

E-GOVERNANCE IN THE PUBLIC SECTOR:
A CASE STUDY OF THE CENTRAL ADMISSION SYSTEM IN TANZANIA

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ABSTRACT

This thesis sets out to answer the following central research question: what are the influences, challenges, benefits and costs of the Central Admission System (CAS) as an e-Governance initiative in improving undergraduates' admissions service delivery and quality assurance in Tanzania's higher education institutions?' In answering this key question, three sub-questions were explored: (1) To what extent and in what ways does the implementation of the CAS influence the organisation of admissions work and workplace relations in higher education institutions? (2) What are the sociotechnical challenges of implementing the CAS? (3) What are the advantages of the CAS in improving admissions service delivery and quality assurance in higher education institutions? The sociotechnical theoretical framework is an ideal for exploring these issues as it accommodates the understanding of dual relationship between social and technological aspects of the CAS in line with the contextual issues in its implementation. The focus of the thesis is on Tanzania's higher education institutions where the CAS is being implemented. The study is informed by data collected through interviews and documentary analysis. Data organization and analysis was done using NVivo 10 QSR software. The study demonstrates that, notwithstanding the fast development and uptake of Information and Communication Technologies (ICTs), the implementation of the CAS in Tanzania is hampered by the fact that most of the end-users of CAS (particularly applicants) have relatively low access to the ICT infrastructure. Several factors continue to have a significant effect on the implementation of CAS, which in turn lead to implications for the uptake of improved admissions service delivery and quality assurance. A digital divide, resistance to change by some higher education institutions (HEIs), poor ICT skills among applicants, the costs of internet services, unreliable electricity supply, and inadequate IT experts continue to frustrate the objective of improved admissions service delivery and quality assurance. As a technological innovation in the workplace, the CAS has led to a restructuring of admissions work tasks among admissions officers, a need to review job descriptions, introduced tighter controls over admission work processes, and has shaped admission workers' professional identities and self-presentations.

DECLARATION

I, Fabian G. Mahundu, hereby declare that this research project is my novel work and comprises no work or material hitherto published or written by any other person. Accordingly, to the best of my knowledge, it has not been used as the basis of diploma or degree awards at any other higher learning institution, with exception of the references acknowledged in the entire work.

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ACRONYMS

CAS	Central Admission System
COSTECH	Tanzania Commission for Science and Technology
DTBI	Dar Technohama Business Incubator
DVCA	Deputy Vice Chancellor Academic
EASSY	Eastern Africa Submarine System
FTC	Full Technician Certificate
HESLB	Higher Education Students Loan Board
HEAC	Higher Education Accreditation Council
HEIs	Higher education institutions
HKMU	Hubert Kairuki Memorial University
IAA	Institute of Accountancy Arusha
UoI	University of Iringa
ICT	Information and communication technology
ISP	Internet service provider
JUCO	Jordan University College
LTE	Long-term evolution
MDAs	Ministries, departments and agencies
MNMA	Mwalimu Nyerere Memorial Academy
MoCST	Ministry of Communication, Science and Technologies
MoEVT	Ministry of Education and Vocational Training
MU	Mzumbe University
MUCCOBS	Moshi University College of Co-operative and Business Studies
MWUCE	Mwenge University College
NBC	National Bank of Commerce
NACTE	National Council for Technical Education
NECTA	National Examination Council of Tanzania
NICTBB	National ICT Backbone
NGO	Non-governmental organisation
OLAS	Online loan application system
PCT	Pharmacy Council of Tanzania
RPL	Recognition of prior learning
RUCO	Ruaha University College
SEACOM	African cable system
SEDP	Secondary Education Development Programme
SJUT	St John's University of Tanzania
STT	Sociotechnical Theory
SUA	Sokoine University of Agriculture
TANU	Tanganyika African National Union
TCC	Tanzania Communications Commission
TCRA	Tanzania Communications Regulatory Authority
TCU	Tanzania Commission for Universities
TDV	Tanzania Development Vision
TLD	Internet Top-level Domain
TNMC	Tanzania Nursing and Midwifery Council
TTCL	Tanzania Telecommunication Company Limited
UCC	University Computing Centre
URT	United Republic of Tanzania

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INTRODUCTION

Introducing the research

The goal of this thesis is to contribute to a sociological understanding of the sociotechnical challenges, advantages, disadvantages, costs of the electronic governance (e-Governance) implementation and its influence on work organization in the public sector, with a case study of the CAS in Tanzania. E-Governance involves the application of electronic means in the interaction between the government and citizens (G2C), government and business (G2B), government to government for internal government operations (G2G) as well as government and employees (G2E) to simplify and improve the democratic government and business aspects of governance (Reddick, 2010). Such interactions are discussed in detail below. On the other hand, the CAS is defined as an electronic system for the selection of undergraduate students into higher education institutions (HEIs) (TCU, 2010a). The system is being implemented by two higher education regulatory agencies: The Tanzania Commission for Universities (TCU) and the National Council for Technical Education (NACTE), in collaboration with all the CAS participating HEIs.

Further, it assesses the roles of CAS in the quality assurance of admissions and the effective service delivery for admissions. The study is empirically grounded in research undertaken in Tanzania and theoretically centred on the sociotechnical theory (STT) (see Chapter 1). This study is pertinent to Tanzania's situation and to other developing countries in general, since e-Governance is broadly being promoted as a tool for efficient public service delivery, and yet its implementation in the regulatory context appears to be under-researched. Therefore, this introductory chapter is devoted to describing research objectives and research questions, the background to the research problem, the anticipated contribution of the research and the organization of the thesis as well as the conceptualization of various key terms used in the study.

Information and communication technologies and society in perspective

In the early 1990s, the developing nations witnessed the proliferation and utilisation of ICTs. Such proliferation of ICT has influenced various social, economic and political life of societies almost in all nations, particularly in Sub-Saharan Africa. Even though Sub-Saharan Africa

(SSA) is viewed as the last region to embrace the benefits of ICTs (e.g. the Internet and mobile technologies), indeed, ICT has brought with it progressive social, economic and political changes within the region (Longe et al., 2009, p. 155). Nevertheless, ICT influence has never been always for the better. Many countries became interested in reforming the public sector through the use of information technology (IT) for improving communication and public service delivery; thus most governments and mega-institutions worldwide implemented technology-mediated governance systems. Such systems are internationally branded as either 'e-Government' or 'e-Governance' (Rabiaiah and Vandijck, 2011; Heeks, 2008). Indeed, the advancement in ICTs promises public access to the various government services online. Such services are frequently recognized with the prefix 'e', for instance e-Health (for online health consultation services), e-Learning (for distance learning services), e-Commerce (for electronic commerce services), e-Banking (for electronic banking services), and e-Governance (for electronic government services).

'e-Governance' is variably defined and researchers do not provide a consistent definition of the term. This thesis adopts Backus's (2001) definition of e-Governance as it serves to explain various sociotechnical interactions in the workplace (e.g. between admissions officers and the CAS) and beyond workplace (e.g. between applicants and the CAS): e-Governance is an 'application of electronic means in (a) the interaction between the government and citizens (G2C) and the government and business (G2B) as well as (b) in internal government operations (G2G) to simplify and improve democratic, government and business aspects of governance' (Backus, 2001, p. 2). Given the above-mentioned definition, it is obvious that e-Governance is not simply the automation of government systems, but the assurance of the ICT ability to make public services available at all times. That is, it enhances an overall governance system by reducing needless travel and saving time and costs for all citizens. Scholars (e.g. Baum et al, 2000) also claim that e-Governance decreases corruption and reduces the use of paper-based office procedures.

Technological innovations and their application in e-Governance are considered to be the key forces driving public sector re-engineering since 1990s. Indeed, the literature has acknowledged the proliferation of new technologies, particularly the on-going establishment of websites and various systems in different institutions with the intention of improving public service delivery (Papadopoulos and Kanellis, 2012; Saleh, 2010; Giacomello, 2005; Heeks, 1999). In their work, Surry, Stefurak and Gray (2011, p. 2) state that new technology plays a

central role in the development and growth of institutions. It allows institutions to reduce costs, improve efficiency, increase productivity, develop new services, and reach more new customers. However, Cascio (2000, p. 82) enlightens that technological innovations at the workplaces are responsible for making employees feel isolated. In fact a certain level of social interaction with managers or supervisors as well as co-workers is vital in almost every job. Deprived of it, employees may feel isolated and out of the ring with respect to essential workplace contact and communications with decision makers who are entitled to make or break their careers (Cascio, 2000). With such consequences, HEIs are no exception. To Surry et al. (2011, p. 2), the most successful HEIs are those that successfully plan for, implement, utilize, and manage new technology.

In fact, the utilization of such technologies in delivering public services to citizens has had a drastic impact on societies, people, institutions, and governments worldwide (Rintala, 2008; Tseng, 2008). Whereas many people would accept that technological innovations play a vigorous role in societal and institutional change, there is a great deal of debate regarding the contextually-specific role played by technological innovations. Researchers (e.g. Moyle, 2010; Lewis and Wrage, 2005; Jayanthi, 1998) argue that there is a need to understand technological innovations on the basis of their aims and the contexts in which they are implemented. This is because technological efficiency and its impact on various social groups is contextual and thus demands a deeper and broader analytical framework. To this end, the sociotechnical approach is considered as an ideal framework because it highlights the significance of the interplay between the social, technical and institutional sub-systems of e-Governance projects and the ways in which they influence each other. Among the common definitions of the term 'sociotechnical' is one offered by Coakes et al. (2002, p. 5), which explains that it is 'the study of the relationships and interrelationships between the social and technical parts of any system'. In terms of this definition, the sociotechnical framework can be considered as being holistic; in other words, it is one that considers all sub-systems in implementing e-Governance system. Hence, the framework forms a means by which the implementation practice of the CAS can be understood, especially in explaining the influence of CAS on work organization, implementation challenges, the advantages and disadvantages of the system towards its purpose of assuring quality in undergraduate admissions and improvement of admissions service delivery. To properly understand the implementation practices of the CAS in Tanzania, therefore, I present background information by profiling the development of the ICTs (see

Chapter 2) and their applications in higher education governance systems, particularly in the area of quality assurance in undergraduate admissions.

Research Problem

Having seen the brief overview of technology and society above, what follows is the description of the problem that has motivated the undertaking of this study. The problem is explained in line with the operationalization of the CAS in Tanzania's context (focusing on end-users) and the influence of the system on work organization and workplace relations.

- The primary aim of the CAS initiative was the cost saving among applicants (aspirants of higher education) who previously used a lot of money for seeking admissions from various institutions. Currently, there is no documented evidence as to whether the CAS real helps applicants to save the application costs. Applicants still travel long distance to acquire the internet services so as to complete their application process. In this context, applicants are probably forced to do so as they have no other option to choose for them to make their application for admissions into higher education institutions. Evidence on the issue of cost saving is yet to be documented by scholars; thus it is the ideal of this study to fill such gap.
- Implementation of the CAS in Tanzania has overlooked the aspect of ICT penetration (digital divide) in the country by assuming that all applicants are in the position of completing their applications without difficulties (digital inequality). First of all, the majority of the applicants in Tanzania are inadequately trained in ICT basic skills particularly those from rural areas as opposed to those from urban areas. Secondly, most of the existing ICT facilities are highly concentrated in urban areas to the extent that those from remote areas must travel at least some distance to access such services. Basically, the CAS services are intended to be accessed mainly through computers, but the majority of the applicants do not have access to computers or smart phones that are capable for internet services. Consequently, many applicants are excluded from accessing the CAS application on their own. The consequence is opting to hire other people (e.g. internet café attendants) to do application on their behalf without knowing the consequence of such decision.
- Even if the CAS has a purpose of controlling quality in undergraduate admissions, the system is claimed to restructure various routineous jobs that were previously done by

institutions especially during manual admissions. Such trend has to a large extent affected admissions officers both in higher education institutions as well as within higher education regulatory agencies. The organization of work and general workplace relations to a large extent has been influenced by a new way of admitting students into higher education institutions. For example, admission officers who were previously engaged in selection process as their major role are no longer doing such jobs. The extent of such workplace restructuring has never been established since its first operationalization of the system from 2009/2010 academic year to-date. No one is sure what are such officers doing after the establishment of the CAS which has taken over most of routineous jobs that were done by them.

- Assuring quality in admissions and improving admissions service delivery through the CAS has been commended by several stakeholders. Nevertheless, as to how this is the case is not yet established.

The issues explained above highlight significant challenges that face the operationalization of the CAS in Tanzania. Digital inequality in the implementation of the system and the influence of the system in work organization and workplace relations are essential for this study. To minimize the challenges facing the CAS implementation, implementers require adequate strategies to be put in place. Unfortunately, presently, no policy is available in facilitating the CAS implementation in Tanzania. This situation desires to be addressed. Without it, the CAS initiative will continue to be challenged by discussed aspects, and perhaps may receive a low acceptance by key stakeholders who eventually will continue to resist the implementation of system or withdraw from being member and thus admit their students direct through their institutions.

Research Goals

The purpose of the study is to describe the implementation practice (planning, operationalization, implementation processes, challenges, benefits, costs) of the CAS. In Tanzania, the coordination of undergraduate admissions became chaotic in the 2000s (TCU, 2009) due to an increase in the number of students and in the number of HEIs. The area of great concern was the multiple admissions and the quality of the students admitted to HEIs. In 2007, an attempt was made to address these problems and the need for reform to improve the

admissions service delivery was considered to be essential; hence, the establishment of the CAS in 2010. This research seeks to understand the implementation practice of the CAS (one of the e-Governance systems) in Tanzania using the sociotechnical theoretical framework. Specifically, the study is intended to:

1. Examine whether and how the implementation of the CAS influences the work organization and workplace relations in HEIs.
2. Explore the sociotechnical challenges of implementing the CAS in Tanzania's HEIs.
3. Explore the advantages and disadvantages of the CAS in its efforts to improve admissions service delivery and quality assurance in HEIs.

This study therefore is informed by three key research questions:

1. To what extent and in what ways does the implementation of the CAS influence work organisation and workplace relations in HEIs?
2. What are the sociotechnical challenges of implementing the CAS in Tanzania's higher education system?
3. What are the advantages and disadvantages of the CAS in its efforts to improve admissions service delivery and quality assurance in HEIs?

These questions were answered using the field data collected through interviews and from documentary sources. Interviews were conducted when prospective students were applying by means of the CAS. During the interviews, the researcher was able to elicit much more relevant information regarding the implementation of the CAS. This was achieved by interviewing admissions officers, applicants and some vice chancellors. Matters that seemed to be pertinent to the research questions were probed in order to gain more clarification.

Contribution of the thesis

In this study, researcher noted the importance of the CAS as one of the e-Governance initiatives towards undergraduate admissions quality assurance in Tanzania. Researcher acknowledged the significance of the system in improving admission service delivery in the country. However, theory and practice does not offer direction in understanding the automation and its impact on work organization and workplace relations within higher education contexts. Thus,

this study sought to understand the influence of the CAS on work organization and workplace relations as a case study. However, the present literature was not able to offer such facilitation.

Generally speaking, little to no research has been done on the automated admission systems in the context of African higher education. This study therefore aims to explain how such systems are implemented (by focusing on the challenges, benefits, costs and their influence on various users). Theoretically and practically, this study envisions contributing to the research field of e-Governance in developing countries by:

- increasing the scope of the current analysis of e-Governance, based on the sociotechnical approach;
- contributing to the discussions on the theorization and examination of e-Governance and online public service delivery;
- contributing to the scientific knowledge of the nature of the sociotechnical context of the implementation and usage of ICT-based services within regulatory agencies (institutions that are mandated to assure quality of the public services like global higher education regulatory agencies, which oversee the quality of higher education in particular country).
- highlighting how technological innovations can be utilised to manage and coordinate higher education admissions services towards higher education quality assurance (from the entrance gate) and thus transform the ‘business-as-usual’ approach and the associated and the unnecessary erroneous manual handling of admissions; and
- drawing practically grounded implications for the implementation of e-Governance in developing countries, particularly by explaining the benefits, costs, challenges and the disadvantages of e-Governance systems, the CAS in particular.

Explicitly, this study is:

- the first study to explore the sociotechnical challenges, disadvantages, limitations, costs, and influence of new technologies on work organization within higher education admissions service delivery in the Tanzania’s e-Governance initiatives;
- the first study to explore the Tanzania’s CAS e-Governance experience (as a typical example of the African Higher Education Quality Assurance-style technology initiative) with a focus on understanding the challenges, advantages, disadvantages and

the influence of technological innovations on work organization when deployed at the workplace; and

- the first sociological study to use sociotechnical framework in examining the CAS implementation experience as an e-Governance project in Tanzania.
- In practice, the study provides CAS implementers in Tanzania and other developing countries with a new approach of imparting mandatory basic ICT skills to students in all advanced secondary schools where “prospective higher education students” are available so as to reduce the digital inequality among them.
- In this study, several other potential research areas have been identified. For instance, research areas including CAS stakeholders’ analysis (institutional perspectives) so as to assess what does and what does not work in the operationalization and implementation of the CAS. Also, the need for deeper understanding of the nature of the digital divide and its influence in allowing applicants to access online admissions services.

Structure of the thesis

The thesis is composed of eight chapters. Chapter 1 contains the literature review and an outline of the sociotechnical theoretical framework that underpins the study. Contemporary thinking on STT offers a profound and discerning contribution to an understanding of how technology ‘is never separated from human beings, human endeavours, and human values’ (Johnson et al., 2009, p. xiii). Chapter 2 discusses the research design and methodology used in conducting the fieldwork. This chapter expresses certain methodological concerns within an interpretivist approach – the main approach for the study – while Chapter 3 explains the contextual background of Tanzania’s ICT development and deployment in e-Governance.

Chapter 4 offers an examination of the extent to which the CAS influences the organization of admissions within HEIs that participate in the CAS. Most of the influences of the e-Governance are viewed as ‘unintended consequences’ (Margetts et al., 2010; Tenner, 1997; Alberts, 1996). This concept explains the fact that certain diverse consequences occur unintentionally in the course of implementing new technology (Hodson et al., 2008, p. 206). Chapter 5 provides an overview and critical discussion of the challenges of implementing new technology (e-Governance) in the public sector, of which the CAS is a case study. The CAS sociotechnical

implementation challenges are explained in this chapter. The advantages and disadvantages of new technologies in the public sector, particularly the CAS in the higher education governance system, are examined in Chapter 6. The contribution of the CAS in admission quality assurance is also assessed in this chapter with the main focus on its role in controlling quality in undergraduate admissions. Chapter 7 provides a general conclusion and recommendation by reviewing the themes surrounding the implementation of the CAS in Tanzania's higher education arena.

CHAPTER 1

OPERATIONALIZATION OF NEW TECHNOLOGY IN THE PUBLIC SECTOR: REFLECTIONS ON SOCIOTECHNICAL THEORY

1.1 INTRODUCTION

This chapter presents the theoretical framework of the present study. Sociotechnical theoretical concepts and themes that inform the analysis of e-Governance in the public sector and its challenges, costs, advantages, disadvantages, and impacts are explained. Generally, various social scientists (e.g. Munyoka and Manzira, 2013; Mwakaje, 2010; Heeks and Bailur, 2007; Ndou, 2004) have analysed these issues in different contexts using social constructivist approach which entails various theories that are common in explaining the implementation of e-Governance; for example, structuration theory, diffusion of innovation theory, social-cognitive perspectives and sociotechnical systems theory (Janssen et al., 2011). Of all, the sociotechnical systems theory offers a remarkable contribution to understanding the implementation of technology in the contemporary office work context (Boreham et al., 2008, p. 16). For example, the meta-analysis study of 84 papers on e-Government research conducted by Heeks and Bailur (2007) finds that most of e-Government studies were written from a ‘sociotechnical perspective’ rather than from the perspectives of technological determinism or social determinism. This confirms that most e-Government scholars reject crude technological determinism in favour of an acknowledgment that social and human factors have a role to play. In fact, STT offers a model which would help people understand various elements of Information and Communication Technology (ICT) in e-Governance public service delivery.

This study, therefore, draws on theoretical concepts that are largely in line with the sociotechnical perspective (Mumford, 2006; Heller, 1997; Trist and Murray, 1993; Cherns, 1987; Emery, 1959) to support the analysis of the studied phenomena. The adoption of the sociotechnical perspective helps to understand the way ICT, institutions, and society are interconnected and intermingle during the implementation and use of the e-Governance system. Principally, the sociotechnical view concentrates on the complete business process, entailing

both social/human and technological facets. The approach tries to place e-Governance in a broader context (Podder, 2013).

1.2 SOCIOTECHNICAL THEORY: AN OVERVIEW

The early history of the STT is closely tied to the Tavistock Institute of Human Relations in London and is assumed to have emerged between the 1950s and 1960s (Trist and Bamforth, 1951). The theory stresses the importance of optimizing the fit between the social and technical subsystems which are mutually interrelated within institutions (further explained below). Additionally, it underlines that an effective implementation of an ICT-based system requires the concurrent configuration of both the social and technical aspects of the system (Bostrom and Heinen, 1977). Klein and Eason (1991) show that the basic idea of STT in itself is not new because Marx was the first to reveal the interrelatedness of society and technology. Within the sociotechnical system, the processes, tasks and technologies need to transform inputs into outputs from the technical subsystem; while the social subsystem entails people (their knowledge, skills, beliefs, values, needs), the existing relationships among them, hierarchical structures and remuneration systems (Bostrom and Heinen, 1997). Any kind of systemic institutional transformation must reflect these two subsystems.

