and interfaces as an external service provider otherwise services will suffer.

For services providing strategic support to university business such as Academic Register Information System (ARIS), there should be a Service Owner (in addition to a Service Manager who belongs to the ICT Organization). The Service Owner represents the Business and her/his role is to produce the business requirements and the business process requirements for the service and to authorize changes related to the service.

⁷ Van Grembergen, W., De Haes, S., & Guldentops, E. (2003). Structures, processes and relational mechanisms for IT governance. In Van Grembergen W. (Ed.), *Strategies for Information Technology Governance*. Hershey, PA: Idea Group Publishing.

⁸ Looijen, Maarten, *Information Systems: Management, Control and Maintenance*, Kluwer BedrijfsInformatie, 1998.

Limited knowledge of ICT management found at the level of university top management compounds the situation even more, especially on technical issues and investments in ICT. Many senior and influential university officials with positions of responsibility requiring decision-making, received their education and early work experiences in environments where the capabilities of what ICT was available, were very limited indeed compared with those of today. It is, therefore, not surprising that these officials lack sufficient grasp of the issues related to ICT resources and its management, and struggle to provide adequate and effective managerial direction and support that is so much needed.

ICT and ICT Trends

For the purpose of clarity on what is involved in the deployment of ICT as a tool for HEIs development and prosperity, we shall review ICT resources based on the following infrastructure domains⁹;

The *technical infrastructure domain*: the computers, network cabling and equipment, and other hardware that is required to host the applications and share and exchange information and data.

The *applications infrastructure domain*: the ICT applications – or software systems – supporting HEI teaching, learning, research, outreach services, management and administration.

The *knowledge infrastructure domain*: the ICT knowledge and skills of ICT users (both staff and students) required to effectively use the hard- and software; and the knowledge and skills of the ICT technical staff required to install and maintain the hard- and software.

The *governance infrastructure domain*: the policies, guidelines, procedures and management structure required to develop, coordinate and sustain the applications, the technical infrastructure and the knowledge domains.

⁹ B. Mutagahywa: Issues Affecting Return on Investment (RoI) on ICT Investment in Public Sector:

A case of the University of Dar es Salaam. (Unpublished writings)

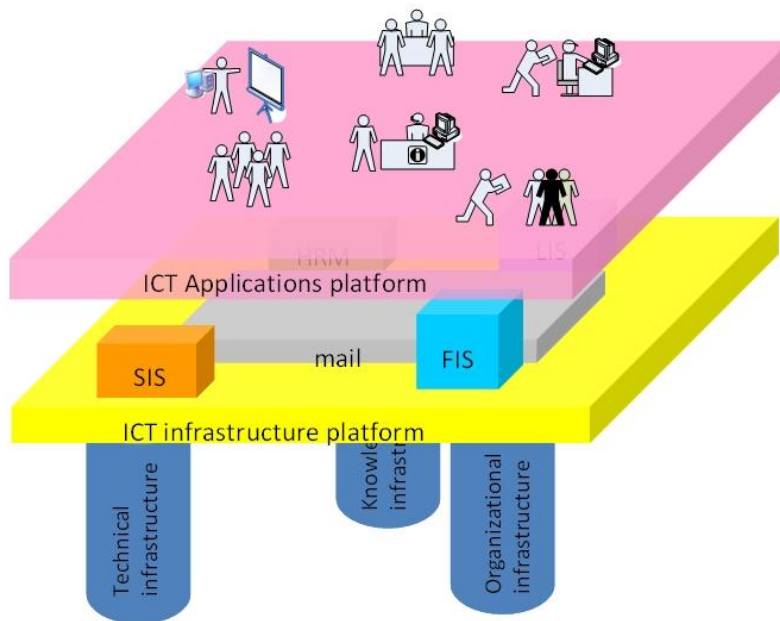


Fig.2. The Relationship of ICT Infrastructure Components

ICT end-user hardware falls under three categories namely; 1) powerful PCs/laptops, 2) Net-books, 3) Smart phones. The key trend is a continuous decrease in the unit cost of computing power. Net-books and smart phones are suitable for the growing trend of cloud computing facilitated by expanding broad band networks (through wireless, cell phone technology or over cables). Cloud computing, means the provision of services on line to computer users including services such as folders for data and a variety of programs that exists on the Internet. The Internet platform has stimulated an explosion of publicly available social networking applications such as Face-book, Twitter, Google-Docs, etc. which are being adopted in the teaching and learning environment.¹⁰ This trend towards mobility coupled with ever increasing

¹⁰ Minocha, Shailey (2009) A Study on the Effective Use of Social Software by Further and Higher Education in the UK to Support Student Learning and Engagement. Final Report. Available at: <http://www.jisc.ac.uk/whatwedo/projects/socialsoftware08.aspx> [Accessed: 7 May 2009]

capacity of mobile devices, now guarantees that every body in the HEI owns a device with which he/she can access network resources. As such Technology is solving one of the main problems faced by Universities in the recent past; that is of ensuring universal access to network resources by all students at any time and any place. Since all students (digital natives) own mobile phones and use them for personal purposes, it is high time for faculty (digital immigrants) to explore how the mobile technology could be applied in the teaching and learning environment in Tanzanian Universities. Indeed Universities should now be reviewing their strategies to include use of mobile applications across the board for example messaging, voicing and getting opinion through e-voting etc. The main ICT is a steady decrease in the unit cost of computing power and the advent of cloud computing through broad band telecommunication networks and mobile devices.