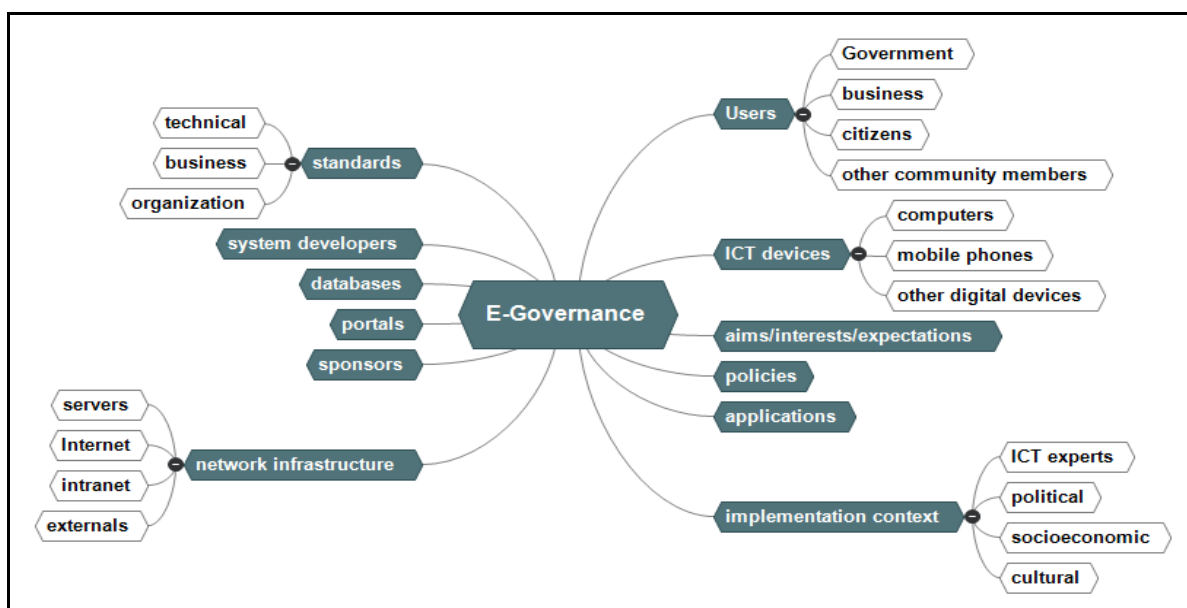
Wiebe Bijker (1995a), in his outstanding overview of socio-historical technology studies, offers a range of perspectives concerning technology implementation approaches. On one side, there are perspectives that treat technology as shaping the society (social), while on the opposite side, there are perspectives that view the social as shaping the technological (technical). This continuum accepts that ‘technology plays a key part in the modern social world, enabling some groups, disabling others: it is through and through, political’ (Michael, 2000, p. 4). However, Bijker questions in what ways the artefacts (no-human components) acquire their politics; whether they are bestowed upon themselves by their users or they are ‘baked into them’ during their development (Bijker, 1995a, p. 237). In trying to address this concern, Bijker (1995a) puts it this way:

a general pattern can be recognised in which the study of technology and society has been developing. This pattern can, very schematically, be characterized as a sort of slow pendulum movement – a dampened oscillation. First technological determinism, then

social shaping; now, oscillating in the middle are a number of approaches that examine the mutual determination of both these factors. From alternately privileging the social and prioritizing the technological, the role of both is emphasized nowadays: these shape one another in complex knots (p. 214).

In the sociotechnical framework a social world and technology-in-use are not seen as distinct – they mutually depend on each other. This framework is greatly (even though not entirely) entangled because its promoters do not insist that this interweaving of social and technical elements is collective. Relatively, it is conventional and an ideal heuristic for investigation (Kling et al., 2000), particularly with complex technological innovations like the CAS. The orientations to social and technological relations are mostly for analytical convenience. For example, one would say that the public institutions are implementing e-Governance systems to support public service delivery and other governance work processes. Such technological innovations benefit the citizens who use the innovative services that are accessible within and beyond the public institutions. Through this perspective, the public sector institutions and its citizens might be treated as ‘social forms’ and the ‘technological innovations’ with all its software and hardware as ‘material ICTs’ (Edwards, 1998). In this context the e-Governance systems might be studied to see how they are constituted as sociotechnical systems. In other words one may simply say that the e-Governance system comprises people, software as well as hardware or machines (see Figure 1.1 below).

Figure 1.1 - E-Governance Sociotechnical Relations



Understandably, given the emphasis on mutual fit of human and non-human elements, Figure 1.1 conceptualises e-Governance as sociotechnical complex system. Such conceptualization offers key components that guide the explanation and discussion of various challenges, benefits, costs, advantages, influences and disadvantages associated with the e-Governance implementation in the public sector. e-Governance researchers (e.g. Zheng, 2007; Ciborra and Navarra, 2005) have generally considered technological aspects of e-Governance as a ‘black box’ without disentangling its numerous constituents and existing interrelationships. Such an approach is deficient as it does not provide a room for understanding the way various sociotechnical components are interrelated in the course of implementing an e-Governance system.

The processes that shape the development and use of technological innovation do carry consequences on the social and technological systems. In other words, it is an understanding of the how technological innovations and use can themselves be understood as rooted within (and representing) wider complex sociotechnical contexts. It is this view that prompts this study to explore the potential influences of such interaction at the workplace and beyond workplaces settings.

In fact, whatever is referred to as ‘technological innovation’ is established within a social world and sustained by people with particular skills (Wellman et al., 1996). Building on this fact, it can be said that whereas small number of scientists have direct understandings with interactive nature of people and technologies, researchers are aware with sounded forms of academic communication and the way such forms are altered by electronic communication devices (Kling et al., 2000). This, in fact, serves as a starting point for explaining our understanding regarding sociotechnical interaction. Teleconferencing or video conferencing and loudspeakers in lecture theatres, for example, do alter the scope and the nature of audiences that academics can reach, which consequently shift the interaction between those lecturers and their audiences. Such networked scenes do not only deliver communication, but also to a large extent alter the means that people speak, communicate and interact. Fundamentally, while working in a distinct conference room, the speaker is virtually detached from local participants by multifaceted technologies (as a result physical local interaction is altered). When the audience increases in size, the natural give and take between lecturers and hearers becomes more challenging (in comparative to the minor face-to-face session). Additionally, those who watch screen videos might secretly replay segments to increase their comprehension, whereas in a face-to-face

session the audience can seek clarification by asking various questions (that in one way may also humiliate the lecturer or questioner). The example above depicts the fact that the links and nature of the social interactions between various participants and technological innovation establish the complex sociotechnical interaction (Bowker et al., 1999).

The technical aspect/subsystem involves an interplay of various tools, devices and skills used in transformation of the inputs into outputs in a manner that improves the institutional work performance (Kling et al., 2000) by increasing workers' efficiency in work processes. The social system entails the personnel and their skills, attitudes, knowledge, values and expectations within workplace environments as supported by the organizational structure that exist in the institution (such as the reward system, institutional culture, work processes, etc.). However, the meaning of the social system subsequently has been extended to include the broader range of other clients outside the institution whose interaction has an influence on the institutional internal operations (Dillon and Morris, 1996). Such clients are often guided by the policy and guidelines which oversee the existing relations between the society and the institution (Dillon and Morris, 1996).

The STT remains an important framework due to its noteworthy contribution to e-Governance studies in the public sector. STT is often defined as a perspective that clearly holds the idea that all systemic aspects are interrelated, that none of the aspects should take rational superiority over the other, and that it is essential for all aspects to be jointly designed (Klein, 1994). As explained above, this means that the social and technical systems depend each other, since the system is built for use by the people, then they should be considered as users of the system. In fact, any exclusion of one part, for example during system design, would be sub-optimal. It is because of this emphasis that STT remains an inspiring approach to studying and understanding e-Governance implementation in complex settings.

The STT approach inspires the researcher to question two interrelated sets of viewpoints: 'that human beings are error-prone, unreliable agents, resistant to change, that ideally should be designed out of systems as soon as this is technically feasible and can be afforded; and second, that when they cannot be designed out, humans need to be managed exclusively through Tayloristic systems of command and control' (Clegg, 2000, p. 466).

Nonetheless, these views might not be openly expressed despite the fact that they are globally evident in different institutions adopting and implementing ICTs in governance systems. The STT approach focuses on the multi-view of the e-Governance systems and their interactions because these systems are built to facilitate the peoples' access to the automated public services, thus their involvement or consideration paid by the system developers is essential for successful e-Governance implementation. Greenbaum and Kyng (1991) believe that one of the key principles of sociotechnical approach is the participatory approach particularly in the system design and development methods, whereby the end-users are involved throughout the design processes. However, such involvement varies in significant respects. The participatory design methods, which cover an array of methods (Muller et al., 1993), often involve the user representatives (users) efficiently into the terrain of the system designers and developers during the project. Conversely, the contextual design (Beyer and Holtzblatt, 1999) and empathic design (Leonard and Rayport, 1997), that reflect the sociotechnical ideas, assume the opposite view which put the system designers and developers into the end-users' realm as part of the system development process. The end-users and other system actors also have, for example diverse economic and cultural backgrounds which need to be re-considered during the system planning and implementation. It is on this background that the STT provides an arena for researchers to understand the way social actions shape technology and vice versa.

STT provides a benchmark for assessing the complex e-Governance systems by paying attention to the humanistic and institutional consequences of such systems particularly questioning the issues related to the contexts in which the system is being implemented, users' skills to interact with the system, system influence among the workers, and many others. This framework has been supported by several researchers (e.g. Trist and Bamforth, 1951). Therefore, the use of STT can help disentangle various dynamics surrounding the complex e-Governance system when the social, technological, psychological, and environmental systems are 'evaluated in totality' - the evaluation that is not biased to one aspect or component of the system, rather assessing the whole system with its components to understand how each aspect affect and is affected by each other.

Due to the lack of a native theoretical framework in the studied field, the STT is used since it allows a researcher to examine the interaction among the elements of an e-Governance system (see Figure 1.1). This theory makes it imperative to understand the state of technological innovations in HEIs and attempts to determine what the most important benefits, challenges,

costs and other influences are between the components and how they fit together. In fact, in analysing data from our case study, there is an extra emerging line of reasoning when it comes to understanding the complex sociotechnical system which entails diverse elements (i.e. the interlock between technology, people [users], institutional business processes and working practices) that need to fit together along the way. So to say, the operationalisation of the CAS entails various stakeholders whose expectations are varied. For example, applicants' expectation is to be selected into HEIs, while the HEIs expect to get the qualified and a good number of applicants through the system. However, the CAS implementers (the TCU and NACTE) expect the CAS to help control the qualifications of the applicants during the selection process. On the other hand, such expectations would come true if the CAS hardware and software are efficient to accomplish the work. But such efficiency depends on the IT experts to align the configurations accordingly. As suggested by Cherns' (1976), that in the processes of planning, designing/redesigning and implementation of the system, users should be taken into consideration for the purpose of realising the effectiveness of e-Governance systems.

1.2.1 Sociotechnical Model: Analytical Framework

Sociotechnical systems theory (STT) identifies the intricacy of the relations between social and technologies and society (Kling and Lamb 2000). There are several models (among them are presented in Table 1.1 below) that attempt to explain the complex nature of technology and society, but these models do not have similar characteristics, though they share several features (Sittig and Singh, 2010 cited in Gil-Garcia, 2012, p. 39). However, these models try to explain the core concepts and theoretical fundamentals of the sociotechnical framework.

Table 1.1 - Key Differences between Standard Model and Sociotechnical Model

<i>Standard Models</i>	<i>Sociotechnical Models</i>
<i>ICT is a tool</i>	ICT is a sociotechnical system
<i>Business model is sufficient</i>	Ecological view is essential
<i>One shot implementation</i>	Implementation is continuing social process
<i>Technological effects are direct and immediate</i>	Technological effects are indirect and involve different time scales
<i>Politics are bad or irrelevant</i>	Politics are central and even enabling
<i>Incentives to change are unproblematic</i>	Incentives may require restructuring (and may be in conflict with other organizational actions)
<i>Relationships are easily reformed</i>	Relationships are complex, negotiated, multivalent
<i>Social effects of ICT are big but isolated and benign</i>	Potentially enormous social repercussions from ICT
<i>Context are simple (described by a few key terms or demographics)</i>	Contexts are complex (matrices of businesses, services, people, technology history, location, etc.)
<i>Knowledge and expertise are easily made explicitly</i>	Knowledge and expertise are inherently tacit/implicit
<i>ICT infrastructure are fully supportive</i>	Articulation is highly needed to make ICT work

(Source: Ali et al., 2011, p. 2).

Following Sorrentino and Virili (2003), Table 1.1 illustrates some of the significant dissimilarities between the standard (tool) model and the sociotechnical view of technology. The sociotechnical perspective takes the view that ICT- based innovations are considered as ‘sociotechnical complexes’ which need an ecological view; and its implementation is a continuing social process as opposed to a one-shot event. Moreover, the sociotechnical perspective admits the fact that the impacts of technological innovation are not direct and immediate. It is said that in sociotechnical view motivations may enter into conflict with other institutional arrangements (Kling and Lamb, 2000); and the STT framework further accepts that the politics are not continuously an obstacle because they are essential and can act as enabling factors towards the implementation of e-Governance. Sociotechnical perspective

insists that even if the usability is a key, it is not enough and single factor for effective implementation of the e-Governance. The e-Governance projects require sociotechnical approach for supporting the ICT infrastructures (Kling and Lamb, 2000). Sorrentino and Virili (2003) further explain that in sociotechnical perspective, the social relations cannot simply be transformed to align with the ICT requirements; but must accept the existing complexity which calls upon the needs for negotiation between both the social and technical. As indicated in the model above, the ICT possibly has enormous impacts (both negative and positive) on institutions and people. Sociotechnical researchers (e.g. Dawes 2009; Kraemer et al. 1989; Pasmore 1988) accept that within STT approach, contexts cannot be sufficiently defined by limited basic demographics. Lastly, it is hard to consider expertise and knowledge as explicit, because they are regarded as essentially implicit/tacit. The next section reviews the e-Governance/e-Government literature, from the African and global contexts, which informs the research that has been undertaken in Tanzania's HEIs, where the CAS is being implemented.

1.2.2 E-Governance as Sociotechnical System

The STT approach is very common in studies that fall under the field of e-Governance and e-Government (terms which are interchangeably used in this study). In using this approach, scholars (e.g. Chen and Chu, 2012; Bwalya, 2009; Carter and Belanger, 2004) have been able to examine the implementation of various e-Governance projects in the public sector. This section is devoted to explaining sociotechnical perspectives on ICT implementation practice and use in the public sector. The discussion is narrowed to the ICT application in e-Governance and expounds on the challenges, costs, benefits/expectations, disadvantages and its influence on work organization and workplace relations. Researchers (e.g. Damodaran, Nicholls, Henney, Land and Farbey, 2005) regard the STT as an essential framework for successful implementation of ICT-based system. It is claimed that the high rate of systems failure is often caused by the biased consideration of technical aspects alone rather than viewing the system as a sociotechnical system (Kling and Lamb, 1999). Such technical bias aims at providing an effective e-Governance system without considering the necessary social and institutional environments where the system needs to operate.

Numerous scholars emphasize the need for integrating sociotechnical approaches both in the design and implementation of e-Governance service delivery (Dawes, 2009; Damodaran et al., 2005). For instance, Damodaran et al. (2005) contend that, based on the users' needs, e-Governance service delivery must consider the varied contexts of citizens (p. 9) who are the main beneficiaries of sociotechnical systems. On the other side, Dawes (2009) states that, apart from the technological tools, there is a need for e-Governance implementing institutions to consider the societal factors, values and policies, as well as institutional and other human concerns. Diversity of e-Governance users with their culture, economy, and norms (language, beliefs, education, environments) are essential aspects in the implementation of e-Governance systems. For example, some cultures may prohibit the citizens to use particular automated public services for a number of reasons. In the context of the pre-paid e-Governance services (e.g. the case of the CAS services) users have to pay so as to access the services. However, some users can be denied to access the services just because they cannot afford the costs. Additionally, some e-Governance services delivered in English may also act as barrier to the majority because of their indigenous local languages. These are among the key issues that social scientists are concerned with the ICT deployment in e-Governance.

Within the social aspect, scholars (e.g. Damodaran et al., 2005) have exposed the gap between developers and the implementation reality of the e-Governance systems. Such a gap is marked due to the presence of digital divide, peoples' cultural issues and electronic readiness (e-readiness), and localization of e-Governance systems based on users' needs (Al Nag, 2009; Maumbe et al., 2008), all of which are discussed within the sociotechnical framework. With regard to technical aspects, studies have tended to focus on the following issues: efficiency of the software and hardware, users' skills, information security, systems integration, awareness and service quality, among others. Lastly, under the institutional aspect, sociotechnical scholars have focused on work processes, human resources, organizational structures, cultural issues, managerial issues, cross-agency collaborations, inter-institutional information integration and sharing (Abdel et al., 2007; Dos Santos and Reinhard, 2007). Moreover, other sociotechnical researchers (e.g. Gil-Garcia, 2012; Reddick, 2010) have analysed e-Governance systems from the viewpoints of the political and legal aspects. Therefore, this study considers the sociotechnical framework as the foundation for analysing the global literature related to e-Governance. For this endeavour, the STT is used to analyse the implementation practice of e-Governance in the public sector with the focus on the social, technological, and institutional aspects. This is because the social processes tend to shape the technological development and

use; while artefacts (non-human components) on the other hand open up opportunities for innovative societal practices (Russell and Williams, 2002). The development of the CAS has, for instance, been shaped by the HEIs – as it is developed to facilitate the coordination of undergraduate admissions for these institutions. Hence, its implementation demands the consideration of the users who shape its usability and if the CAS architecture becomes user-unfriendly then they would be denied from accessing the CAS services. The e-Governance sociotechnical system, such as the CAS, comes to fulfil the socially valued functions. However, it also conditions the ways such functions are perceived, by describing the likely or desirable ends including the choice of means. Sociotechnical systems approach allows us to understand the development and use of technological innovation in terms of the complex adaptive processes constituting the interplays between the social and material.

Technological innovations never appear completely formed and in observable working order (Bijker, 1997). The delivery of services needs alignment of heterogeneous (social and technical) elements into working arrangements. For example, the CAS implementers are required to offer training to the users and provide awareness for efficient use of the system. Any sociotechnical system is, therefore, responsible to pay attention to the varied broader social, psychological and demographic environments of the users based on their contexts in which technological innovation operates. It is the fact that social actions, environmental dynamics and users' expectations can all impose significant influences on the patterns of operationalizing and use of technological innovation. Rip and Kemp (1998) refer these processes (functioning beyond, but interrelated with, particular technological innovations) as 'sociotechnical landscape' (p. 71).

The STT approach prompts researcher to grapple with this intricacy which puts technological innovation in the settings that allow it to function. Henceforth, the main concern is not just with artefacts, but the agents, structures, and processes that replicate a 'sociotechnical practice' (Rip and Kemp, 1998). This could denote, for example, to the various institutions, actors (stakeholders) and sub-systems that determine the successful implementation of any ICT – based system. Rip and Kemp (1998) further contend that some sociotechnical systems are rooted more vigorously than others, meaning that they enjoy better institutional support, more supportive infrastructures, better integration with other social practices, greater economic importance, and broader political acceptability – which is referred to as 'sociotechnical regimes'. In these regimes, according to Geels (2002), there are more interlinked, well

established and clearly aligned user relations, policy frameworks, guiding principles, and institutional cultures. In the context of the multifaceted sociotechnical regime, circumstances and paths for change will always differ on case basis.

The e-Governance systems symbolise an intricate sociotechnical network comprising numerous interrelated components (see Figure 1.1). Widely speaking, such components entail the following: a) e-Governance end-users (people/citizens, governmental ministries and departments, employees at the workplace, business, and other community members); b) numerous technological facilities that glue them collectively such as the internet, computers, mobile phones, network infrastructure, and c) the software component which involves the ICT databases, websites, blogs and other portals. Additionally, in the course of e-Governance implementation there can emerge many other sociotechnical and institutional components that are not mentioned here. A schematic representation of the e-Governance sociotechnical relations is well illustrated in Figure 1.1.

The sociotechnical approach provides an explanatory foundation for understanding and describing the processes, challenges, impacts, advantages, costs, benefits and interactions in the course of implementing e-Governance systems. It offers a number of advantages (Coakes et al., 2002) over the approaches centred purely on a deterministic view of either technology or society. In particular, the sociotechnical framework is capable of linking the subsystems more closely and establishes a contextual implementation of the e-Governance projects. This perspective is frequently used for the purpose of stressing the interrelatedness between people and machines and to address the changes in the workplace, particularly the working conditions of employees in industrial settings (Ropohl, 1999). Thereafter, the sociotechnical perspective was broadly used in various fields and was intended to explain the implementation of ICT systems from a holistic view (Verkerk, 2004, p. 88). This is to say, any initiative on e-Governance implementation needs carefulness over slippages into technological determinism. Of course, technological innovations exert effects on the societies in which they arise. Equally, broad and significant commitments in society offers support in shaping the design(s) of technological systems. A long tradition of research in sociology, evolutionary economics, and philosophy investigates the social processes supporting development and use of various artefacts (e.g. Bijke, 2001). As technological innovations get domesticated in ordinary peoples'

lives, they can enable and or constrain in significant ways. However, such structuring abilities can reflect previous social relations, and/or primarily be unclassified in their effects.

Scholars interested in e-Governance consider the sociotechnical systems perspective to be attractive for two reasons. The first is that the widespread and diffusion of e-Governance systems particularly in the public sectors is founded on facilitating changes in the way public services are delivered, and that calls upon the mutual fit of both the human and non-human aspects. The second reason ascends from acknowledgment that automation of various social, economic and political activities requires the consideration of both the institutional contexts and the external environments (e.g. users of the e-Governance system); and that is assumed to be achieved through the lens of sociotechnical approach (Kling et al., 2000).

1.2.3 The e-Governance Interactions

The concept of ‘e-Governance’ is defined by Backus (2001) as: ‘... the application of electronic means in the interaction between government and citizens and government and businesses, as well as in internal government operations to simplify and improve democratic, government and business aspects of governance’ (p. 2).

Additionally, Song (2004) conceives e-Government as:

‘... sociotechnical system consisting of two lower systems: social and technical subsystems. ‘Social subsystem’ includes variables related to organizational structure and work processes ‘technical subsystem’ includes hardware, software, applications, network, and so forth. The e-Government can function properly only when factors constructively interact with each other’ (p. 52).

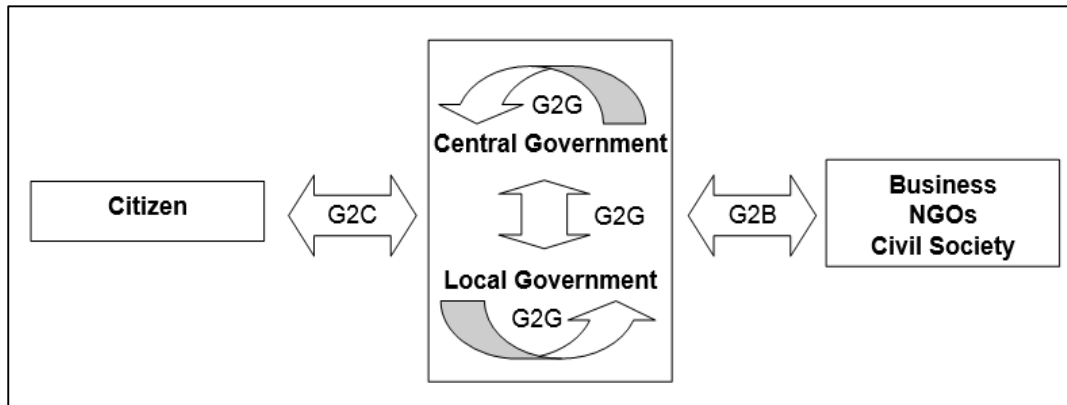
The definition by Backus (2001) offers an ‘e-Governance model’, which aims to describe the common sociotechnical interactions in the course of implementing an e-Governance system. The model offers two basic interactions: first, ‘external interaction’ which happens when the government interacts with the citizens, businesses and other interest groups, and, second, the ‘internal interaction’ which occurs when the government interacts with its sectors (ministries,

regions, districts, provinces, etc.). Such interactions can be symbolized using the following abbreviations:

- Government to Citizens (G2C) – This interface is assumed to empower the citizens to benefit from effective delivery of various public services. The interaction presupposes an enhanced quality, convenience and openness of the public services.
- Government to Government (G2G) – This interaction takes place across various government entities and can be categorised as both vertical (interaction which takes place at the levels of a national, province and local government; also across various levels within an institution; or horizontal (interaction which takes place across various government sectors as well as across diverse functional areas within the sector. Generally, this interaction aims at improving government effectiveness and performance in delivering services to its citizens. It is in this interface where government interact with its employees on a regular basis, forming the abbreviation known as ‘government to employees’ (G2E). This happens because at the global level the governments are the largest employers.
- Government to Business (G2B) – This interaction envisions to offer e-Governance tools to the business groups – e.g. services and goods providers. The core goal of this interaction is to cut down operational costs, save time and build a more transparent business atmosphere between the government and businesses. Most of the businesses taking place in this interaction are transactional, promotional and facilitative in nature (e.g. procurement and revenue collection, licensing, tourism and investment) (Backus, 2001, p. 4-7)

Additionally, the abbreviations such as ‘Business to Business’ (B2B) and/or ‘Business to Consumer’ (B2C) are used to describe the interactions within the electronic commerce (e-Commerce) contexts showing the key groups engaged in interaction. The interactions that have been explained above which take place within e-Governance are schematically represented in Figure 1.2.

Figure 1.2 - Interactions between main groups in e-Governance



(Source: Backus, 2001, p. 4-7).

The interactive sociotechnical e-Governance implementation shows the existence of the varying degrees or stages/models. Despite the existence of such multiple models (e.g. Andersen and Henriksen, 2006; Layne and Lee, 2001; Howard, 2001), the fundamental logic is typically the same, presenting the development of e-Governance from its simple stages or services to a higher-order integration of government services (systems) that eventually transform the governance systems (MAIR, 2012, p. 182). Building on Gartner's e-Governance Maturity Model (Baum and Di Maio, 2000), such stages include:

- Information – This is the first phase where the government gets online (on the web) for the purpose of providing the public with relevant government information such as press notices, consultation papers, policies, white papers, news, health and safety advice, benefits and entitlements and applicable regulations (G2C and G2B interaction). Moreover, at this stage the government can also circulate information internally (G2G) using the static electronic means (e.g. the internet).
- Interaction – Similarly, in this second stage there is an interface between the government, citizens, and businesses (G2C and G2B) through numerous applications (e.g. via e-mails and search engines) for obtaining various information such as downloadable forms and documents. The purpose is to diminish the citizens' physical travel to the government offices. In this phase, some applications can be used to offer simple public services online 24/7 in a day, services which previously were only obtainable at the office counter during working hours. Such interaction takes place internally (G2G) as well between various government institutions through intranets, e-mails and Local Area Networks (LAN) particularly in normal communication and data

exchange. One still, though, has the responsibility of going to the office for finalising the transaction process (such as paying a fee, signing papers and handing over pay slip/payment evidence).

- Transaction – It is in this third stage where technology starts to be complex. The nature of government interaction with citizens and businesses (G2C and G2B) as well as internal government interaction (G2G) takes a complete path whereby transactions can be completed online without going to the office. This stage entails security and personalization issues (e.g. electronic/digital signatures become essential to allow legitimate transfer of services). Thus, this is mostly a complex phase. The assumption here is that most processes are fully automated (e.g. payments, digital signatures, etc.), hence leading to cost, paper and time saving by users.
- Transformation – This is a fourth stage in which various e-Governance systems are integrated. In this phase, the public (citizens and businesses - G2C and G2B) are now able to access the services at single (virtual) counters. In fact, this is an ultimate goal for most government, though the intricate part in attaining this goal is largely on the internal side as it involves radical change of workplace processes, culture and accountabilities within the government sector's interactive processes (G2G) (Backus, 2001, p. 5-7).

It is within the transformation phase that the government employees in various sections have to collaborate and work together in a sociotechnical network. This stage promises cost-saving, improved and efficient services, and clients' satisfaction. Also, this phase depicts the way ICTs can be employed in e-Governance to re-engineer the governance systems (Backus, *ibid*).

1.3 THE G2E INTERACTION: UNDERSTANDING WORKPLACE TECHNOLOGY AND WORK ORGANIZATION

The interaction between the government and employees (G2E) within e-Governance sociotechnical system builds a foundation for understanding the influence of new technology on work organisation in institutions. Organization of work entails both intra-institutional and inter-institutional forms of action (Zucker, 1988). Work organization on one hand can be seen as a dynamic system functioning within the workplace and encompassing various components

that are related to the institution and society in which work organization is entrenched (Stähle and Grönroos, 1999). Adler (1997) defines ‘work organization’ as *who does what tasks* – this is the foundation upon which the formal structures of industrial relations are built’ (p. 1). According to Adler (1997), the evolution of work organization reflects both the technical demands and prospects for improved productivity and the social requirements related to the prevalent capitalist forms of control and ownership. Of all these sets of forces, each imparts different and often conflicting trends towards the organization of work (Adler, 1997, p. 1). So as to properly understand such trends, a clear and specific description of ‘work organization’ is needed. Adler (1997, p. 2) has described the term ‘work organization’ by including four key dimensions/components: skills (required for workers to accomplish their jobs), and the remaining three falls within the generic subject of ‘work relations’ (workplace relations among workers), which entails the nature of a specific work unit, horizontal relations within work units (inter-unit linkages), and vertical relations (under which units’ work is controlled and coordinated). The introduction of ICTs into institutions has gradually transformed these dimensions of work organization (Coombs et al., 1992). Such changes, however, vary in institutions have resulted in the reformation of skills requirements and a growing interdependence of job tasks across all dimensions of work relations mentioned above (Coombs et al., 1992).

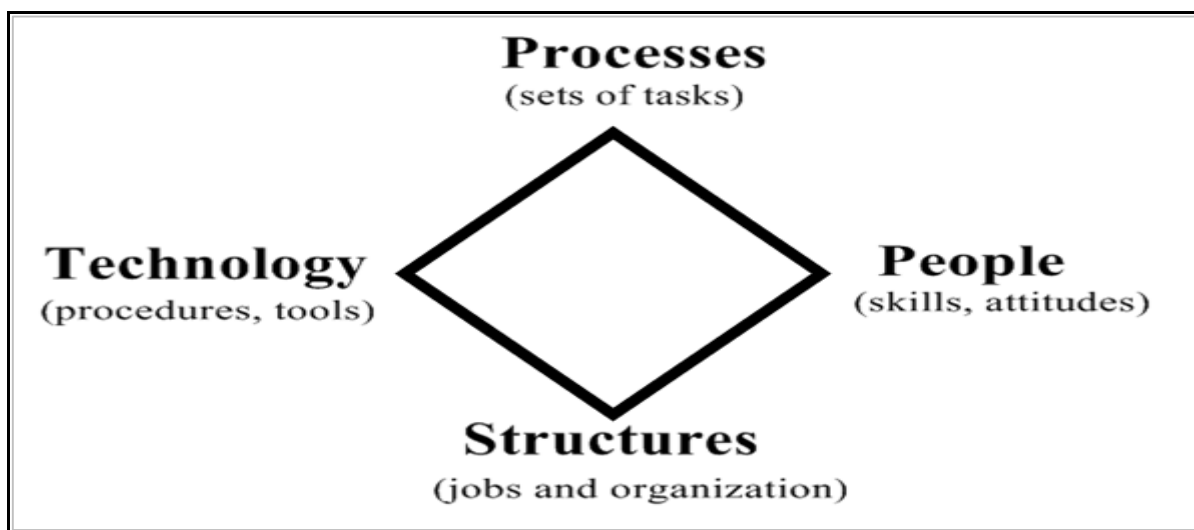
Generally, studies of new technology in institutions and its impact on work organization have been broadly documented by various scholars (e.g. Boreham et al., 2008; McLoughlin, Preece and Dawson, 2000). Different researchers have written on the topic from different research backgrounds and contexts that have revealed diverse results and experiences from various parts of the world. What follows below is a brief overview of interactive workplace changes.

1.3.1 A Synopsis of Workplace Changes

ICTs are increasingly affecting the everyday work aspects. These technological innovations have been welcomed as one of the best technological advancement in contemporary history (Franz, Robey and Koebnitz, 1986). Researchers (e.g. London and Bassman, 1989; Cascio and Zammuto, 1987) contend that the increased automation and microelectronics in institutions provides a prospect for increased production and service quality. Such hoped-for results have

led to high spending on ICTs in various institutions (Benjamin and Blunt, 1992). In turn, however, such technologies have resulted in restructuring of some social and technical aspects of work systems. The change in ‘social’ aspects involves the people (with their attitudes and skills) and existing structures that express their roles and responsibilities, while the change in ‘technical’ aspects refers to all processes (or set of various tasks) which people must perform when interacting and using different means (such as technology, tools and procedures). This interaction is diagrammatically represented in Figure 1.3 below.

Figure 1.3 - Elements of Work System



The combination of the above dimensions (people, technology, structures and processes) is very important in determining the performance of work. The current dominance and significance of ICTs based systems to the processes of work calls for understanding how these technological innovations impact the employees who are compelled to use such systems. Through the ‘change process perspective’, Woodman (1989) advocates that the study of ICTs is evolving as an essential field of interest in today’s society. Using the sociotechnical systems perspective, Woodman (1989) argues that if IT is treated merely as a technical innovation, and its effects on the social aspect of the system is overlooked, then people should expect the unwelcoming lessons. Innovation initiatives might fail, or at least might fail to achieve most efficiently, if their counterpart social/human consequences are disregarded (Woodman, 1989, p. 209). For example, when ICT based system is introduced or upgrading of existing system is done in the institution, there is a big chance of wiping out various present jobs. In turn, it can impose new threats to employees’ welfare, particularly in industrial contexts. Consequently, technology can even lead to the closure of departments/units which may lead to the shift of

some industries to new places. Roberts (1982) notes that ‘no industry is immune to such changes, which are constantly shifting the structure of skills, occupations, jobs, and earnings of workers’ (p. 89). Roberts further avows that technologies may lead to elimination of some professions, the modification of job content of some workers, and may necessitate changes in work flow and skill requirements Roberts (1982, p. 89).

1.3.2 Technological Innovations and Workplace Changes

As previously seen, ICTs are continuously changing the workplaces in various ways. For example, the changing skills content of jobs is one of the impacts of the technologically-induced workplace changes. Global literature shows that with technological changes, requirements for new skills have also increased for many jobs (Di Gropello et al., 2011). Closer analysis of the literature reveals a more multifaceted relationship existing between workplace technologies and job content (Cooper et al., 2001) and managerial control of work (Boreham et al., 2008). Social researchers, be it sociologists, economists, or historians, have for a long time endeavoured to explain the technological advancement with a focus on its scope and effects on work and on various social groups. Furthermore, they view these technological innovations as specific objects that pose an array of problems to the society (Callon, 2012, p. 83).

Zuboff (1985) for example, point to ICTs at the workplace as being responsible in mediating the work through computers whereby workers’ tasks are no longer having direct physical contact with their jobs rather than through the technological tools or systems. There are two basic conflicting views that exist about the impact of technological innovations on workers. One is that which consider an automated workplace as inhumane to the extent that the employees’ jobs are deprived of enriching features (Attewell and Rule, 1984). Jobs become deskilled and consequently lead to the workers’ produce isolation, dissatisfaction, and lessened motivation to accomplish their jobs. Secondly, there are those who view technological innovations as liberating tools (e.g. computer systems) for people. On the other side, there are some who view technological innovations being liberating (e.g. upskilling) individuals (Mesthene, 1970) in various contexts. From this view, ICTs are assumed to play a great role in assisting the removing of the monotonous jobs by making them more improved and satisfying.

In 1988 Zuboff came up with the IT typology which replicates these conflicting perspectives. Zuboff (1988) categorized them into two types: informed or automated. According to Zuboff any informing technology, is intended to enrich or upgrade the working processes. By eliminating the most monotonous, tedious, perilous and boring tasks from the work, Orlikowski and Robey, (1996) assert that it leaves a human labour to accomplish only those aspects of work that are intellectual, creative, challenging, and sustaining. On the other hand, automating technology pursues to exert the deskilling effect on work processes. In fact, this form of technology, ensures more control and stability over the processes of work which are accomplished by replacing technological innovations on place of the human labour (Zuboff, 1988).

Indeed, it remains essential to note Zuboff's (1988) typology offers a benchmark for explaining the impact of ICTs on individuals and helps to describe the way technological effects alter the nature of the work which workers must accomplish. The studies related to technological effect on work provides a massive literature that helps in shedding some light on the fundamental processes by which technological innovation impacts employees. Thus, in order to understand how technology impacts workers, it is crucial to examine the way new technologies impact work organization.

New technologies at work have been studied widely by sociologists exploring mainly issues related to deskilling, upskilling, worker alienation, and the like. The sociotechnical perspective compels sociologists to believe that the society and technology are mutually related and that changes in one aspect will have consequence on the other, including human skills transformation. For example, Chidambaram (2000) argues that workers who perform their jobs in a virtual place are likely to have a greater dependence on technology rather than developing their individual skills (p. 41). Hence, workers surrender themselves with their professional skills into the workplace playground of ICTs and other technological innovations.

The concept of 'skill' in the context of workplace discussion seems to be ubiquitous and it is incoherently defined and applied (Spenner, 1990). However, Braverman conceptualize 'skill' as simple 'craft mastery' (1974, p. 443). Braverman's definition suggests that 'skill' is comprised merely of 'technical elements' and can be empirically assessed and observed. Nevertheless, Grint (2005, p. 182) puts it clearly that 'skill' is socially constructed and,

therefore, is a dependent phenomenon. Grint offers an example of clerical work which at one time was regarded as among the very skilled types of work due to the limited literacy levels of people at that time. Arguing in the same line, Volti (2012, p. 88) shows that the introduction of new technological innovations at the workplace has shown some mixed consequences as far as workers' skill requirements are concerned. For instance, in some circumstances, the introduction of ICTs into the workplace has done little to encourage new skills development. Volti (2012) contends that:

... sitting in front of a computer monitor while doing data entry is not as physically taxing as working on an assembly line, and the work environment is likely to be more pleasant, but the skill requirements are still minimal. Under these circumstances, workers are not likely to have much more control over their jobs than assembly line workers do. At the same time, however, many recent technological developments have required the ministrations of workers with advanced levels of technical skill (p. 88).

Given such contradictory tendencies, 'skill' is viewed as an abstract concept with a diversity of meanings, and the broadly diverse skill requirements of different work contexts and occupations additionally complicates its understandings. Volti (2012) further affirms that various studies have reported an increase of workers' skills in some occupations whereas the opposite of that also has been reported in others. For instance, the study conducted by Milkman and Pullman (1991) from 1960 to 1985 was more optimistic, concluding that most of the works accomplished by American workers had moved towards the course of greater interactive and cognitive skills. On the other hand, in the context of the automobile industry, another finding by Milkman and Pullman (1991) established that advancement in automation and mechanization had removed numerous 'low-skill jobs' and increased the number of jobs that demanded skilled workers.

The findings above provide an indication that technological change has both a positive and negative influential role on workers' skills, though it does not do so as an 'independent agent'. As ever, it is imperative not to fall into the error of technological determinism because, as seen in section 1.4.1, in the context of workplace changes the sociotechnical perspective and the existing power relations within the system always have to be taken into consideration when examining technological trajectories at the workplace.

1.3.3 Workplace Technologies and Managerial Control of Work

The term 'control' remains the dominant idea of 'scientific management' (Gigliani and Bedeian 1974, p. 292). Making reference to Frederick Taylor's *The Principles of Scientific Management* (1911), Miller and O'Leary (1987) explain that 'control' was aimed at discovering 'the one best way' of doing a job, which would be accomplished by the 'one best man'. Gallie (1991), building on the views of Joan Woodward and Robert Blauner, considers automation as one of the strong transformer of the nature of the workplace control system, and such type of control removes various worst causes of friction between workers and management (Gallie, 1991, p. 429). Gallie takes technological innovation as having direct impact on both the work and individuals whose interaction with these technologies is must and endless in today's workplaces (Gallie, *ibid*).

In fact, workplace control system varies substantially between various institutions particularly their degree of impersonality (McLoughlin et al., 2000, p. 429). On one hand of the scale, there are technological innovations that assign all aspects of control to be carried out directly by the management. In this context it is likely that workers will feel the weight of individual power. In this hand of scale, McLoughlin and colleagues contend that: 'further along the scale one encounters systems of impersonal administrative control where the penalty for unsatisfactory performance - although mediated by human beings - is awarded very much as the result of the operation of an impersonal set of rules' (McLoughlin et al., 2000, p. 429). Incentive payments are considered a typical example of this system of control. Lastly, on the other hand of the scale there are technological systems whose control is built into the technology itself. In this type of control, once the technological innovation is designed so and put into operational, then the managerial intervention to guarantee the required criteria of work performance is almost unnecessary. This type of control system is closely associated to the central form of manufacturing technological innovations and is highly experienced by workers in manufacturing industries (McLoughlin et al., 2000, p. 429).

Indeed, the current workplaces furnished by various ICT systems have changed the whole landscape of work from industrial to clerical work environments. Such changes are associated with the ICT implementation which usually amounts to a whole range of unexpected, unintended, sometimes counterproductive, even paradoxical effects (Robey 1997; Orlikowski

1992). For instance, ICT deployment in the workplace is projected to alter job design, work processes, organizational structures, business cultures and workers' individual skills. In some contexts, the impacts may even be undesirable to the extent that the value of working life becomes diminished (Tolsby, 2000) making the workplace unsatisfying for workers. Important among others is the substantial shift in the managerial control of worker monitoring systems and strategies (Teicher et al., 2013, p. 157).

Moreover, technological innovation at the workplace makes workers to have limited chance to select their own ways of working, because such decisions have been fused into the components of technological architecture and functioning (McLoughlin et al., 2000, p. 4). McLoughlin and colleagues provide an example of the textile industry where the work pace and output are determined by the technological system; and the organization of works to a large extent is operative; merely responding to the demands and beats of the technical system rather than workers instigating activities and exert control.

Cornfield (1987, p. 333) reflecting on Edwards' perspective argues that technological control (a managerial strategy) which takes discretion concerning the determination of work processes and pace from employees through the use of technological innovations (e.g. assembly line), was broadly implemented throughout the period of 1920s which aimed to suppress work unrest and increase productivity. Cornfield continues saying that technical control really attested to be counterproductive for management since it connected all employees in the assembly plant, letting them to interrupt production; and the example of this is the 'sit-down strikes' of 1930s (Cornfield, *ibid*).

The literature further indicates that the accessibility, growth, and application of new ICTs has lengthily offered a strong weapon to managers in its pursuit to make sure that workplaces are properly controlled. The on-going implementation of numerous technological innovations has assisted managers in various ways including: disrupting employees' informal organizations at the workplace, reorganizing production, feminizing work, increasing the office work control, and destabilising workers trade unions (Fischer and Sirianni, 1994. p. 120).

In some contexts, the introduction of ICT in the workplace has led to workers' stress and feelings of powerlessness (Crompton and Lyonette, 2006). In most cases, the introduction of new technology is said to be accompanied by work restructuring and this accounts for the stress

not only among the workers but also in the management. According to Hodson and Sullivan (2012, p. 314), new technology is responsible for degrading and deskilling workers, particularly when it forces the narrowing of specializations which is accompanied by the loss of variety, autonomy and job mobility. The three main aspects which are extensively affected by such technologies in institutions include job content, supervision and relations among workers. These in one way influence the professional identity of workers.

The increasing use of ICTs in the workplace is responsible for altering professional activities and workplace relations in such a way that it challenges the old-style conventions concerning professional identity (Walsham, 2001). Though several contemporary professions are also affected, researchers offer a distinctive opening to study the influences of ICTs on professional identity. Scholars of ICTs have revealed some ways in which technological innovations shape and perhaps re-shape workers' professional identities (e.g. Walsham, 2001).