ICT in Research

The use of ICT in academic research has been growing in all Universities. This includes the use of powerful computers for complex calculations on very large data sets like in modelling and simulation applications; use of communication tools and the Internet ensures that research teams can be spread across the world; increased academic resources through the use of digital libraries. To take full advantage of the above, Universities in Tanzania need to form a strong collaborative Institution (eg. NREN) in order to solicit investment from government for the required sustainable broad band connectivity, various software applications and technical expertise. It is highly recommended that Universities in Tanzania form a National Virtual Library learning from the experience of Nigeria. In Nigeria, the Virtual Library was established by the National Universities Commission to promote access to recent publications and to provide opportunity for research dissemination through on-line e-journals¹¹. The technical ICT infrastructure needed for research by university faculty and students requires major financial investments and as such should be based on well conceived national and Institutional policies. The national ICT policy at a minimum should spell out clearly how improving ICT capacity for the education sector can address issues of access and equity of education at all levels.

¹¹ K. Balasubramanian, Willie Clarke-Okah, et al. ICTs for Higher Education; Background paper from the Commonwealth of Learning UNESCO World Conference on Higher Education Paris, 5 to 8 July 2009.

ICT in Community Engagement

Universities in the country are slowly but surely taking their rightful place in promoting community economic growth and social development. This calls for closer community engagement at various levels from project conceptualization, planning, execution and project monitoring and evaluation. In this aspect ICT has not only provided the tools for Universities but has also extended the scope of such engagement and reinforced the direct role of Universities in community development. When properly deployed, ICT enables universities to facilitate and be part of developmental effort and do so without over extending their human, time and financial resources.

A university which is not contributing effectively to the regional/national economic growth through innovation is now perceived as not fulfilling its mandate. This has led to what is termed a “triple-helix model” of development where university-industry/village-government linkages lead to technology transfer and economic growth. Through ICT networks, universities can now engage more with government and industry in the development of technology Parks and in the development of both production and consumer cooperatives.

ICT in Teaching

University faculty are now using computers in teaching taking advantage of the power of the computer in manipulation of words and symbols. Introduction of eLearning or on-line learning is also on the increase in universities. However the role of ICT in teaching and learning is more pronounced in institutions which have adopted Learning management Systems (LMS). LMS generate and manage various student support services and products such as course outlines, digitally recorded classroom material, discussion groups, lab. Assignments, lecture notes, live lectures for later viewing and re-viewing, links to specific websites, on-line tutorials, supplementary readings and virtual office hours for teacher student consultations. Virtual library and open course ware allow students to get content at no or low cost instead of acquiring expensive text books, reference materials or journals. On-line content has in fact allowed Institutions to co-own content which they can use when and if a particular faculty who created it leaves the Institution. In general terms ICTs have been credited with improving quality, widening access and cutting costs in the teaching function.

ICT in Administration

Universities are using ICT in managing students admission and records, tests/examination results and transcripts, managing human and financial resources and management of various assets. The highest impact of ICT on university governance can be felt in this area of administration when Institutions will start using more ICTs for better planning, setting standards, effecting change and monitoring results of core functions of the University. Many ICT applications in HEIs should be directed at improving the quality and capacity of management information systems to support strategic decision-making and policy implementation, stimulate and facilitate free flow of information through the university and to respond to the needs and demands of students for better and increased access to university services and information through the web.

Consultations and accountability can easily be facilitated by online discussion forums and mailing/sms lists with staff and students. Extensive use of the Intranet will enhance the collegiality feeling by giving access to minutes/records of decision making organs to all staff affected by those decisions; and at the same time allowing senior managers to have access to background information and the thinking behind issues they are requested to make a decision on.

Various Management Information Systems are deployed in Universities. The key challenge however is to integrate these systems and enhance their capacity to support strategic decision making. Also the voluminous amount of data generated/captured by these systems will be a wasted opportunity if not used, through data warehousing technologies, to discover trends and provide hidden information that eases managers' decisions.¹² Data warehousing is defined as;¹³ "a subject oriented, integrated, non volatile and time-variant collection of data in support of management decisions"

The data warehouse acts as a hub, to facilitate the exchange of information between systems and therefore serves as the Institutions information infrastructure.¹⁴ Questions like what is the

¹² Flory Andy et al. A Design and Implementation of a data warehouse for research administration; http://subs.emis.de/LNI/Proceedings/Proceedings_13/35_a_Design_and_Implem.pdf

¹³ W.H. Inmon, Building the Data Warehouse. 2nd. Edition . John Wiley & Sons, New York (1996)

¹⁴ Wagner Christian et al; Enhancing E-government in Developing countries. Managing Knowledge through virtual community. EJISDC (2003)

quality of education offered by a particular HEI can only be adequately addressed through the use of data warehousing and data mining technologies.

Conclusions and Recommendations

- The integration of ICT in education is inevitable as it will cater for increasing demand for higher education, the need for online learning and lifelong learning.
- ICT trend is towards mobile technology, virtual world, social networking, cloud computing etc HEIs should integrate these technologies into their programs and strategies.
- HEIs should clearly identify specific role for ICTs to enhance research capacity and provide for adequate infrastructure and capacity building. The role of institutional collaboration in virtual library, access to online databases, networking, use of ICT experts should be seriously explored.
- E-governance in HEIs will enhance good governance, efficiency and transparency. However the accumulated massive data will only be useful for decision and forecasting when data warehousing and data mining technologies are deployed in HEIs or across the higher education sector.
- ICT is a strategic resource for HEIs and as such ICT governance should be prioritised and made part of the Institutional governance.
- Universities should pay particular attention to ICT-business alignment. Defining roles for Business Owners and Service Manager(s) will help in this area.
- The advent of mobile computing and broad band telecommunication networks makes it possible for all University stakeholders to have access to digital resources thus increasing the Institution's robustness and its accountability to people it serves, as such improving governance when Universities deploy mobile applications..