Professional identity is basically defined as the 'valued professional self' (Davey, 2013, p. 31). The study of the professions has a long history in sociology (Freidson 1994 cited in McLaughlin et al., 1999, p. 100). New forms of technology, linked to new management practices, are often presented as one factor in the shift away from professional power for groups such as social workers (Dominelli, 1996 cited in McLaughlin et al., 1999, p. 100). In fact, the growing deployment of ICTs in the workplace and in governance systems in general raises a number of motivating and indeed challenging enquiries about its influence on workers' 'professional identity'. The uses of ICTs in institutions are increasingly transforming employees' professional activities in various ways. Such transformation contests traditional conventions about professional identity. Scholars have established some ways in which the ICTs in institutions shape workers' professional identities (Walsham, 2001). There are sociologists such as Whyte (1956) who have established the ways people identify themselves through their work they do and the organizations where they accomplish such work. The Whyte's (1956) interpretation of the 'organization man' indicates that the workplaces furnished by various ICTs to a large extent influence workers' identities and self-presentations. Moreover, accompanied by the new technological innovations and workers' educational background and affiliation in a particular professional association contributes to the shaping of the employees' sense of who they are, how they should perform their professional activities, and the way others would regard them (Lamb and Davidson, 2005).

Researchers (e.g. Barrett, Sahay and Walsham, 2001) conclude that the introduction of technological innovations particularly ICT-based systems in the workplace and their accompanied work practices play an imperative role in structuring the systems of professional knowledge and creating fears about deskilling amongst professionals. Being traditional roles whose skills are challenged by the amplified reliance and trust in these technological systems, professionals tend to create fear concerning their identity. Even if there are opportunities for upskilling and perhaps enablement which may also ascend as ICT-based systems and practices evolve, Barrett et al (2001) are largely concerned regarding the adverse implications for workers' professional identity. These researchers admit that enablement is possible, though, deployment of ICTs in the workplace tend to redesign the workers' professional roles and reorganize organizational power. Such comparable dichotomy of automate/informate or deskill/empower consequences was also identified by Zuboff (1988) as ICT- based systems are used in professional work. Zuboff and Maxmin (2003) agree that on one hand there are potentials; nonetheless, they find that those who hold authority in institutions tend to favour computerization over enablement. In fact, the deployment of ICTs in the workplace may be accompanied by the re-definition of the workers' roles and responsibilities which consequently, such re-definition of roles implies the change in power relations as well as reshaping the professional identity.

In fact, there are several factors that fuel the on-going growth of workers' monitoring and its consequences on individual worker profession and the general work organization in institutions. The fast mounting rate of workers' monitoring can be accredited to the accessibility of ICT tools, the easiness of setting up such tools, the increasing workplace use and accessibility of the internet, and the availability of monitoring hardware and software materials (e.g. computer systems and tools embedded within the systems themselves). A report by Andrew Schulman (2001, cited in Weckert (2005, p. 23) shows that globally the sales of workplace monitoring products (e.g. software) are rising, amounting to hundreds of millions sales in U.S. dollars per year. For example, companies (e.g. SurfControl, Elron internet Manager, Telemate, Tumbleweed MMS) that deal with employees' monitoring software reported an enormous increase of sales of about 33 per cent per year in 2000. Accordingly, Baltimore MIMESweeper had increased its sales to a net increase of 80 percent in the same year (Weckert, 2005, p. 23).

Weckert (2005) offers additional reasons that propel the fast growing workplace employee monitoring:

- The dropping costs of both hardware and software, which bring ICTs within employers' reach, while it was previously difficult to afford them.
- The smallness of monitoring equipment which offers the possibility of concealing them hence making workplace monitoring less questionable by workers.
- The growing use of e-mail and internet technologies within the institutions offers workers easy access to these technologies; as a consequence, there is the likelihood of them being misused and abused.
- The ever growing availability and user-friendliness of the internet and e-mail user-interfaces, which in turn enables a regular employer to make use of ICTs with fewer difficulties.
- The change of workplace management styles by employers from the old over-the-shoulder styles to new small, less invasive and teamwork-based styles.
- The belief by employers that when employees are monitored, there is a promise of more production (either in terms of goods or services) (Weckert, 2005, p. 23).

Currently, the control by management has become tangibly easier as ICTs have allowed more diverse, unescapable and prevalent monitoring practices (Sewell, 2005, p. 700). Further, such ICTs have made the boundaries in the workplace to be progressively pervious, particularly as technologies and other digital devices mediate much of employees' communications and work content both distantly and in job places (Sewell, 2005). For example, monitoring can take place through electronic devices (e.g. mobile phones) and can happen directly at workplaces or when workers keep closer to their employers through their mobile devices (e.g. smart phones) when working outside the offices. Consequently, the restrictions of workplace control lead to a debate as to what is private and what is public (Dash, 2014).

Generally, we can say that ICTs are deployed in the workplace to enhance managerial power through monitoring of workers and keeping track of the tasks they perform (e.g. many profit-making institutions may include 'logs function' that counts key strokes in order to determine employees' productivity). Such monitoring ICTs are also broadly used outside the workplace (telework) realm (e.g. GPS-based technology which can be used to constantly track the locale of truck drivers). To some scholars, ICTs are considered as the microelectronic equal of the

‘assembly line’ to automatically control employees rather than a tool to improve work (Trost, 1985). In other words, workplace technologies have been established and applied for the purpose of consolidating and/or increasing managerial control over workers (Trost, *ibid*). Additionally, workplace technologies are responsible for making managers to lose their powers which consequently can be a distressing prospect for them; however, deskilling workers and keeping them on a minimal leash is a poor business practice that hampers the effective operation of any firm or institution (Volti, 2008). This is due to the fact that one of the workers’ expectations include career development which in some ways can be viewed as unnecessary particularly when institutions goes for full automation; which can make the employees to be attendants of the machines. Indeed, the subject of new technology and managerial control over work has been addressed by several sociotechnical analysts such as Boreham, Parker, Thomson and Hall (2008), who argue that ‘while new technologies might not necessarily be being used by managers to simply deskill workers, they are being used in increasingly diverse and subtle ways to enhance managerial control over work and labour process’ (p. 29).

1.4 THE CHALLENGES OF NEW TECHNOLOGY IMPLEMENTATION: A FOCUS ON E-GOVERNANCE

Apart from the workplace realities concerning the influence of technology on work organization (which has been discussed under the umbrella of G2E interaction), this section offers a wider overview of the challenges facing e-Governance implementation in various contexts by focusing on other remaining e-Governance interactions. As seen in sections 1.2.2 and 1.2.3, the existing sociotechnical interactions in e-Governance is very important in determining the success or failure of the e-Governance projects. Users have their own expectations when interacting with e-Governance system, and such expectations will only be met when the technological part is aligned to human social needs. It is from this view that the challenges are viewed on both sides the social and the technical part – hence sociotechnical challenges. There are several sociotechnical issues that influence the implementation process of e-Governance systems. Since new technology implementation commonly results in main challenges particularly in aligning the interaction of the social and technical artefacts, when these innovations are introduced in institutions, it is significant to look more closely at these factors. Some of the technical challenges are caused by the decision makers and systems developers who usually define the type and architecture of the service or product they anticipate

to be developed by paying less attention to those intended to use such systems. This has been clearly explained by Kaplan and Harris-Salamone (2009):

Some projects are undertaken for reasons other than need for the project: because requirements come down from the top, or because the project was simple to do, or because developers like the people who want the project (Kaplan and Harris-Salamone, 2009, p. 295).

In the planning phase, there is a tendency by decision makers or systems developers to draw on their earlier works of engaging in developing similar technological innovations with the purpose of showing the way they want the intended ICT system to be developed and used (Orlikowski, 2008, p. 291) instead of relying on the ideas offered by the end-users. Systems designers define the key players with explicit competence perceptions, and may also build an assumption that technology would develop in specific ways (Akrich, 1992, p. 208). So to say, ICT systems designers and developers thus create many assumptions concerning the world in which the technological innovation is established to function, as stressed by Akrich (1992):

A large part of the work of innovators is that of ‘inscribing’ this vision of (or prediction about) the world in the technical content of the new object. I will call the end product of this work a ‘script’ or a ‘scenario’. The technical realization of the innovator’s beliefs about the relationships between an object and its surrounding actors is thus an attempt to predetermine the settings that users are asked to imagine (Akrich, 1992, p. 208).

Nevertheless, such writings do not continuously align to what users need. A good example of challenging situations could be technological innovation which has a tendency of distracting users from their central work when ‘users have to visit different windows to accomplish a task’ (Berg et al, 1998, p. 247). Conversely, several ICT-based projects are very ambitious, comprising plans for significant institutional changes which have been cautioned by scholars (e.g. Heeks and Bailur, 2007) that there is a large risk of failure especially when there are continuous changes of the system (Heeks, 2006, p. 128). Indeed, neither decision makers nor end-users have a complete synopsis of these classical changes. So, it is imperative to explore in larger depth and attempt to realise what essentially goes on in deploying ICTs in e-Governance within various settings, rather than making use of the outside sources and top organisation to establish programmes aiming at changing the institutions that perhaps might

not work efficiently. Atkinson (1995) offers an example of ICT system implementation in the health sector with the focus on peoples' culture: 'In attempting to understand a cultural domain such as medicine it is often necessary to acquire some degree of 'insider' knowledge' (Atkinson, 1995, p. 18).

Moreover, there are some projects that are more complex as they involve several diverse stakeholders whose interests differ to a large extent. The outcome of such complexity and diverse interests is that it is very challenging when it comes to issues related to project coordination and working together towards collective goals. Such observation has been also explained by HOD (2009, p. 134) whose analysis indicates that, technological innovations entail a complex diverse stakeholders and power imbalances between them. Building on our case study of the CAS, one may have similar views that the system is characterised by a great number of stakeholders ranging from HEIs, system implementers, system developers, and end-users (e.g. applicants and admissions officers), and other key players.

Additionally, researchers admit that there is inadequate devotion paid to sociotechnical views particularly in the designing processes of ICT based systems. This appears to be so due to the fact that sometimes those who prepare system users' requirements are not the same persons as those who work with the actual system design and implementation (Hess et al, 2008, p. 14). Moreover, those who order new ICT infrastructure are not essentially the similar persons as those who are expected to work with them (Berg, 1998, p. 458). Sociotechnical scholars (Hess et al, 2008) further argue that system designers rely on the information basically obtained through questionnaires, surveys, protocol analyses, or interviews (Hess et al, 2008, p. 32).

The understanding of system developers about the future technological innovations, thus, is a representation of a mere inadequate model of the working practice, instead of the whole picture of it. In other words, the system designers are enforced to depend on inadequate data such as (e.g. the pyramid of responsibility and control, the sequence and flow of tasks as well work respectively, and many others (Berg, 1998, p. 458), instead of having complete knowledge of the work itself. As a consequence, the implementation of technological innovations in institutions are accompanied with the unintentional consequences (Harrison et al, 2007), and thus it is difficult for a person to totally predict the deliveries of the new technological innovation. Hence, due to unintended consequences, there is a possibility of technological innovation having serious and dramatic impacts. Because various ICT-based projects might

result in unintentional and contradictory outcomes which in one way are not easy to control them (Hanseth and Ciborra, 2007).

Sociotechnical researchers recognise the existing relationship among the social and technical challenges of implementing new technological innovations in institutions. Such challenges cover the plethora of the diverse aspects that, in one way or the other, influence the design, operationalisation and implementation of different technological innovations. Researchers have established the centrality of both the social and technical challenges in shaping ICTs deployment and implementation. Social researchers (e.g. Bijker, 2001; Kling, 2000; Bowker, Star, Turner and Gasser, 1997) have explored the implementation of technological innovations, e-Governance in particular in the public sectors by exploring among others the challenges of these innovations. Their focus has been on implementation processes and the problems facing both the society as users and the technologies themselves. The challenges on end-users of these innovations have been explored by focusing into two groups, users within institutions (this is discussed separately in section 1.3 with a focus on work organisation) and users beyond institutions. The challenges of the ICT-based innovations are complex and sometimes are difficult to label them as whether technical or social. ICTs entail a wide range of greatly diverse tools and devices, ranging from software to hardware, mainframes to mobile phones (Henman, 2010, p. 28) of which people interact with them socially in a wide ranging settings such as through the e-Governance.

Focusing specifically on the e-Governance, much of the literature indicate that most of the e-Governance projects suffer from the challenges related to the ICT infrastructure. Several researchers (e.g. Heeks, 2003; Ndou, 2004) have documented their findings most of which outline the internet penetration and costs, unreliable electricity, accessibility issues, as well as ICT physical facilities, being marked as prominent challenges in the course of implementing e-Governance. As discussed in section 1.2.3, concerning the existing sociotechnical relations within e-Governance systems, the end-users of the e-Governance services particularly outside the workplaces depend on their ability to pay (the direct or indirect costs users incur) to access online services. Such costs may vary depending on whether users have to pay before accessing the services or they have to pay for internet so as to access free online services. In most developing countries, cost has been mentioned as one of the big hindrances in implementing e-Governance projects. This is particularly common among the people who live below the poverty line (Mittal and Kaur, 2013. p.1197).

The literature further shows that apart from the cost of accessing the e-Governance services incurred by the end-users, there is also the funding problems that face many e-Governance projects in developing countries. It should be pinpointed that most e-Governance projects are donor-funded (donors such as World Bank are also part of the sociotechnical e-Governance system), thus they have influence in the process of implementing such projects. Baark and Heeks (1999) give an example of China where several donor-funded public sector ICT projects were found to be partial failures. Ebrahim and Irani (2005, p. 606) admit that in the public sector organizations the main source of funding for these projects comes from the government and sometimes depends on donors, thus making it hard to manage and sustain the projects due to the unreliable sourcing of funds. Therefore, due to financial constraints, most e-Governance projects in developing countries are not sustainable.

More critical is the internet which is assumed to have top preference in enabling ICT businesses, particularly e-Governance operationalization. Most of the e-Governance services are globally offered through the internet whereby citizens may access such services using their computers or mobile phones. However, globally that seems to be challenging due to the fact that about 1.3 billion people (approximately one quarter of the world inhabitants) are living below the extreme poverty line (Stadtfeld, <http://inequalitywatch.eu/spip.php?article105#nb1>) hence their affordance to pay for accessing pre-paid services is not assured. The issues related to access and digital divide (see It is argued that the challenges related to ICT infrastructure are not strongly dominated by 'technology' but rather the 'processes' and the 'people' who are responsible for configuring them (Rahman, 2010, p. 118). For example, any fault caused by wrong configuration has great impact on the end-users of the e-Governance system. Any account of the failure of the e-Governance initiatives is multifaceted due to the complex sociotechnical nature of such systems.

As perceptive as Sorrentino and Virili's (2003) sociotechnical viewpoint is, their model of e-Governance systems remains foundational to understanding the ecological view of technology and society. This is because the 'focal concern is not just with artefacts, but the structures, agents and processes that reproduce a 'sociotechnical practice' (Rip and Kemp, 1998, cited in Smith and Stirling, 2008, p. 6). Russell and Williams (2002) agree that, on the one hand, social processes play an influential role in shaping the development, adoption and use of technology, and on the other hand, the artefacts open up the potential for new social practices.

As such, the ICT infrastructure has been considered to be the backbone of the implementation of the e-Governance system (Heeks, 2003). The efficiency of e-Governance system is largely dependent on among other things the available software and hardware. However, as pointed earlier, the issues of affordability, pricing and reliability for such infrastructure may lead to the purchasing of low quality and inadequate ICT infrastructure (Said and Yared 2002 cited in Reddick, 2010, p. 54). In turn, people who use the e-Governance services might face several challenges caused by weak infrastructure. Such mutual dependence is highly insisted by sociotechnical scholars, that by having the best technical facilities, may lessen the difficulties and challenges facing the end-users who are social actors within the e-Governance system.

Reddick (2010) further argues that in implementing e-Governance success is to a large extent dependent upon the available infrastructure of e-Governance. This supports Nkwe's (2012, p. 41) observation that the absence of proper ICT infrastructure may act as an obstacle for smooth implementation of e-Governance. Nkwe examined the opportunities and challenges of implementing e-Governance in Botswana where he found that poor and/or lack of strong ICT infrastructure is among the leading challenges in implementing e-Governance in this country. Further to this matter, Kettani and Moulin (2014, p. 16) contend that poor and inadequate ICT infrastructure is a predictive sign of an e-Governance initiative's failure. In fact, with poor ICT facilities, it provides the view that the meaning of optimisation within sociotechnical e-Governance becomes less important when one side does not pay attention to the counterpart (e.g. running the e-Governance system with poor hardware and software which in one way may impose inconvenience to users). Zaigham (2013) insists that having a strong base of ICT infrastructure is essential for successful e-Governance implementation (p. 88). Within the sociotechnical e-Governance system, the ICT based system-in-use embodies ICTs, social, economic and political dimensions. Whereas the technical infrastructure offers the opportunity for accessing public services within the interconnected nodes, thus, the efficiency of such facilities is essential for delivering the expected outcome (Mingers and Willcocks, 2004, p. 415).

Apart from infrastructural issues, the implementation of e-Governance confronts various human challenges, particularly in developing countries. Human factors are central to the sociotechnical e-Governance implementation; and are largely represented by the public workers and the general public/citizens. As explained by Backus (2001), e-Governance

attempts to improve and reshape the interaction and relationship between the government, employees, citizens, businesses and public sector departments. Being sociotechnical systems entailing multiple stakeholders, the implementation of e-Governance systems demands the creation of favourable environments for fair interaction between all actors (Abu-Shanab and Bataineh, 2014, p. 211). Failure to re-consider the importance of every actor within the sociotechnical system, may trigger pressure for resisting the implementation of new technology in a particular context. Such pressures may emerge from both the internal and external environment of the institutions. For example, in the public sector, government employees are always condemned for being in front line to resist the change (e.g. implementation of e-Governance projects) (Schwester, 2009, p. 116). Resistance to change by employees in the public sectors is an indication of fear on the future of their employment which is subjected into new working environments.

The term 'resistance' has been viewed as unbecoming for use particularly in the situation where new technology is being institutionalized. The claim is that it assists mostly to blame the people who resist; speaking issues related to resistance suggests a technocratic and managerial bias (Bauer, 1997, p. 1). As it is in many other fields (e.g. organizational studies), in sociology researchers have used the term 'resistance' to describe an eclectic diversity of behaviours and actions across different levels of social life (institutional, collective, individual) and in a diverse context, including the workplace and political systems (p. 534). In organizational change research (Oreg 2006; Dent and Goldberg 1999) the concept of 'resistance to change' is often used to explain why efforts of introducing technological change in various contexts fail or fall short of expectations. Within managerial psychology literature there are several definitions of the term 'resistance to change' which range from Beer et al. (1990), who view resistance as a function of the misconception of programmatic transformation. Goldstein (1994) requested managers to consider resistance as a 'provisional attraction' towards stability; while Kotter (1995) considered resistance as an obstacle in the structure of organization. On the other hand, Spreitzer and Quinn (1996) argue that 'resistance' originates from individual and or organizational structures (e.g. barriers to work, self-esteem). Generally, the literature shows that resistance to change is closely linked to users' behavioural and usage intentions, attitudes, and beliefs. These play a great role as whether to use or not to use a new technological system.

Resistance to technological innovations has been framed by sociotechnical approach in terms of 'poor fit' between the realities of using these new technologies and the real work practices.

Scholars (e.g. Brown and Duguid, 2002) have demonstrated the way workplace technologies are entrenched in the complexes of social relations which make their use significant. There are elements that depict how to familiarise, use or work with such technologies and these are learned through collaboration and collective practices. Such elements include the social infrastructure (language, culture, education) which powerfully influence how and whether implementation of specific technological innovation ‘work’ and viable in particular circumstances of use (Greenhalgh et al., 2014, p. 212).

For sociologists, resistance to technological innovation stems from the human agent, whose position in some particular sociotechnical relations; entails a particular set of moral principles, capabilities, organisational role, identity, beliefs, and many others; and accords meaning to present technologies being implemented in particular environments (Greenhalgh et al., 2014). This study employs STT to understand such resistance to the implementation of the CAS in HEIs in terms of the human agent’s cognitive and actions; as well as the way both the social structures (particularly social, political authority, professional values and norms) and technological (physical/material capabilities and restrictions) trigger the occurrence of such resistance.

Mingers and Willcocks (2004, p. 12) assert that in the context of complex sociotechnical systems the principle of ‘joint optimization’ between the human and non-human aspects is essential. When such principle is violated particularly when the system is ‘indeed designed and implemented for the purpose of satisfying the IT requirements ... and in the situation where an information technology (the technical system) is scrupulously designed, implemented, installed or otherwise procured, but no accompanying preparations are made in the organisation (the social system), the information technology’s requirements of the organization will nonetheless manifest themselves by evoking undesigned and therefore, most likely, undesirable changes in the organization’ (Mingers and Willcocks, 2004, p. 12). Such consequences may comprise human resistance to the technological innovation (Markus, 1983) and may even lead to the failure of the technological innovation. An important point to make here is that any changes in either the technical system or social system will be escorted by changes, whether intended or not, in the other sub-system. The embryonic outcome, therefore, is more likely to be the achievement of the envisioned goals if, firstly, the constant growing requirements of both the technical system and social system are often taken into account and, secondly, the

anticipated changes happen by design before detrimental changes emerge by default (Mingers and Willcocks, 2004, p. 12).

Some scholars (e.g. Hirschheim and Newman 1988; Markus 1983; Keen 1981) have been interested to understand challenges to the ICT-based system's acceptance: resistance or rejection or non-adoption. Lapointe and Rivard (2005) avow that some tried to open the black box about the reasons and the way (why and how) resistance occurs. Resistance to change can be grouped into two main types: 'passive' (difficult to identify and hard to handle) and 'active' (observable and comparatively easy to discover) resistance (Kim and Kankanhalli, 2009, p. 575). However, Derya and Gökhan (2013) offer three common categorization of resistance to change:

- Blind resistance – this type of resistance to change happens when few individuals in an institution are scared and afraid of change due to the distressing unknown.
- Political resistance – this type of resistance to change happens when institutional members think that implementing change may lead to loss of some valuable aspects (e.g. loss of power, role, status, and position) in institution.
- Ideological resistance – this type of resistance happens when there are philosophical and intellectual differences, feelings or beliefs (e.g. when individuals disagree concerning institutional change just because of believing that such anticipated change is untimely and might lead to the harm than improvement (Derya and Gökhan, 2013, p. 16).

According to Derya and Gökhan (2013, p. 17) resistance to change in the context of work organizations can be triggered by many factors, including ignoring the expectations and needs of the institutional members, the provision of inadequate information regarding the type of anticipated change, and not recognising the needs for the change. Because of this, individuals in institutions may build anxiety and fear over such issues like change of occupation levels, different wage rates, loss of job satisfaction, job security, changes to working conditions, fear of the unknown, and loss of individual control over work (Rose, 1994, p. 150).

Literature shows that most e-Governance projects confront strong resistance when governments automate their operational businesses. Resistance occurs due to the influence of such technological changes on some public officers' power and relations, including the

reduction of some influential decisions in the government undertakings and a reduction in employment (Abu-Shanab and Bataineh, 2014, p. 2011). In fact, the introduction of technological innovations in institutions generates a new working environments which involve control of how workers perform their daily routineous jobs, in such that some workers might find it difficult to cope with them (Abu-Shanab et al., 2013; Nkwe, 2012). In some cases, public employees tend to resist new technological innovations due to the perception that such technological innovation may replace the need for people (i.e. if public services become automated and provided through the internet, then the need for more conventional office workers may be deemed unnecessary; consequently, this may result in fewer jobs (unemployment). Technological innovations at the workplace may also result in an unintended reduction of occupation ranks or the necessary swap of such occupations with the changed types of skills (Abu-Shanab and Bataineh, 2014, p. 2011). In fact, it is in this context where training for new skills becomes mandatory (Alshehri and Alfraaj, 2012). Such training can focus on the ICT tools and the internet.

Social scientists further point to the ‘digital divide’ as among the core challenges of e-Governance implementation. There has been an expanding body of scholarly research over the past 20 years indicating the increasing emergence of digital divide (US Department of Commerce, 2005); generally seen as happening amongst the ‘information poor’ and ‘information rich’ (Doctor, 1991; Wilson, 1987) or technological ‘haves’ and ‘have-nots’ (Howland, 1998). In summary, the term ‘digital divide’ can be defined as ‘the perceived gap between those who have access to the latest information technologies and those who have not’ (Compain, 2001, p. xi). Scholars have labelled the ‘digital divide’ as one of the most serious sociotechnical challenges of the implementation of e-Governance in many projects.

Digital divide is social, historical, political and cultural in nature (Ortiz, 2008, p. 42). Researchers view divides as the problems that cannot be fixed just by increasing the number of computers or by installing rapid internet access into an intrinsically unbalanced system (e.g. Ortiz, *ibid*). Digital divide issues have been recognized as important in explaining the challenges in the implementation of new technologies in the public sector. Some scholars consider that the digital divide was once important, but as internet access has become widespread (if not at home then at least through smart phones or at schools and colleges), it has closed the divide and the subject of parity in ICTs should no longer be an issue (Garson, 2006, p. 97). In addition, Warschauer (2003) affirms that: ‘... digital divide can be seen as either

passé (because most people who want computer and internet access in the richest countries can now afford them) or irrelevant (because those who have internet access really need it' (p.12).

Apart from the digital divide, social scientists (e.g. Srivastava and Teo 2007; Gil-Garcia and Pardo 2005) describe poor human capital (lack of IT experts, website managers) as another challenge facing implementation of the e-Governance and other ICT-based systems. Remenyi (2009) views human capital as one of the key stumbling blocks to sustainable implementation of e-Governance. Among the issues that Remenyi put forward is the fact that IT experts are part and parcel of the ICT infrastructure and that their education and training are varied, making e-Governance projects subject to risks (p. 407). This happens when most IT experts leave their jobs at one institution to go to another looking for greener pastures/good pay.

Human capital is seen as a key determinant of the smooth running of e-Governance projects. The implementation of e-Governance in any country requires adequate and competent human resources. The reputation and success of e-Governance profoundly depends on well trained and skilled human resources (Bhuiyan, 2011). The technological part of e-Governance will only function well in the presence of fully equipped human resources. In other words, prior to the implementation of the e-Governance system, priority must be given to the development of skilled, knowledgeable and efficient human resources for its success and sustainability during implementation.

The implementation of e-Governance projects, particularly in most African countries, is reported also to have been facing sociocultural challenges (Rahman, 2010). These challenges are also part of the human factors in the implementation of e-Governance. The subject of sociocultural challenges is a growing field in e-Governance research. Looking back to the historical growth of technology, Amoretti (2009, p. 71) contends that this subject has been explored in various themes such as technology and society, technology and culture, and sociotechnical studies (sociological analysis of technology). These focal areas are important because technology growth arises in particular social, cultural and economic settings, and its deployment in various places is mediated by the interplay of various stakeholders whose social response might vary accordingly (e.g. the citizens' attitudes, propensity, willingness, expectations, know-hows, etc.) (Amoretti, 2009, p. 71).

Much sociological research has been conducted on subjects connected with technology, culture and institutional interactions. For instance, normative politics of technology (Garrety and Badham, 2004) as opposed to the political culture of technology (Sørensen, 2004) are extensively discussed. The political culture of technology includes constructive and critical interventions, while the normative politics of technology is explained as ‘user-centred’ design. These methods are also essential in understanding the deployment of ICTs in e-Governance. Since ICTs are technological innovations, they remain the basis for the formulation of e-Governance policy (Rahman 2010, p. 73).

The literature further shows that public awareness of e-Governance initiatives is essential (AlShihi, 2005). This may take different forms including but not limited to seminars, conferences, exhibitions and media (radio, television, newspapers, etc.). Such awareness is significant in enlightening people concerning the newly introduced e-Governance services, the expected benefits and the instructions on how to access or use such services (AlAwadhi and Morris, 2009). Baker and Bellordre (2003) consider awareness challenges as a major concern for citizens to realize the benefits of ICTs in e-Governance; thus they propose that in its operationalization and implementation, it should be accompanied by the awareness programs so as to make the citizens become cognisant with the e-Governance potentials and become familiar with the new channels of service delivery. Users’ familiarity with an array of technological innovations remains an essential part of e-Governance implementation. It is pivotal for e-Governance systems to consider also different social groups available in the society (e.g. citizens with disabilities, elders, geographically and economically disadvantaged, etc.). All these are part of the sociotechnical e-Governance system; therefore, users should not be denied their right of accessing the public services online. The study by Jaruwachirathanakul and Fink (2005) established that conducting awareness in the initial phases of e-Governance implementation contributes to an electronic readiness (e-readiness) to accept new technological innovations. Jaruwachirathanakul and Fink (2005) agree with other researchers that providing eye-catching demonstrations in several media (e.g. radios, newspapers, television and in the websites) becomes advantageous when such services reach a big number of prospective users.

Furthermore, apart from awareness as explained above, the political factors undoubtedly constitute an obstruction to the e-Governance adoption and implementation mainly in African contexts. Lack of e-readiness (measured by a country’s access to ICTs - Ngulube, 2007) is the main factor affecting e-Governance implementation in Africa. In this context, Heeks (2002)

outlines the e-Governance implementation challenges associated with e-readiness to include the technological and leadership role (motivation, involvement, influence and support), and the legal, human and data systems of various institutions. Heeks (2002) insists that political leadership remains a vital prerequisite and a dependent factor upon which any successful implementation of e-Governance can be realized. In relation to this observation, Heeks adds that political leaders who are important in supporting e-Governance strategies and plans. However, in African e-Governance programs politicians tend to be in the forefront to resist such initiatives (Heeks, 2002).

The influence of politics in e-Governance implementation in Africa is experienced in variable ways, one being the politically subjugated bureaucracy. Bureaucracy, in fact, characterizes e-Governance issues, such as the determination of technological opportunities. Indeed, the public governance is controlled by politicians through their technocrats and government officers, professionals and executives who have power in enforcing their decisions. For example, Ngulube (2004) refers to Wilson's analysis stating that within sub-Saharan Africa the revolution in ICTs has been viewed by politicians and administrators as an extremely political matter and not a technological challenge (Ngulube, 2004, p. 158).

Wimmer and Traunmüller (2002, p. 216) agree that the implementation of e-Governance is powerfully driven and shaped by political factors. According to Wimmer and Traunmüller (2002), the development and implementation of e-Governance, therefore, is respectful to these political influences which not only bear hindrances towards a distinct solution, but more significantly bear enormous possibilities for its take-off and sustainability. It is said that political dynamics are very effective in influencing the general functioning of the government in that politics has the ability to hinder the e-Governance implementation if the interests of a particular group are disadvantaged (Hassan, 2012, p. 115). Additionally, Hassan (2012) insists that political stability remains an important aspect for the successful implementation of e-Governance in the world (Hassan, 2012).

Political will is earmarked by sociotechnical researchers (e.g. Hamelink, 1999; Heeks, 1998) as a driving force for public sector reforms, and thus e-Governance take-up. Heeks (2005) compares ICTs with trees and their roots which are concealed in the surrounding 'soil' of the institutional environment: social, cultural, economic, political, etc. Heeks (2005) argues that there is a broad range of factors that are responsible for failure of many e-Governance

initiatives (e.g. cultural factors, economic constraints, legal restrictions) but, above all, politics stands at the top.

As clearly depicted by Backus in the model of e-Governance (see Figure 1.2), government interaction with the citizens offers an opportunity for them to participate directly in issues related to e-voting, e-democracy, e-education facilities, online political movements, and so forth; political influence in such interaction remains pivotal as it involves political parties, judiciary functions, parliament and other dynamics. Thus, e-Governance forms a complex political web that influences its adoption and implementation (Fang, 2002, p. 5), including the rejection of some e-Governance systems that seem to have political influence.

Several other studies (e.g. Sebastian and Supriya, 2013; Odat and Khazaaleh, 2012; Nayak, 2005; Backus, 2001) concur with the findings of Fang (2002). The study conducted by Dada (2006) in Botswana revealed that whether to adopt or not to adopt an e-Governance initiative depends to a large extent on the willingness of the prevailing politicians. Politicians are responsible for enacting the laws which may guide the implementation of various e-Governance initiatives. Moreover, they are the ones who can build the trust of citizens about the newly introduced e-Governance system. Mullen and Horner (2004), however, contend that citizens would feel as sufferers of social injustice, particularly in the context where there is an access divide to e-Governance services, which in turn may adversely affect peoples' trust about their government.

Generally, it can be argued that one of the intentions of e-Governance is to discourage frequent interaction of people with the government servants, which in turn helps in minimizing corruption issues (Shah 2007, p. 134). However, strong opposition by government workers may demand a wise and cautious approach. In this, the robust willpower of leaders and politicians seems to be significant. For example, Shah (2007, p. 134) contends that the electronic voting (e-Voting) concept is a non-welcoming idea to politicians. The discussed key challenges are diagrammatically summarized in the Figure 1.4 below.

Figure 1.4 - Infrastructural, human and political challenges of e-Governance implementation



The literature further shows that system development methods are responsible for predicting the prospective challenges of e-Governance (OECD, 2003). Because of this, the portals for e-Governance services need to be developed using proper and best methodologies that take into account the end-users' requirements and capabilities. Hasan (2003) outlines various portal developmental challenges that may hinder the e-Governance acceptance rates: the extent to which portal information is complete, easiness of exploring online services (e.g. how easy one can search the information), and the extent of security and confidentiality as regards to both the portal security and the individual information security. Normally, users of e-Governance services have their own expectations which drive them to go for online services. If such expectations are not met, then the number of those accessing online services may go down. However, such a trend does not cut across all the automated services because some services have a limited access option. This happens when there is only one option whereby users are compelled to go online for them to access a particular service. This is true with an example of the CAS in Tanzania.

In fact, there are various studies whose focus has been on understanding the implementation challenges of various e-Governance initiatives (e.g. Geels, 2005; Davidson and Lamb, 2000; Al Bakr, 2009). The analysis by Al Bakr (2009, p. 182) condenses e-Governance implementation challenges using the case study of the Emirate of Dubai. In his analysis, the following issues were identified as hindrances to the implementation of e-Governance in the region: inadequate ICT skills among users, inadequacy and unavailability of ICT infrastructure and equipment, citizens' preparedness and access challenges. A similar observation was also made by Yonazi (2010, p. 96) who identified the generic citizens' readiness/preparedness and access issues to be the influential challenges facing many Tanzanians to make use of the automated services.

Similar challenges have been explained by AlShihi's (2006) analysis of the e-Governance implementation challenges in Oman. AlShishi asserts that Oman has been confronting various technical and non-technical challenges in implementing its various e-Governance projects. According to AlShihi, these challenges include: ICT infrastructure (equipment, e-readiness), policy issues, human capital development (ICT skills, education and learning), change management (culture, resistance to change), partnership and collaboration (stakeholders' participation), strategy (vision, mission), leadership role (motivation, influence, involvement, support), high cost of internet access, unreliability of internet connectivity, unreliable electricity, and poor ICT technologies. Similar findings have been registered by Hasan (2003) who also found many technical problems regarding the adoption and implementation of e-Governance in Bangladesh. All these challenges are discussed in detail below. Next follows a discussion on the way various technological innovations influence organization of work and workplace relations in various settings.

1.5 THE MERITS AND DEMERITS OF ICTS IN E-GOVERNANCE

The advancement in technological innovations and their entanglement in every aspect of social life in the 21st century present citizens with novel opportunities, choices, and challenges. In fact, these advancements have created a new universal economy driven by ICT. While deployment of ICT in e-Governance has had a great effect in revolutionizing global governance systems, experiences from different contexts reveal the presence of both advantages and

disadvantages of implementing these systems in the public sector. This section is focused on exploring the advantages and disadvantages of using ICT in e-Governance, mainly in the public sector. This treatment stems on the sociotechnical framework, on the basis of reasoning how e-Governance systems provide both the benefits and disadvantages among various sociotechnical groups.

A wave of public sector re-engineering was more obvious around the 1990s when most government agencies revealed that the use of internet was a beneficial way to interconnect with citizens, internal government agencies, businesses and other agencies (West, 2005, p. 3). According to West (2005) the internet is the most prevalent e-Governance delivery channel (p. 3). For example, in the United States of America, 81 per cent of federal e-Government initiatives are delivered through the internet with the feedback and/or remainder being done in the forms of telephones, kiosks, bulletin boards and emails. Different from the old-style 'bricks-and-mortar' agencies that are linear, hierarchical, and one-traffic in their communications model (West, 2005, p. 3), e-Governance systems are nonlinear, non-hierarchical, interactive (sociotechnical), and available 24/7. Because of this, citizens today celebrate the availability of governments online as a means to conveniently interact with government officials on various issues ranging from social to political and economic (West, 2005).

The advent of ICTs and their use in electronic business (e-business) within the private sector steered the paradigm shift in the public sector, whereby governments worldwide started to reconsider their hierarchical and bureaucratic managerial models (Heeks, 1999). The basic proposition behind the deployment of ICTs in e-Governance is that citizens will have improved and easier accessibility to different governmental departments and within the government itself e-Governance ensures and enhances internal communication. Such promises have been anticipated through the use of the internet which put most of the local governments online through the Web portals. This is meant that making governments' online availability to be 24-hours a day, accessible in any vicinity using internet-capable tools/devices (smart phones, iPad, tablets) and other means of communication. Moreover, there is a promise for government itself to make its outputs easily accessible in a comparatively cost-effective and efficient way. This is assumed to be possible due to the availability of cheaper internet where its cost is often incurred by users (Peacey, 2002, p. 12). who pay to access the automated services.

In fact, the advantages of implementing technological innovations, particularly the e-Governance are similar across the developing and developed countries (Ndou, 2004). Nevertheless, much of the advantages seem to be obvious to the government sectors (G2G), business (G2B) and the citizens (G2E). ICT application in e-Governance assist the government sectors, citizens and businesses to have improved access to online government services (e.g. various information, online payment) 24/7 hours a day. Cost reduction and diminishing the levels of organizational processes in institutions (by restructuring and re-organizing working procedures have been extensively documented by several scholars (Abu-Shanab and Bataineh, 2014; Alshehri, Drew and Alfraaj, 2012; Heeks and Bailur, 2007; AlShihi, 2006; Ndou 2004) as among the advantages of the e-Governance system. Another advocated claim towards e-Governance implementation is the performance improvement by government institutions which consequently ensures an effective delivery of the public service effectively for citizens (Rubin and Wang, 2004).

The experience of e-Governance implementation both in developing and developed countries has shown that deployment of ICTs in e-Governance offers a great opportunity to improve public service delivery, thus leading to the improvement of service quality. Also, ICTs in e-Governance provide a possibility of promoting 'good governance' (i.e. it provides greater public engagement through citizens' direct voice and representation) (de Jager and Reijswoud, 2006). Moreover, the National Office for Information Economy (2003) offers a summarised set of e-Governance advantages such as the reduced organisations' and customers' effort, costs, and time; improved service delivery and hence offering satisfaction to citizens; increased ICT skills for users, thus acquiring knowledge on basic computer and internet usage; and emergence of more work opportunities and new business creation (National Office for Information Economy, 2003, pp. 36-45)

In addition, the OECD (2003) has offered a several advantages of e-Governance implementation most of which have also been documented by other scholars in different contexts. These include the following: improved efficiency of government sectors in data processing; improved public services through enhanced understanding of consumers' requirements, hence aiming for all-in-one wired services; sharing ideas and other information amongst government sectors and departments at a single mega database; improving accuracy and transparency in matters related to the government information. Moreover, e-Governance assists in building citizens trust to their governments since citizens can easily be involved in

the policy process through internet-based approaches, hence indicating how government is transparent and accountable to its people (OECD, 2003, p. 2).

The advantages of e-Governance cannot be over stressed, as many developing countries also recognise this paradigm shift towards re-engineering the public sectors and have taken several initiatives to implement the same in different sectors. Worldwide, nations cannot disregard the obvious advantages of ICTs when deployed in e-Governance. However, e-Governance is not a remedy that completely provide a guarantee in solving all issues of public sector governance systems nor will it eliminate all the difficulties to public service delivery. Such statement offers an indication that 'ICTs deployment in e-Governance carry with it both the advantages and disadvantages to (so to say, while e-Governance projects offer benefits to the citizens, in other context such projects may have adverse effects to users, and such effects can be obvious in the workplaces). While it is evident that developed countries (e.g. Europe, U.S of America, Australia and Singapore) are far ahead in terms of ICTs deployment in e-Governance, most of the developing countries particularly in Africa are still lagging behind (United Nations, 2014).

Whereas e-Governance systems continue to revolutionize the way public services are delivered, the benefits tend to be measured by focusing on the 'supply-side' (Kolsaker and Lee-Kelley, 2008. p. 725). This means that implementers of e-Governance are the best commentators of the advantages than disadvantages; and in so doing the make users remain silent as receivers of new technologies; and in most cases though not in all situations, they lack an opportunity to express their concerns in regards to the accompanied disadvantages of such technological innovations. This is because there is often a big gap between e-Governance design and reality from users.

Various e-Governance studies have registered a mixed perspective concerning the benefits of deploying ICTs in e-Governance in various contexts (Cohen and William, 2002). Such benefits are discrete in the sense that while ICTs are beneficial to some, they become disadvantageous to others (Bwalya and Zulu, 2012). Given the complexity of technological change, it is not easy to predict the ultimate impact of new technologies on both the society and government. West (2005) agrees that occasionally it may take long time before the ultimate technological effects become realised after making it operational in institutions. Moreover, one may note that change does not unveil uniformly or clearly; rather there exist several avenues by which technological innovation emerges (OECD, 1998). For instance, at first the internet was embraced by people

as an ideal tool for individual liberation (one may use internet for several purposes ranging from social, economic and political purposes). Because of its devolved character and ability of creating two-way interaction, advocates sold it as a 'joy' that would give people comprehensive control over their information needs (Szoka and Marcus, 2011). However, in the era of computer hackers, security breakdowns, viruses, and unwanted spam, people are reconsidering the societal benefits of ICTs.

It is argued by West (2005) that apart from being sociotechnical tools for empowerment and liberation, ICTs have been overwhelmed by behaviour that assaults individual privacy, causes significant awkwardness, and threatens personal affairs. For example, between the period of 2001 and 2002, the Computer Security Institute projected that losses from computer viruses alone equalled nearly \$50 million, apart from uncountable hours of individual annoyance experienced by computer users (West, 2005, p. 15).

West (2005) further contends that in some contexts e-Governance systems are implemented in a way that ignores the truth that longer-term technological effects are mediated by institutional setting, financial realities, and political dynamics. As indicated by Fountain (2001), on some occasions the bureaucracy tends to be a barrier to implementing technological innovations due to the new creations that signify a change in the 'status quo'. Scholars view technological innovation as having power to enforce officials to change working relations, sacrifice autonomy, and alter practices/routines (McLaughlin et al., 1999). Moreover, officials can speed up or slow down the innovation diffusion by injecting barriers in the path of novel ideas (West, 2005). Despite the established record of technological effectiveness and efficiency, such innovation may not be adopted unless government bureaucrats agree that such innovation can be implemented (West, 2005, p. 13).

Equally important, such technological innovations are likely to produce some disadvantages or undesirable consequences. Volti (2012) provides an example of American railroads which suffered a financial beating as buses, trucks and cars in 1920 took away a considerable portion of the marketplace for the transportation of people and goods. According to Volti (2012), ICTs at the workplace have at times been implemented and applied by the managers not just for the purpose of increasing efficiency but also because managers wanted to strengthen their managerial control role. In turn, such a goal tended to make employees unhappy with

technological changes at the workplace in fear that such technological innovations would result in downsizing, insecurity and permanent unemployment (Volti, 2012, p. 83).

Jalon (1985) explains how the use of ‘electronic synthesizers’ radically downsized the number of musicians in various studios in Los Angeles. A similar trend is also reported in the manufacturing sector, where innovative production technologies have caused employers to either sustain or even increase production while downsizing the number of employees (Volti, 2012). An ideal example of this is that of Ford Motor Company which managed to make as many vehicles in 1988 as it used to do in 1978 while retaining half as many workers (Templin, 1992). It is unquestionable that some technological innovations have rendered some work obsolete and the trend is a continuing dance – loss of particular jobs, either through replacement of workers by labour-saving technologies or through the obsolescence of an entire industry – have all impact on employees. However, Volti (2005) states that in technological innovations can also indirectly create new employment opportunities.

1.6. CONCLUSION

The chapter offers an overview of operationalization of new technology in the public sector by reflecting on the sociotechnical framework. It proposes that there is always influential sociotechnical connection between actors (human and non-human) of the e-Governance systems. The chapter also highlights the importance of engaging literature and sociotechnical theoretical ideas to unravel contextual issues that underpin several occurrences in the study of technological innovations in the public sector. This chapter provides the possibility of drawing learning instances that are essential in sociotechnical understanding of technology implementation in the public sector, especially the e-Governance. These entail the requisite to address workplace changes concerns when new technology is introduced in institutions such as the changing skills content of employees’ jobs, workers’ jobs being deprived of enriching features, their jobs becoming deskilled, workers’ isolation, dissatisfaction, and lessened motivation. More importantly, new technologies at the workplace subject and condition workers to have a greater dependence on technology rather than developing their individual skills and also such technologies creates a possibility of removing numerous ‘low-skill jobs’ and increasing the amount of jobs that basically need skilled workers. It is imperative also to note that sociotechnical e-Governance interactions are accompanied by various challenges,

advantages and disadvantages. Issues related to cost saving (to some) and cost burden (to others), resistance to new technologies, ICT skills challenges among e-Governance users, and many others are raised in this chapter. The chapter also highlights an existing intricate relationship between social and technical aspects of technological innovations, specifically the e-Governance systems.

CHAPTER 2

RESEARCH DESIGN AND METHODOLOGY

2.1 INTRODUCTION

This chapter offers an overview of the research design and methods used in the study. It outlines the epistemology and methodological perspective of the study. Further, it looks at the research methods adopted to achieve the research objectives. A case study is used as a research strategy because it is known for its ability to examine the implementation of sociotechnical systems from different perspectives (challenges, costs, benefits, prospects and impacts) among the system's users. The first section of the chapter offers an overview of the interpretivism as research philosophy. It then provides further details on the research methodological approach, particularly the description of the case study. Further, the section describes the research goals and data collections methods. Sections 2.7, 2.8 and 2.9 describes the sampling and selection of study participants as well as the details on the data management and analytical processes by sharing an insight into the methods that were applied to the management and analysis of data. Additionally, the chapter discusses how researcher sought to ensure that ethical protocols were observed. Researcher also discusses the limitations that were encountered during the data collection period. Below is a summary of the chapter, presented in the form of a table that highlights the main verdicts made for the purpose of conducting this scholarly research (Table 2.1).

Table 2.1 - The research design summary

Decision level	Choice
Epistemological and ontological assumptions	Interpretive
Research strategy	Single case study
Research techniques	Interviews (individuals), document analysis
Institutions	TCU, MoEVT, HEIs, HESLB, NECTA, NACTE, UCC and DTBI
Unit of analysis	The CAS
Study participants	TCU staff, admissions officers, (Deputies – Vice Chancellors?), principals and provosts; representatives: NACTE, NECTA, HESLB, UCC, DTBI
Field of subject	E-Governance
Theoretical framework	Sociotechnical theory

2.2 RESEARCH PHILOSOPHY

Epistemology is the theory of knowledge that studies how knowledge is acquired (Horrigan, 2007; Galliers, 1992). Traditionally, there are two leading philosophies concerning knowledge: positivism and interpretivism. Positivism (also known as logical positivism) is a philosophy which believes that scientific knowledge is the only authentic knowledge, and that such knowledge may only emerge from the positive affirmation of theories through observation. Lincoln and Guba (1985, p. 19) assert that the origin of positivism dates back to the nineteenth century. Lincoln and Guba add that, within a positivist model of inquiry, the truth is seen as prevailing; the material world is determined by natural causes; and truth is objective, singular and separated from the researcher. Several axioms to positivism have been credited by Lincoln and Guba (1985) (see Table 2.2 below).

Table 2.2 - Axioms of positivism

SN	Axioms	Meaning
1	Ontology	The truth is the sole reality, neutral, and separated from investigator.
2	Epistemology	The investigator is independent of the variable being investigated and has no room to influence the findings.
3	Axiology	The analysis is unbiased and value-free; it aims to seek objectivity
4	Rhetoric	The writing is based on a prescribed style that uses quantitative terms with meanings that are set at the beginning of the study.
5	Generalizations	There is the possibility of free generalizations, based upon time and context.
6	Causal linkages	Real causes are precedent to or concurrent with effects

Source: Lincoln and Guba (1985, p. 157).

On the other hand, the interpretivist (phenomenological or humanistic) approach is viewed as directly opposed to the positivist approach (Lee, 1989). According to Klein and Myers (1999), the basic assumption for interpretive inquiry is that knowledge is learned through social constructions (e.g. language and shared values). Interpretive research methods accept the view that truth is socially constructed by human actors (Walsham, 1995); thus, the researcher is supposed to understand the best approach to be adopted in the study. This helps to determine the research methods to be used in order to answer the research questions. That understanding will also dictate the research approach to be used in the study; it could be either qualitative or quantitative.

A wide range of approaches have been suggested to be used in the broad field of computerization and society (Galliers, 1992). Currently, an interpretive research approach has evolved as a key strand in technology-based research (Myers and Young 1997). The approach is claimed to assist the technology-based researcher to understand human perspectives and actions within the social and institutional contexts. Moreover, it has the potential to produce a deeper understanding of the phenomena under investigation. Galliers (1992) admits that some imperative concerns are associated with knowledge and its acquisition, which, if recognised, would lead to a shift in what comprises valid research in the field of ICTs. Galliers contends that ICTs' research epistemology draws deeply from the social sciences; this is because ICTs are not essentially technical systems – rather, they are also social systems.

2.3 METHODOLOGICAL APPROACH

This thesis builds on the qualitative research approach. In qualitative study, the researcher seeks to ascertain the qualitative (non-numeric) features of the phenomenon being studied from the respondents' perspectives in order to understand the meaning of the phenomenon in totality (Dempsey and Dempsey, 1999). This type of research approach begins with questions with the ultimate goal of learning. The approach has two distinctive features: (1) an investigator is the means through which the research is conducted, and (2) the goal is learning about some aspects of the social world. Both features are fundamental to an understanding of learning that views the researcher, rather than the recipient, as the creator of knowledge (Rossman and Rallis, 2003). Babbie (2007, 2001) elucidates that qualitative case study research helps a researcher to come up with either 'explanatory' or 'descriptive' knowledge. This study pursued a 'explanatory case', which according to Danemark et al. (2002) offers rich and revealing understandings into the social world of a particular case which should be studied in its natural setting within which it occurs.

The interviews, observation and participant observation (fieldwork), questionnaires, documents and texts, and the researcher's impressions and reactions are the main sources of qualitative data (Myers and Young, 1997). Qualitative research methods are envisioned to help investigators understand peoples' social background and the cultural milieus within which they live. A unique strength of the qualitative research methods approach is its value in shedding light on what goes on in institutions (Walsham, 1995).

Qualitative research entails some distinct features that are distinguishable from quantitative methods. While quantitative researchers generically have only marginal contact with the study participants, qualitative researchers often employ themselves as the data-collecting instrument. In other words, rather than using the accurately constructed data-collection instruments and tools to collect data regarding their subjects' interests, backgrounds and knowledge, qualitative researchers spend lengthy periods of time with the participants in their studies, while observing and recording the participants' actions and behaviours. During this time, the researcher makes comprehensive notes on all of the events that have been observed, the interviews that have been

conducted, and any other relevant evidence that could have an influence on the study (Dempsey and Dempsey, 1999).

Even though there are various qualitative research approaches, there are some common features to all that are pivotal to understanding, describing and explaining the social phenomena ‘from the inside’ in a different way (Flick, 2009, p. ix). Since qualitative research anticipates approaching the world ‘out there’ (not in formalised research settings e.g. a laboratory), Flick (2009) insists that there are features that remain essential, and that the researcher may examine them, these are:

1. through an analysis of individuals’ or groups’ experiences (such experiences could be related to life histories or to professional (or everyday) practices; they might be addressed through the analysis of everyday stories, knowledge and accounts);
2. through an analysis of communications and interactions in the making (this can be accomplished by observing or recording practices of interaction and communication and analysis of such materials); and
3. through an analysis of documents (texts, images, music or film) or similar other traces of interactions or experiences (Flick, 2009, p. ix).

Through qualitative inquiry, the researcher is able to listen for, and be receptive to exposures. Unlike in quantitative research, the qualitative researcher is also able, to some extent, to welcome outliers because the approach allows the exploration of new possibilities in research. As argued by Giorgi (1994), a more wide-ranging phenomenological approach would expand the qualitative perspective since it allows for the advantaged admittance of important experiences of the lived world.

Whereas several researchers take a hard line by admitting only one of the two processes (qualitative and/or quantitative processes), Kvale (1996) argues that an entire research process contains the interaction of both approaches. According to Kvale (1996), qualitative analysis becomes the first step in investigating the phenomenon and developing qualitative concepts and assumptions in a specific study. The collection and analysis of data can either be qualitative or quantitative, with an interaction between the two methods every so often. Reporting the results, on the other hand, is primarily qualitative. As to whether to adopt a qualitative or quantitative approach, or a kind of mix of both was a seminal choice for this study. Several

scholars (e.g. Hussey and Hussey, 1997; Myers and Young, 1997; Huberman and Miles, 1994) have remarked on the need to choose between qualitative and quantitative methods in an empirical/fieldwork study. Myers (2013, p. 7) contrasts quantitative and qualitative research methods.

Table 2.3 - Contrast between quantitative and qualitative research methods

<i>Qualitative research: A focus on text</i>	<i>Quantitative research: A focus on numbers</i>
<i>Action research</i>	Surveys
<i>Case study research</i>	Laboratory experiments
<i>Ethnography</i>	Simulation
<i>Grounded theory</i>	Mathematical modelling
<i>Semiotics</i>	Structured equation modelling
<i>Discourse analysis</i>	Statistical analysis
<i>Hermeneutics</i>	Econometrics
<i>Narrative and metaphor</i>	

Source: Myers (2013, p. 7)

Myers (2013) argues that ‘quantitative research is best if you want to have a large sample size and you want to generalize to a large population. In this case the objective is to study a particular topic across many people or organizations’ (p. 8). Myers warns that such a general rule tends to lose various social and cultural aspects of organizations or fears that they might be treated in a superficial manner. In contrast with the qualitative methods, he avows that ‘qualitative research is best if you want to study a particular subject in depth (e.g. in one or a few organizations). It is good for exploratory research, when the particular topic is new and there is not much previously published research on that topic’ (Myers, 2013, p. 9).

Kaplan and Maxwell (1994), adding to Myers’s comments, emphasise that the objective of understanding any phenomenon from the participants’ perspectives in terms of its specific social and institutional context largely gets lost if text data are quantified. Since no instruments have been established that would quantify the various aspects in this study, it was resolved that a predominantly qualitative approach for data collection would be employed because this study sought to understand the people in the social and cultural contexts (Myers and Young, 1997) within which the CAS is being implemented. The CAS, being a new admissions system in the quality assurance of higher education (not only in Tanzania, but also within Africa), deserves an in-depth understanding of its implementation practice – an endeavour that can only be met by using qualitative research methods. The choice of a qualitative approach is in line with the

views of Hussey and Hussey (1997, p. 20), who define qualitative research as ‘a subjective approach which includes examining and reflecting on perceptions in order to gain understanding of social and human activities’.

Fundamentally, critical studies intend to critique the status quo through the disclosure of what are believed to be deep-rooted, structural flaws within social systems, and thus to convert these restrictive and alienating social conditions (Trauth, 2001, p. 6). Given the prevailing position of positivist approach in ICTs research (Trauth, 2001), it is not surprising that some of the qualitative works have attempted to bridge both the positivist/quantitative and interpretive/qualitative divide (Gallivan, 1997; Lee, 1991). Accordingly, even if this study is interpretive in nature, it also borrows some aspects of positivist’s approach for the purpose of triangulating the findings. Bryman (2004) notes: “There is a tendency to associate case studies with qualitative research, but such an identification is not appropriate ... case studies are frequently sites for employment of both quantitative and qualitative research” (Bryman, 2004, p. 49).

Even if this research is qualitative in nature, it admits the use of statistical (quantitative) data in presenting the findings. Given the nature of the research problem, it was apparent that the case study option would be the most suitable choice for this research project.

2.4 RESEARCH METHOD: CASE STUDY

Sociotechnical systems are complex (Leavitt, 1965). Understanding the phenomena related to such systems requires a generic approach which can produce not only comprehensive descriptions of situations and events, but also an in-depth understanding of the actors involved, their feelings and the interactions among them (Yin, 2012, p. 1). Only qualitative methods can provide a comprehensive view of this type (Yin, 2012, p. 1), and case study research in particular will enable the researcher to observe and analyse the phenomenon as a single, composite whole (Bullock, 1986 cited in Yin, 2012, p. 1). The choice of case for a case study is made not because it is extreme or uncommon in some way, but due to its prospects of offering a suitable context for the particular study questions to be answered (Bryman, 2004, p. 51) in order to unravel a particular situation. In addition, it must be noted that in qualitative research, the truth is context bound as well as time specific (Merriam, 2009, p. 5).

The case study method is very common for research that hopes to explore the implementation of ICTs, irrespective of whether it is qualitative or quantitative in nature. Yin (2012) writes that ‘all case study research starts from the same compelling feature: the desire to derive a(n) (up-) close or otherwise in-depth understanding of a single or small number of “cases”, set in their real-world contexts’ (p. 4). Case study research answers two major questions that are asked by the investigator: ‘how’ or ‘why’. These questions are asked in a situation over which the researcher has little control, and when the attention is on the prevailing phenomenon within real-life context (Yin, 2003, p. 1). Furthermore, Yin asserts that the case-study method has a unique strength in its ability to deal with a broad range of evidence – interviews, observations, documents, and artefacts (Yin, 2003, p. 8).

Case study research is often chosen due to the dearth of empirical work (Bryman, 2012; Gilham, 2000) in a specific field of study. And, because our context is e-Governance in HEIs, a case study is a highly appropriate method for studying the implementation practice of the CAS. In addition, this system cannot be studied adequately outside the context in which it operates (Yin, 2012; Creswell, 1994; Bryman, 2004).

Flyvberg (2006), nevertheless, shows that the qualitative case study approach is condemned for superficially generating knowledge that might be generalized. However, he rectifies this misinterpretation by arguing that knowledge produced through the case study is determined by designs used (i.e. exhaustive or wide-ranging) within a specific case and not the case on its own; and he adds that the focus must be more on understanding the studied phenomenon in specific context and the need to generate beneficial knowledge to the people. Accordingly, Stake (1995) also maintains that the case study research should benefit people rather than leaving the research outputs in the archives.

The setting of the case, its theoretical aim, the case’s individuality and the units of analysis are distinctive, as briefly described in Table 2.4 below.

Table 2.4 - The Central Admission System (CAS): case description

Criteria	Case description
Setting of the case	Intrinsic: extraordinary and unique
Theoretical aim	Descriptive: it required theory to guide data collection and analysis
Number	Single case: the CAS
Units	Multi-layered: more than one sub-unit (technical, social, institutional)

This study was conducted in the higher education setting in Tanzania, where field interviews started in April 2013 and lasted until August 2013, and from December 2013 to February 2014. Such a study design was essential to ensure the researcher's interaction with the applicants and other entitled users of the system (e.g. admissions officers) during the application period of the CAS. Furthermore, it was important to conduct interviews during its application (for easy access to applicants) and after the application period had closed for the purposes of following up the selected applicants in various institutions by interviewing admissions officers at different points in time in order to allow the researcher to track the challenges of the system and its influence in the workplace from the time when its operationalization started until the time when this study was conducted.

There are several factors that influence a researcher's decision to choose qualitative research methods in research related to ICTs (Trauth, 2001). Among them are the following: the nature of the problem being researched, the surrounding epistemological issues (i.e. theoretical lens of the researcher) and the nature of the problem (the degree of doubt surrounding the phenomenon being studied). The nature of the research problem, as explained by Trauth (2001), is what determines the research method. Likewise, the rationale for the decision to choose qualitative research methods was based on the fact that the CAS is a complex sociotechnical system within higher education e-Governance systems. It requires an exploration of the context in which it operates rather than being explored by means of the available formal methods. The CAS is seen as a sociotechnical system as it involves, for instance, social-cultural issues, politics and power relations within a regulatory context (the milieu where, in some cases, the regulated need to adhere to the regulator's control tools and mechanisms). Table 2.5 below is the list of the institutions that admit their students through the CAS. It is from these institutions the sample for this study was drawn. The list of institutions participating in the CAS is for 2013/2014 academic year.

Table 2.5 - Institutions participating in the CAS during the academic year 2012/2013

S/N	Name of institution	Code	Type of institution	Ownership status	Location
1.	Archbishop Mihayo University College of Tabora (AMUCTA)	AM	University College	Private	Tabora (www.amucta.ac.tz)
2.	Ardhi University (ARU)	AR	University	Public	Dar es Salaam (www.udsm.ac.tz)
3.	Arusha Technical College	AT	Non-University	Public	Arusha (www.uoa.ac.tz)
4.	Catholic University of Health and Allied Sciences (CUHAS)	CU	University	Private	Mwanza (www.bugando.ac.tz)
5.	College of African Wildlife Management-Mweka (CAWMM)	CAW	Non-University	Public	Moshi (www.mwekawildlife.org)
6.	College of Business Education (CBE) Dodoma	CBD	Non-University	Public	Dodoma (www.cbe.ac.tz)
7.	College of Business Education (CBE) DSM	CB	Non-University	Public	Dar es Salaam (www.cbe.ac.tz)
8.	Community Development Training Institute Tengeru (CDTI)	CD	Non-University	Public	Arusha (www.cdti.ac.tz)
9.	Dar es Salaam Institute of Technology (DIT)	DT	Non-University	Public	Dar es Salaam (www.dit.ac.tz)
10.	Dar es salaam Maritime Institute (DMI)	DMI	Non-University	Public	Dar es Salaam (www.dmi.ac.tz)
11.	Dar es Salaam University College of Education (DUCE)	UDD	University College	Public	Dar es Salaam (www.duce.ac.tz)
12.	Eastern Africa Statistical Training Centre (EASTC)	EA	Non-University	Public	Dar es Salaam (www.eastc.ac.tz)
13.	Eckernforde Tanga University (ETU)	ET	University	Private	Tanga (www.etu.ac.tz)
14.	Hubert Kairuki Memorial University (HKMU)	HK	University	Private	Dar es Salaam (www.hkmu.ac.tz)
15.	Institute of Accountancy Arusha (IAA)	IA	Non-University	Public	Arusha (www.iaa.ac.tz)
16.	Institute of Adult Education (IAE)	AE	Non-University	Public	Dar es Salaam (www.iae.ac.tz)
17.	Institute of Finance Management (IFM)	IF	Non-University	Public	Dar es Salaam (www.ifm.ac.tz)
18.	Institute of Procurement and Supplies (IPS)	IP	Non-University	Private	Dar es Salaam (www.ipstz.ac.tz)
19.	Institute of Rural Development Planning (IRDP)	RD	Non-University	Public	Dodoma (www.irdp.ac.tz)

S/N	Name of institution	Code	Type of institution	Ownership status	Location
20.	Institute of Social Work (ISW)	SW	Non-University	Public	Dar es Salaam (www.isw.ac.tz)
21.	Institute of Tax Administration (ITA)	IT	Non-University	Public	Dar es Salaam (www.ita.ac.tz)
22.	International Medical and Technological University (IMTU)	IM	University	Private	Dar es Salaam (www.imtu.ac.tz)
23.	Iringa University (IU)	IU	University	Private	Iringa (www.uoi.ac.tz)
24.	Jordan University College (JUCo)	JC	University College	Private	Morogoro (www.juco.ac.tz)
25.	Josiah Kibira University College (JoKUCo)	JKU	University College	Private	Bukoba (www.jokuco.ac.tz)
26.	Kampala International University -Dar es Salaam Constituent College(KIUDCC)	KU	University College	Private	Dar es Salaam (www.kiu.ac.tz)
27.	Kilimanjaro Christian Medical College (KCMCo)	KC	University College	Private	Kilimanjaro (www.kcmc.ac.tz)
28.	Mbeya University of Science and Technology (MUST)	MB	University	Public	Mbeya (www.must.ac.tz)
29.	Mkwawa University College of Education (MUCE)	UDM	University College	Public	Iringa (www.muce.ac.tz)
30.	Moshi University College of Cooperative and Business Studies (MUCCoBS)	MC	University College	Public	Moshi (www.muccobs.ac.tz)
31.	Mount Meru University (MMU)	MM	University	Private	Arusha (www.mmu.ac.tz)
32.	Muhimbili University of Health and Allied Sciences (MUHAS)	MH	University	Public	Dar es Salaam (www.muhas.ac.tz)
33.	Mwalimu Nyerere Memorial Academy (MNMA)	MN	Non-University	Public	Dar es Salaam (www.mnma.ac.tz)
34.	Mwenge University College of Education (MWUCE)	MW	University College	Private	Moshi (www.mwuace.ac.tz)
35.	Mzumbe University (MU)	MU	University	Public	Morogoro (www.main.mzumbe.ac.tz)
36.	Mzumbe University – Mbeya University College (MUMCo)	MMB	University College	Public	Mbeya (www.mcc.mzumbe.ac.tz/)
37.	National Institute of Transport (NIT)	NT	Non-University	Public	Dar es Salaam (www.nit.ac.tz)
38.	Open University of Tanzania (OUT)	OU	University	Public	Dar es Salaam (www.out.ac.tz)

S/N	Name of institution	Code	Type of institution	Ownership status	Location
39.	Ruaha University College (RUCo)	RU	University College	Private	Iringa (www.ruco.ac.tz)
40.	Sebastian Kolowa Memorial University (SEKOMU)	SK	University	Private	Tanga (www.sekomu.ac.tz)
41.	Sokoine University of Agriculture (SUA)	SU	University	Public	Morogoro (www.suanet.ac.tz)
42.	Stella Maris Mtwara University College (SteMMUCo)	SAM	University College	Private	Mtwara (www.stemmucoco.ac.tz)
43.	St Augustine University of Tanzania (SAUT)	SA	University	Private	Mwanza (www.saut.ac.tz)
44.	St Augustine University of Tanzania-Bukoba Centre (SAUT)	SAB	University Centre	Private	Bukoba (No Website)
45.	St Augustine University of Tanzania-Songea Centre (SAUT)	SAS	University Centre	Private	Songea (www.songea.saut.ac.tz)
46.	St. Francis University College of Health and Allied Sciences (SFUCHAS)	SF	University College	Private	Ifakara, Morogoro (www.sfuchas.ac.tz)
47.	St John's University of Tanzania (SJUT)	SJ	University	Private	Dodoma (www.sjut.ac.tz)
48.	St John's University of Tanzania (SJUT) (St. Mark Centre)	SJD	University Centre	Private	Dar es Salaam (No independent Website)
49.	St. Joseph University in Tanzania (SJUIT)	JD	University	Private	Dar es Salaam (www.sjuit.ac.tz)
50.	St. Joseph University College of Information Technology (SJUCIT), Songea	JS	University College	Private	Songea (No independent Website)
51.	St. Joseph University College of Agricultural Sciences and Technology (SJUCAST), Songea	SJA	University College	Private	Songea (No independent Website)
52.	St. Joseph University College of Management and Commerce (SJUCMC), Makambako	SJM	University College	Private	Makambako (No independent Website)
53.	Stefano Moshi Memorial University College (SMMUCo)	SM	University College	Private	Moshi (www.smmuco.ac.tz)
54.	Tanzania Institute of Accountancy (TIA)	TA	Non-University	Public	Dar es Salaam (www.tia.ac.tz)
55.	Teofilo Kisanji University (TEKU)	TK	University	Private	Mbeya (www.teku.ac.tz)

S/N	Name of institution	Code	Type of institution	Ownership status	Location
56.	Tumaini University Dar es Salaam College (TUDARCo)	TD	University College	Private	Dar es Salaam (www.tudarco.ac.tz)
57	Tumaini University Makumira (TUMA)	TM	University	Private	Arusha (www.makumira.ac.tz)
58.	Tumaini University Makumira-Mbeya Centre (TUMA)	TMM	University	Private	Arusha (No independent Website)
59.	United African University of Tanzania (UAUT)	UN	University	Private	Dar es Salaam (www.uaut.ac.tz)
60.	University of Arusha (UoA)	UA	University	Private	Arusha (www.uoa.ac.tz)
61.	University of Arusha-Buhare Centre (UoAB)	UAB	University Centre	Private	Musoma (No independent Website)
62.	University of Bagamoyo (UB)	UB	University	Private	Dar es Salaam (www.uob.ac.tz)
63.	University of Dar es Salaam (UDSM)	UD	University	Public	Dar es Salaam (www.udsm.ac.tz)
64.	University of Dodoma (UDOM)	DM	University	Public	Dodoma (www.udom.ac.tz)
65.	Water Development Management Institute (WDMI)	WD	Non-University	Public	Dar es Salaam (www.wdmi.ac.tz)
66.	Zanzibar Institute of Financial Administration (ZIFA)	ZF	Non-University	Public	Chwaka Zanzibar (www.zifa.ac.tz)

Source: TCU, 2013.

The fact that the CAS is a very new and unique in Tanzania creates a certain level of uncertainty. This means that certain issues need to be emphasized in the research, thus making it more suitable for qualitative research methods. The research field for this study was conducted at various Tanzanian HEIs and at the offices of key stakeholders. Table 2. 6 below summarises the sites/ institutions visited during the research.

Table 2.6 - Sites visited during fieldwork

SN	Institution	Location
1	Tanzania Commission for Universities (TCU)	Dar es Salaam
2	National Council for Technical Education (NACTE)	Dar es Salaam
3	Ministry of Education and Vocation Training (MoEVT)	Dar es Salaam
4	Hubert Kairuki Memorial University (HKMU)	Dar es Salaam
5	Mzumbe University (MU)	Morogoro
6	University of Iringa (UoI)	Iringa
7	Ruaha University College (RUCO)	Iringa
8	Jordan University College (JUCO)	Morogoro
9	Mwenge University College (MWUCE)	Moshi
10	Moshi University College of Co-operative and Business Studies (MUCCOBS)	Moshi
11	Institute of Accountancy Arusha (IAA)	Arusha
12	St John's University of Tanzania (SJUT)	Dodoma
13	Mwalimu Nyerere Memorial Academy (MNMA)	Dar es Salaam
14	Sokoine University of Agriculture (SUA)	Morogoro
15	Dar Technohama Business Incubator (DTBI);	Dar es Salaam
16	University Computing Centre (UCC)	Dar es Salaam
17	National Examination Council of Tanzania (NECTA)	Dar es Salaam
18	Higher Education Students Loan Board (HESLB)	Dar es Salaam

All applicants (the main users of the system) were interviewed at the TCU's offices, the place where currently the system is hosted, and where all challenges facing applicants are handled. Most institutions are located in Dar es Salaam city – the place where the CAS developers' (UCC, DTBI) offices and many HEIs, including all key stakeholders (TCU, NACTE, NECTA, HESLB, and MoEVT) are located. Additionally, most of the meetings for the preparation, operationalization and implementation of the CAS were held in Dar es Salaam city. Logistically, because I am a resident of Dar es Salaam, it was easy and cost-effective for me to undertake this research there, in contrast with other distant institutions which involved not only long-distance travel but also the associated additional expenses. Indeed, in the field of e-Governance, a case study is a generally recognised research strategy. As argued by Paré and Elam (1997), a case-study research strategy entails an in-depth understanding of the circumstances and can be employed to accomplish a range of research objectives using various techniques of data collection and analysis.

Scholars have offered several typologies of case-study methods which researchers may opt to follow. For example, Jensen and Rodgers (cited in Taylor et al., 2006, p. 27) identify five types of the case studies. They are explained below.

- 1) *Snapshot case studies* entail a detailed, independent study of one research unit at a particular period of time. They may involve the testing of a hypothesis by comparing the patterns across sub-units (e.g. comparing the agents of socialization across generations).
- 2) *Longitudinal case studies* are qualitative and/or/quantitative case studies of one research entity at ‘multiple phases’, or time periods.
- 3) *Pre-post case studies* entail one case study entity at two phases of different time periods divided into a certain critical event (based on a theory underpinning the study that would be anticipated to influence the case observations meaningfully).
- 4) *Patchwork case studies* entail multiple case studies with a similar research unit; and they are conducted using either longitudinal, snapshot, and/or pre-post strategies. This approach is envisioned to offer a more holistic view of the dynamics of the research subject.
- 5) *Comparative case studies* involve multiple case studies with multiple research units; they aim to make cross-entity comparisons. Comparisons made are generally both qualitative and quantitative (Jensen and Rodgers cited in Taylor et al., 2006, p. 27).

For the purpose of this study, the researcher undertook a snapshot case study which offered more detailed and rich information regarding the implementation practice of the CAS instead of testing a hypothesis. Since the research being undertaken is qualitative in nature, it is anticipated to be mutable, multi-layered, and contextual, due to the fact that data collected depends on who provides it and how skilful the researcher is when he or she receives it. In addition, since the existing qualitative study design inhibits *a priori* controls, attaining consistency in the traditional sense is not only fictional but impossible (Merriam, 1988).

To ensure the consistency of the methods and research questions used, this study builds on Maxwell’s (2013, p. 117) matrix of research methodology, in which six components are regarded as important and are thus used in this case study. These components are briefly illustrated in Table 2.7 below and are further discussed in the succeeding sections.

Table 2.7 - Methodology matrix for a study of the implementation of CAS practice in Tanzania

Research questions (What do I need to know?)	Why do I need to know this? (Goals)	Sampling decisions (Where will I find this data)	Data collection methods (What kind of data will answer these questions?)	Whom do I contact for access?	Data organization and analysis
What are the challenges in the implementation of the CAS in higher education regulatory contexts?	Challenges of ICTs implementation are varied based on the context and type of technology. It is therefore important to understand the CAS stakeholders' perceptions of these challenges	CAS stakeholders' offices (TCU, NACTE, HEIs, NECTA, HESLB, MoEVT, UCC, DTBI) Applicants	Interviews Documentary analysis	Applicants Admissions officers Key stakeholders (Officials, DVCs, CAS developers)	Single case: audio taping, transcription, thematic coding (using Nvivo 10 QSR), re-reading documents (content revise)
To what extent and how does the implementation of the CAS influence work organisation in higher education institutions?	To better understand how the implementation of the CAS influences work organization in higher education institutions	CAS stakeholders' offices (HEIs)	Interviews	Admissions officers	Single case: audio taping, transcription, thematic coding (using Nvivo 10 QSR)
To what extent and how does the implementation of the CAS guarantee efficiency in quality and admission service delivery in higher education institutions?	To understand how the implementation of the CAS has improved admissions service delivery and quality assurance in higher education institutions	CAS stakeholders' offices (TCU, NACTE, HEIs, NECTA, HESLB, MoEVT, UCC, DTBI)	Interviews Documentary analysis	Admissions officers Key stakeholders (Officials, DVCs, CAS developers)	Single case: Audio taping, transcription, thematic coding (using Nvivo 10 QSR) Re-reading documents (content revise)

Adapted from Maxwell (2013, p. 241-242).

2.5 DATA COLLECTION METHODS

During research fieldwork, data were collected using interviews as the main source of data; whereas secondary data sources were obtained from documentary analysis (CAS reports, minutes of meetings, and applicants' queries obtained from their emails and query forms). Combining the interviews and documentary analysis helped the researcher to triangulate the information with the purpose of decreasing the researcher's bias. In addition, it was intended

to increase the validity of the data and support the interpretive potential of the study (Denzin 1989). The techniques used for data collection are now clearly described below in details.

2.5.1 Interviews

Interviews entail a rich sources of research information. Their inherent value stems from the researcher-participant interaction that is at the core of the method. The availability of modern technology has broadened the concept of ‘face-to-face’ dialogues to include interviews done by means of video, telephone and other communication media. Nonetheless, the core part of interview is the ‘verbal give-and-take’ between the two involved parties (Frankfort-Nachmias and Nachmias, 2000). On the most generic level, interviewing is a basic mode of inquiry that aims to understand the lived experience of participants and the meaning they ascribe to what they experience (Seidman, 2006, p. 8) or a ‘conversation with a purpose’ (Bingham and Moore, 1959). Basically, this happens during data collection in which someone (an interviewer) puts questions to the other person (an interviewee) (Babbie, 2001). Wengraf (2001) makes it clear that ‘interviews are not merely speech-events, they are non-verbal communications and whole-body/whole-context events’ (p. 48). The aim of the interviews in this study was to understand the implementation practice of the CAS in higher education governance systems. Intentionally, the qualitative research interview intends to describe the various meanings of the central themes in the life world of the participants.

Patton (1990) groups the interviews into three basic types: an informal conversational interview, a semi-structured (the interviews guide approach) and the standard open-ended interviews. Even if these types differ in terms of the structure of their format and questioning, basically they all share the common feature that the interviewee’s responses are open-ended and are not limited to choices offered by the interviewer. The fourth type is the closed (fixed-response) interview, which is common in quantitative research. In this type, research informants are required to choose from an encoded set of response groupings. This study used the interview guide approach (this was conducted with the applicants and admissions officers) and open-ended interviews that were accompanied by probing for more meaning.

The open-ended interviews were conducted with key informants: the TCU staff, CAS stakeholders (including system developers – UCC and DTBI), applicants and academic administrative leaders who work directly with the issues surrounding admissions. This was done in order to obtain information regarding the enactment, the functioning and the implementation challenges of the CAS. Although this approach to interviewing can be accompanied by a questionnaire to be followed up by the interviewer, most often a topic guide, a list of topics to be covered in the key informant’s interview is used to probe the respondent. Questions are generally open ended, meaning that they leave space for the respondent to answer in different ways (Royse, 2008, p. 183). Interviews with key informants collect informed opinions, perceptions and facts from people with specialised knowledge and expertise about the implementation of the type of programme being considered.

The use of interviews is usually accompanied by several limitations that can usually be established during the interview process and in the data collected from the interviewees. For example, it is worth noting that what people say is not always what they mean or do. The gathered data sometimes can be subject to the researcher’s bias that results from human interaction during the interview process (Babbie, 2001; Frankfort-Nachmias and Nachmias, 2000). Having a give-and-take relationship is an advantage; however, ‘innate characteristics and differences in interviewer techniques may affect respondents’ answers’ (Frankfort-Nachmias and Nachmias, 2000, p. 219). Notwithstanding such problems related to interview data, we depend heavily on the research results which can offer copious benefits to the study particularly when they are combined with other sources of information.

In this study, the interviews were conducted in the period of June 2013 to February 2014. The case study constituted thirty respondents from the groups of applicants, admissions officers, system developers and key stakeholders. The focus of the research was on the system users (applicants, admissions officers and developers). A total sample of thirty participants from these clusters were interviewed, with the assurance that a significant portion of the CAS stakeholders’ views was covered (see sampling and rationale, section 2.7). It also meant that it was possible for people both outside HEIs and within HEIs to cross-check the respondents’ answers. Nevertheless, to some extent the size of the sample was opportunistic and profoundly dependent on the practical concern of the researcher’s access to the respondents.

The research and interview questions were designed by surveying the qualitative literature relating to technology and by adapting the interview instruments described in the literature (Buchanan, 1993). The interview questions focussed on the challenges of new technology, the influence of new technology on the organization of work and the generic benefits and other unintended consequences of technology in institutions. This was the boundary that the organisation imposed on the interviewing process. The interviewer's key role was to record interviewees' views and to sympathise with respondents so that an open atmosphere and trust prevailed. At the beginning of the interview session, the respondents were requested to talk freely and were allowed to ask questions and discuss them as their own lived experiences. Participants' commentary was not interrupted. It was only at the end of the interview session that particular questions were asked; this was only done when a key aspect of the research questions had been omitted (not answered).

The interview questions were formulated in line with the following guidance questions:

- 1) What does the CAS aim to do (i.e. meaning)?
- 2) Does the CAS require one (e.g. an admissions officer) to do his/her job in a different way (i.e. norms)?
- 3) Who has led institutions to use the CAS and what are its motives (i.e. power)?
- 4) What changes in one's work, and that of others in the institution, have resulted from the use of the CAS (i.e. work organization/production)?
- 5) What has remained the same (i.e. reproduction)?
- 6) Have you experienced any unexpected problems in the use of the CAS? And what happened as a consequence (i.e. the unintended consequences)?

Almost all the interviews were conducted in Swahili; whereas, English was used only in a few cases. They were conducted strictly one-on-one. However, during phase two of the data collection, all issues which had not been strongly articulated during face-to-face interviews, and which needed more clarification were communicated by telephone and by email in order to clarify them. More than one interview session was conducted with some key informants to seek more clarification on some issues that were in demand. At HEIs the interviews were conducted and recorded in the interviewees' offices. For ethical reasons, neither video recording nor photographing was used to document the data; but in some cases, brief notes were taken on paper. The transcription of the recorded interviews into text followed later when the texts were combined with field notes and were sent to NVivo 10 QSR for further

organization and analysis (see Figure 3.3). In fact, the audio recording that was made during interviewing helped the researcher to capture all the informants' conversations which were later filtered during transcription to include only the key issues that had been raised in the interview guide. The interviews were usually complemented by documentary analysis, which is now described below.

2.5.2 Documentary Analysis

Revising documentary sources produces socially researched evidence (Mason, 2002, p. 103). Thus, any document that contains pertinent information should not be overlooked (Henning, 2004, p. 99). The reason for this is that most of the research interviewees have in some way engaged themselves in writing various institutional reports related to the study. And these are worth being reviewed as secondary sources of data. The utilization of secondary sources encourages the reader to believe that the research made all-inclusive use of both primary and secondary sources of data. Normally, secondary data are generated later through the ready-made literature while primary data are generated from the field work through interviews and other sources (Marwick cited in McCulloch, 2004, p. 30).

In collecting secondary data, a review of various significant published and unpublished literature was done as another source of information that supplemented the interviews. The collected documents were reviewed in order to understand the implementation of the CAS practice. Next, all documents reviewed during the study were collected in categories: meetings reports, CAS project reports, statistical data on admissions, applicants' query forms, applicants' emails, and e-Government strategy documents and profiles of the research sites. Table 2.8 below demonstrates some examples of the reviewed documents.

Table 2.8 - Reviewed documents

Document Category	Example
Meetings reports and other printings	<ul style="list-style-type: none"> ▪ Management Meetings' reports of the operationalization of the CAS; ▪ Joint Admission Committees Reports ▪ Admission committee reports ▪ CAS Technical Committee Meetings' reports ▪ Admissions guidebook ▪ Rolling Strategic Plan 2009/10-2013/14
CAS project reports	<ul style="list-style-type: none"> ▪ CAS Oman report ▪ CAS progress reports to the management and stakeholders
Admissions statistical data	<ul style="list-style-type: none"> ▪ TCU: University and university colleges' facts and figures ▪ CAS selection reports (2010/2011; 2011/2012; 2012/2013)
Applicants' query forms and emails	<ul style="list-style-type: none"> ▪ Applicants' query forms and emails from 2010/11-2012/2013 admission cycles.

Reports of meetings were revised in order to track and triangulate the reported challenges of the system and the way in which such challenges were faced. The reason for the revision of the CAS project reports and other related documents was to gain specific information on the why, when and how the project was initiated and operationalized. The admission statistics were revisited with the intention of tracking the admissions trends before and after the introduction of the CAS.

The reason for revising the applicants' query forms and emails was to understand the various challenges that faced CAS users when they applied for admission via the system. In contrast, the purpose of revising the ICT policy document and e-Government strategy documents was to understand the national vision of e-Governance and the present plans for effecting its implementation in various government sectors/institutions. In addition, it assisted the researcher to understand the extent to which the current case study was aligned with the national vision and plans.

In a nutshell, the use of documents as sources of evidence has a lengthy and commendable tradition in the empirical social sciences (Hesse-Biber et al., 2008, p. 112). The use of documents as sources of information in social research provides a comprehensive yet concise introduction to the investigation of the role and nature of documents in field research. By transmitting ideas, images, instructions, etc. and influencing the course of social interaction as

well as its pattern, they are central to the research process (Prior, 2003, p. 198). Vartanian (2011) argues that secondary data tend to be far less expensive and require far less time to organize (mostly in terms of putting them together in working form for analysis) and often are accessible at no cost (Vartanian, 2011, pp. 13-14). However, while secondary data promise various benefits for researchers, there are still good reasons for using primary data. The use of secondary data is very challenging in the sense that one may lack control over the wording and framing of the research issues. In other words, questions that are important for a specific study are not directly included in the data obtained from secondary sources. Moreover, refinements usually matter a great deal in research, thus secondary data may relate to wider or interrelated questions, but not exactly to those questions being explored by researcher (ibid, p. 15).

During the fieldwork, which started at the TCU offices and thereafter took place in various selected institutions, I interviewed applicants, admissions officers and other key stakeholders who are in charge of academic matters and those who have interest in the system. These respondents played a major role as representatives of the key stakeholders of the CAS. These are the people who participated in the project from the initial stage of planning for the new admissions system until the present stage of the implementation of the project. Indeed, they helped me to gain and gather different views concerning the system (CAS). All respondents who were purposely selected were either applicants, admissions officers, system developer(s), chief officers in charge of academic affairs in HEIs, and/or key stakeholders in the system. Nonetheless, even if the official documentary records may provide particularly remarkable sources of research data; researchers are cautioned to be aware of certain ethical issues. This is due to the fact that some archives may contain certain identifiers (e.g. names and addresses), and so their use requires researchers to take the ethical matter of confidentiality into consideration (Berg, 2001, p. 195).

2.6 SAMPLING AND RATIONALE

Selecting a sample is an essential step in any research plan since it is rarely practical to study a complete population. The process of sampling entails the selection of some part of the entire population for the purpose of observation and so that one may be able to evaluate something about the entire population (Thomson, 2012, p. 1). Marlow and Boone (2010) argue that there are two key types of sampling - probability and non-probability sampling. Since this study

adopted the later - on-probability sampling, which is a sampling type that allows the researcher to intentionally select participants who are ‘information rich’. The method is very common in qualitative studies; and it is divided into the following major types (see Table 2.9) as given by Marlow and Boone (2010).

Table 2. 9 - Non-probability sampling methods

<i>Sampling method</i>	<i>Generalizability</i>
Typical cases	Those with ‘typical’ characteristics
Criterion/purposive	Participants are selected according to some eligibility or criterion
Key informants	Those with experience in the research topic
Quota	Certain proportions of participants from different groups selected according to specific characteristics
Availability/Convenient	Those selected because they are available

Source: Marlow and Boone (2010, p. 146).

This study used non-probability sampling in which purposive (criterion) sampling was used to select admissions officers from the institutions participating in the CAS; key informants sampling was used to select some key CAS stakeholders for interviews, and lastly the availability (convenient) sampling was used to access applicants who visited the TCU offices during different time periods. The TCU site was the only place where applicants could easily be accessed for interviews, hence all applicants were interviewed at the TCU offices. Table 2.10 below offers a summary of the interviewed people, their positions and the date of their interviews.

Table 2.10- Interviewees¹, their positions and dates of interviews

SN	Name	Position	Interview Date
1	Rogers	CAS Applicant	23 April 2013
2	Kyando	Deputy vice-chancellor (academic) (DVCA), HKMU/Senior Official	29 April 2013
3	Amina	Admissions officer, SUA	29 April 2013
4	Godfrey	CAS applicant	30 April 2013
5	Humphrey	CAS applicant	30 April 2013
6	Joshua	Admissions officer, MUCCOBS	10 May 2013
7	Mwanjonda	Government officer, HESLB	22 May 2013
8	Hyera	Admissions officer, IAA	30 May 2013
9	Mwenda	Admissions officer, SJUT	30 May 2013
10	Basil	CAS applicant	16 June 2013
11	Dimoso	CAS applicant	27 June 2013
12	Joel	System developer, UCC	5 July 2013
13	Prosper	System administrator, TCU	5 July 2013
14	Mbunda	System developer, DTBI	8 July 2013
15	Alphonse	CAS applicant	9 July 2013
16	Kingo	Deputy vice-chancellor (academic) (DVCA), (DVCA), SUA/Senior Official	17 July 2013
17	Sharifa	Admissions officer, RUCO	30 July 2013
18	Keto	Admissions officer, MWUCE	30 July 2013
19	Janeth	Admissions officer, JUCO	30 July 2013
20	Brown	Government officer, MoEVT	16 August 2013
21	Bakari	CAS applicant	16 August 2013
22	Flora	CAS applicant	16 August 2013
23	Mwinyi	Government officer, NECTA	16 August 2013
24	Caizer	Admissions officer, NACTE	16 August 2013
25	Gaudence	Admissions officer, UoI	16 August 2013
26	Imani	Admissions officer, TCU	16 August 2013
27	Joan	Admissions officer, MU	4 December 2013
28	Josiah	Admission officer, MNMA	7 January 2014
29	Habibu	CAS applicant	13 February 2014
30	Suzan	CAS applicant	13 February 2014

The involvement of prospective students, also known as applicants, in this study was due to the fact that they are the main users of the system. Likewise, IT experts and/or developers of the CAS were part of the study – because of their position, they were able to share their experience of the implementation of the CAS, including the challenges faced by the CAS users

¹ Due to the significant ethical concerns in the study, participants were assured of anonymity by guaranteeing them that their names would not be revealed in the research report and that only their position would be included for the purpose of indicating the clusters of interviewees. Thus, all names (in Table 2.4 above) are fictitious; however, the names of the institutions where interviews were conducted are indicated in this study.

during applications. Admissions officers and other key stakeholders of the CAS were chosen because of their expertise in the field of admission and my familiarity with their role, but also because of their acknowledged influential role in admissions-related matters in HEIs. I interviewed admissions officers and other officials who deal with admissions with the aim of developing the best case scenario involving technology and work organization in the workplace. I made these decisions in full recognition of the potential threats to validity that my familiarity with the CAS might introduce. It is my opinion that the benefits outweigh the disadvantages. My familiarity with the system provided easier rapport building and hopefully a richness of data that might not otherwise have been possible. Furthermore, my expertise presented me with a better context for understanding which questions might elicit the information that I was seeking.

2.7 ORGANIZATION OF DATA

While one begins visualizing the way in which a research project will ‘unfold, cascade, roll, and emerge’ (Lincoln and Guba, 1985, p. 210), at the same time one is obliged to imagine what the data will look like. In fact, the organization of qualitative data depends partly upon its appearance. If data are in textual form (like field notes), or can be made into textual form (like the transcription of a tape-recorded interview), it may be organized in one manner. However, if they are in photographic, video or drawn materials, then the data will need a different procedure for their organization and analysis. Nonetheless, irrespective of the way in which the raw data appear, the researcher must consider this issue early during the phase of design process.

Usually, the raw data that has been gathered are not quickly available for analysis. Rather, the raw data involves some sort of organization and processing before they can actually be analysed. For example, field notes may fill a tenth of the number of pages in a notebook pages or they may occupy thousands of megabytes on a computer’s disk space or on memory sticks. Such field notes must undergo editing, correction, and be made clearly readable, even before they are organized, indexed, or entered into a computer-generated text analysis program file. Recorded interviews must be transcribed (transformed into written text) corrected, and edited also (Berg, 2001, p. 33) before being somehow indexed or entered into a text-based computer analysis program. The voluminous pages of qualitative raw data may be relatively intimidating

to the inexperienced researcher; thus, organization and management of data for this study was done by the researcher himself using Nvivo 10 QSR as had been decided during the preparation phase. Maxwell argues that:

One of the most common problems in qualitative studies is letting your unanalysed field notes and transcripts pile up, making the task of final analysis much more difficult and discouraging ... The experienced researcher begins data analysis immediately after finishing the first interview or observation and continues to analyse the data as long as he or she is working on the research stopping briefly to write reports and papers (Maxwell, 2013, p. 104).

2.8 DATA ANALYSIS

Huberman and Miles (1994) argue that data analysis can be well defined as containing three concomitant flows of action: data reduction, data display, and conclusions and verification (pp. 10-12). According to Huberman and Miles, data reduction in qualitative research does not essentially refer to quantifying nominal data. Rather it means reducing and transforming them into a readily accessible, understandable format for drawing out several themes and patterns. Data reduction is essential in qualitative research due to the presence of the voluminous nature of the raw data. This phase directs its devotion to the need for focusing, simplifying, and transforming collected data into a handier form. Often, this phase (data reduction) takes place throughout the research project's life-cycle. For instance, the in-depth interviews are conducted and various audio recordings are created. Then the interviews are transformed into text/print form using word-processing programs and/or computer-based documentary analysis formats. As the project progresses, additional ways in which to reduce data (Berg, 2001, p. 35) may be necessary. These could be in different forms such as written summaries; coding; the development of grounded themes; identification of analytic themes; and considering relevant theoretical explanations. This process of data reduction and transformation occurs throughout the period of the research; and this study applied the same process.

The notion of data display is intended to express the data presentation that has been done as an organized, compact assembly of information that allows conclusions to be critically drawn. In that way, displays may entail data tables; tally sheets of themes; extents or summaries of

various statements, terms or phrases; and likewise condensed and transformed groups of data. These displays help the researcher to understand and/or observe certain data patterns, or determine what extra analysis or actions need to be done. Indeed, this process cannot be detached from the former since it is a part of the analytical process (Berg, 2001).

According to Berg (2001), the last activity during analysis is the drawing of conclusions. Throughout the research process, the investigator makes numerous informed decisions and evaluations of the study and the data. Sometimes the conclusions reached are based on the material found in the existing literature (as the researcher moves back and forth between his or her research and consulting the literature). Sometimes such evaluations and/or decisions occur as a consequence of the collected data (based on recorded statements during interviews, observations of patterns made for various documents, etc.). During these initial phases of the research process, a skilled researcher should not reach final conclusions. Rather, the researcher should maintain an open mind and maybe even a sceptical point of view. Finally, after collecting, reducing, and displaying the data, the analytical conclusions may begin to form and define themselves more distinctly and conclusively (Berg, 2001, p. 36). This study followed Berg's phases of analysing data by making use of Nvivo 10 QSR, as mentioned earlier.

Basically, Nvivo helps the researcher manage, explore and find patterns in the collected data, but it cannot replace the researcher's analytical expertise. It does not favour a certain methodology; rather, it is designed to facilitate common qualitative techniques in the organization, analysis and even the sharing of research data, no matter what method has been employed. In principal, this computer-based software is intended to answer qualitative inquiry that tends to focus on questions of 'how' and 'why' rather than the more quantitative perspective of 'how many' or 'how often' (QSR International, 2014, p. 5-6). Through this qualitative research and under the guidance of the research objectives and the literature review, the researcher was able to identify themes and sub-themes which were later transformed into interview questions. These questions then formed the basis of the data collection, data management (organization) and consequently their analysis using the computer-based software, NVivo 10 QSR (See Appendix 8). The software is capable of organizing research data in a way that is thorough, transparent and transportable for further analysis and interpretation. To reach this end, the following processes were accomplished:

- a) Interviews were transcribed using InScribe software (although this could have been done with Nvivo software, the software was only acquired later).
- b) Themes (that form substantive chapters) were constructed in the Nvivo software.
- c) All interview questions formed sub-themes and each one was embedded in the theme to which it belonged.
- d) All transcribed interviews (that were in the format of Microsoft Word documents) were then uploaded into the Nvivo software, ready for analysis.
- e) Lastly, the interviewees' answers were coded correspondingly to the sub-theme/interview question through 'drag and drop' (see appendix 8).

Rossmann and Rallis (2003) comment that, 'Whether analysis is ongoing or focused toward the end of data gathering, composing short notes about emergent insights, potential themes, methodological questions, and [the] link between themes and theoretical notions is invaluable' (p. 291). Thus, in the course of the data analysis, the completed document was exported to Microsoft Word for presentation and interpretation of the findings. Fundamentally, as noted before, the software (NVivo) only helps the researcher to organize, analyse and visualize (in the case of quantitative aspects) data. The interpretation of findings/data is done entirely by researcher himself/herself.

2.9 ETHICAL ISSUES

It is argued that 'ethics is at the heart of high-quality research practice and a consideration that runs through research from the early stages of design to reporting and beyond' (Ritchie and Lewis, 2013, p. 108). Social researchers, more so than others, have an ethical responsibility to their co-workers, their study participants, and to society as a whole. The reason for this is that social researchers delve into the real lives of other people and because people's lives are private, different practices, policies and even rules may apply. This is why the researcher should guarantee the confidentiality and safety of the study population and the generic communities (that are part of the study) (Berg, 2001, p. 39). According to Berg, during the past decades, research methods for collecting, organizing, and analysing data have been more penetrating and sophisticated. The consequence of this is that the scope of research has greatly expanded, thus increasing people's consciousness and concern over the ethical issues which concern both the research and the researchers. To a great extent the research's ethical concerns

revolve around several issues of consent, privacy, harm and the confidentiality of data (Punch, 1994 cited in Berg, 2001, p. 39).

Before conducting this study, a letter of introduction was obtained and sent to each institution involved in the study requesting their participation. Rapley (2007, p. 24) maintains that research should not cause any harm or distress, either psychological or physical, to anyone taking part in it. A minimal disruption to the institutional setting was an important consideration and the participants' rights to privacy through confidentiality were protected. In analysing the data, the study used pseudonyms to ensure anonymity by avoiding the use of participants' names or any other means of personal identification. The participants' informed consent was obtained by explaining the purpose of the study to participants in order to make them understand the nature of the research and its likely impact on them, by informing them that participation was voluntary, and by assuring them that they might at any point withdraw from the study. Informed consent was intended to ensure that the participants were placed in a situation where they could decide, in full knowledge of the risks and benefits of the study, whether and how to participate (Endacott, 2004 cited in Boeije 2009, p. 45). In other words, research participants have the right to know that they are being researched, and they should actively give their consent.

2.10 LIMITATIONS OF DATA COLLECTION

In this thesis, the researcher acknowledges the following limitations encountered during the data collection:

- a) Some HEIs were hesitant to allow the researcher to conduct an interview with admissions officer for no obvious reasons, despite the fact that the letter of introduction and request to conduct research had been sent.
- b) Most of the interviewed applicants were from Dar es Salaam city and its surrounding areas. These had easy access to the offices of the Tanzania Commission for Universities (TCU) where interviews were conducted.
- c) Since the system is developed in English and the interview was conducted in Kiswahili, to some extent the interviewees could not describe technological terms (in explaining

the challenges). However, because researcher had prior IT-related basic skills, could understand what the interviewees were trying to say.

- d) Since this study has focused on the implementation practice of the CAS, the results are limited to this specific technological innovation, in this specific country within specific period of time (2010/2011-2012/2013 admissions cycles).
- e) The limitations of this study are representative of most qualitative research. The intricate, observable findings may be simplified by the collected responses. Thus, the research methodology that used interviews and documentary analysis might be severely criticized by all those commentators who promote a more traditional research design such as questionnaires or surveys.
- f) As may be universally experienced in a study of this nature, there may be levels of analysis that have not been explored and use of some of the techniques of data collection could be considered irregular. Therefore, this thesis acknowledges that not all research participants (e.g. applicants and other key stakeholders) faced similar challenges in using the CAS due to their varied ICTs backgrounds. Moreover, differences in the challenges are due to the institutions participating in the CAS being both private and public institutions of higher education whose experience with the CAS could not often provide similar level.

Notwithstanding the pronounced limitations, the findings presented in this thesis are grounded in authentic voices and responses that have not been changed or manipulated in any way.

2.11 CONCLUSION

This chapter started off by presenting the research philosophy and the research approach. Thereafter, it presented a description of the research methods used for data collection during the study, followed by the research goals, the data collection methods, the sampling rationale, the data organization and the data analysis. Finally, the chapter concluded by discussing the limitations imposed by the methodology of the study. The following chapter describes the background of ICT development situation in Tanzania, thus forming a benchmark for the coming discussion of the challenges, advantages, disadvantages and implication of CAS among users.

CHAPTER 3

BACKGROUND TO THE DEVELOPMENT AND APPLICATION OF INFORMATION AND COMMUNICATION TECHNOLOGIES IN TANZANIA

3.1 INTRODUCTION

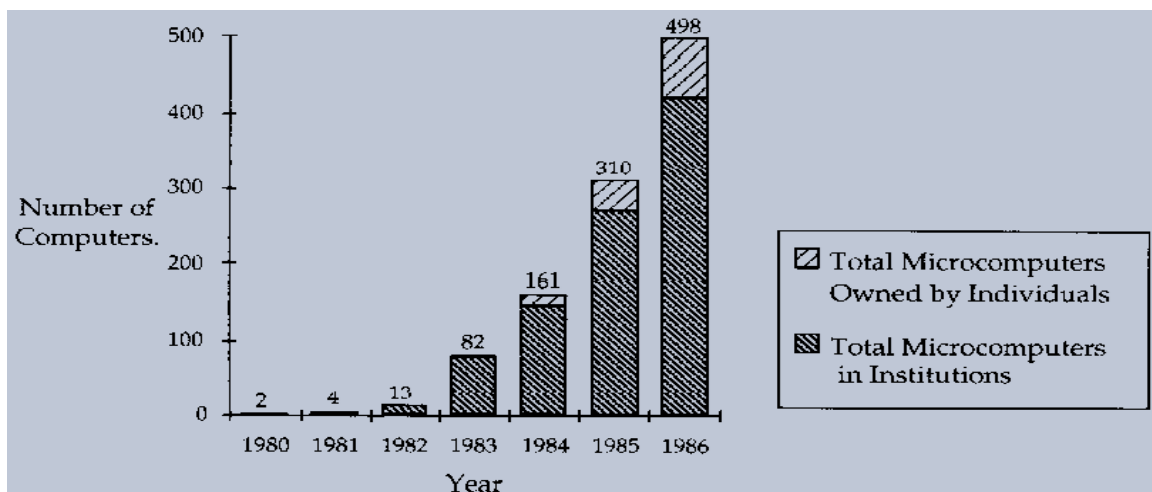
This chapter provides the contextual background to the development of ICTs and their application to e-Governance in Tanzania. Section 3.2 presents general situation of ICTs growth in Tanzania tracing its brief history, coverage, and access issues to ICT services in the country. A description of the on-going efforts to promote the use of ICT in the country is provided in section 3.3. Section 3.4 describes the use of ICT in higher education governance, the discussion which is preceded by a synopsis of Tanzania's higher education: history, size, Shape/structure, growth and regulation. Section 3.5 presents an overview of the admissions before the establishment of the CAS and how ICT was adopted in higher education admissions – the establishment of the CAS. This background helps to situate the context in which the CAS initiative for coordinating admissions in the country is currently being implemented, and the associated opportunities as well as challenges. The guiding assumption here is that CAS implementation is shaped by numerous contextual situations including but not limited to Tanzania's ICT circumstances, social and economic issues (education, economy, language, human resources,), infrastructure, political environment more generally, and more specifically other issues related to ICTs.

3.2 ICTs IN GENERAL: THE SITUATION IN TANZANIA

Tanzania is officially known as the United Republic of Tanzania (URT) and is one of the fastest growing emerging nations in Sub-Saharan Africa in terms of the development, the distribution and use of ICTs particularly mobile phones. The arrival of ICTs in Tanzania can be traced back to 1965 when the first computer, an ICT 1500, was introduced by the Ministry of Finance (Mgaya, n.d). By 1974, the country had only seven computers – and by then the Ministry of

Finance had already obtained a new computer, an ICL 1900 (Mgaya, n.d: <http://archive.unu.edu/unupress/unupbooks/uu19ie/uu19ie0i.htm>). However, the advent of computers was characterised by difficulties, particularly in terms of their installation. According to Mgaya, the assembly of these computers relied totally on overseas experts who, in some cases, were not sufficiently competent or knowledgeable. Moreover, the applications of these computers were poorly documented and therefore could only be used when the foreign experts were available; but when they were not present in the country, the applications ceased working. Figure 3.1 below shows the status of computers that were owned by both the government and individuals in the country by 1986.

Figure 3.1 – Status of computer systems in Tanzania from 1968 to 1986



(Source: Mgaya, n.d, <http://archive.unu.edu/unupress/unupbooks/uu19ie/uu19ie0i.htm>).

Even though there were few ICT facilities, in 1974 the government of Tanzania banned the use of televisions and computers. However, in the early 1980s, numerous influences pushed the government to reopen the doors to the importation of more computers. In this way the country became committed once again to adopt and use ICTs – indeed, with a new impetus. By this time the monopoly of the provision of data and call services in the country were under the Tanzania Telecommunication Company Limited (TTCL). Nevertheless, this ended in 2005, the year in which other companies that provided similar services were welcomed (Mkono and Kapinga, 2014). The overall ICT sector still needs more investment, whether locally or internationally, under close control of the Tanzania Communications Regulatory Authority (TCRA) which oversees registrations and operations of all ICT based companies in the country. The TCRA is a legal regulatory body that regulates all communication sectors in Tanzania. It

was established by the TCRA Act No. 12 of 2003 which fused the Tanzania Communications Commission (TCC) and the Tanzania Broadcasting Commission (TBC). TCRA became operational on 01/11/2003 and effectively took over the functions of the previous two commissions (<http://www.tcra.go.tz/index.php/about-tcra/tcra-profile>). The functioning of the TCRA is controlled by the Ministry of Communications and Technology (MoCT).

It is said that before 1990 the use of ICTs in Tanzania was primarily confined to landline telephones and radio. The massive use of ICTs occurred in the mid-1990s. By 2001 it was projected that Tanzania's ICT industry had produced approximately US\$ 300–350 million per year (Mwakaje, 2010, p. 112). Currently, there are various development initiatives for ICTs that are being funded by the government, the private sectors and donor countries. Because of this funding, several tele-centres were established; this development coincided with the increase in mobile phones use in rural areas. This is part of the success that led to e-Governance initiatives, and it occurred essentially in big cities and other towns in Tanzania. Currently there are numerous ICT service providers in the country, these are:

- Tanzania Telecommunication Company Limited (TTCL);
- Internet service providers (ISPs);
- Web content providers (ASPs);
- Mobile phone companies (e.g. Airtel, Vodacom, Tigo and Zantel);
- Televisions (TVs), radio and newspapers; and
- Non-governmental organisations (NGOs) (URT, 2011).

Indeed, there is remarkable scope for the growth of ICTs in almost every sector and almost half of Tanzania's total population (44 928 923 people) benefit, according to the Population and Housing Census (PHC) of 2012 (URT, 2012). A survey by IT News Africa which sought to understand the general state of ICT in Tanzania demonstrates that, whereas Africa's internet diffusion is only 13.5 per cent, way below the global average of 32.7 per cent, Tanzania remains one of the Africa's top countries when considering the total number of the ICT users. According to the World Internet Stats' chart, Tanzania is ranked sixth, having about 5.9 million users, just below South Africa which has about 6.8 million people using this technology (Fripp, 2012).

Fripp (2012) indicates that by December 2000 Tanzania had only 115 000 internet users, but the number of users has increased enormously since that time. Further analysis depicts that the

number of users of mobile internet is on the rise on the African continent, with Tanzania being marked as a good example of this increase. The country also has a great number of registered websites, of which about 339 712 that use the ‘.tz’ internet top-level domain (TLD), which is equivalent to 7.79 Internet Protocol (IP) addressed for almost every 1 000 users. According to Fripp, the country has newly launched the first subscription of commercially based, long-term evolution (LTE) - 4G technology by Smile Telecoms Mobile operator for users of mobile internet, thrashing the African giant, South Africa. This service, however, is currently only available in Dar es Salaam city and entails the use of 800 MHz frequency band.

3.3 COVERAGE OF AND ACCESS TO ICT SERVICES IN TANZANIA

Most developing countries, including Tanzania, are still far behind their counterparts (developed countries) in utilizing the benefits of newly emerging technologies (Shih et al., 2008). In Tanzania for example, the coverage of ICT services is still low. Due to the lack of telecommunications and other infrastructural facilities, the provision of ICT services in rural areas is a basic deficiency, with greater coverage being limited to urban areas. This is because of the existing ‘digital poverty’ (a lack of goods and services based on ICT) among households (Barrantes, 2007, p. 29). In assessing the households’ access and use of ICTs in four East African countries, Barrantes (2007) reveals that Tanzania is disadvantaged in terms of the extent of its ICTs when it is compared to other East African countries. This is shown in the table below. Nevertheless, currently the country’s position regarding the use of ICT-related facilities, particularly mobile phones, ranks relatively high (see section 3.2).

Table 3.1 Households’ ICT ownership in four countries (in percentages)

ICT	Tanzania	Kenya	Rwanda	Uganda	All
Radio	66.7	79.3	72.8	61.1	70.0
TV	23.7	39.3	23.5	9.8	24.1
VCR/DVD	12.0	19.8	16.9	4.5	13.3
Land line	1.8	0.5	3.2	1.0	1.6
Computer	1.8	1.8	9.1	1.3	3.5
Internet connection	0.3	0.8	2.2	0.0	0.8
Email address	5.1	16.8	29.2	18.6	17.3
Mobile phone	54.2	67.9	55.8	64.9	60.7
Any ICT	70.2	81.0	73.5	61.3	71.5

(Source: Barrantes, 2007, p. 29).

In the past six years, ICTs have remained the most important commercial activity in Tanzania with a growth rate of 21.9 per cent in 2009 compared to 20.5 per cent in 2008, contributing 2.1 per cent in GDP (URT, 2009). According to the Research ICT Africa (RIA) 2011, that undertook a survey of electronic access (e-Access) and usage in eight African countries, including Tanzania, less than 0.8 per cent of Tanzanian households have internet connection, while it is highest in South Africa (19.7 per cent), followed by Namibia. For Tanzania, the main reason for not having an internet connection for most households is the cost of the service (Gillwald, 2012).

Despite the on-going development in the communications sector, Tanzania is facing a number of sociotechnical challenges to the adoption and deployment of ICTs in various sectors. These and many other challenges are discussed in Chapter 4. Sedoyeka and Hunaiti (2008) identify various difficulties facing ICTs' growth in businesses in the country. These include but are not limited to low IT knowledge (literacy), affordability (costs), government policies, poor/no public infrastructure; and service availability (Sedoyeka and Hunaiti, 2008).

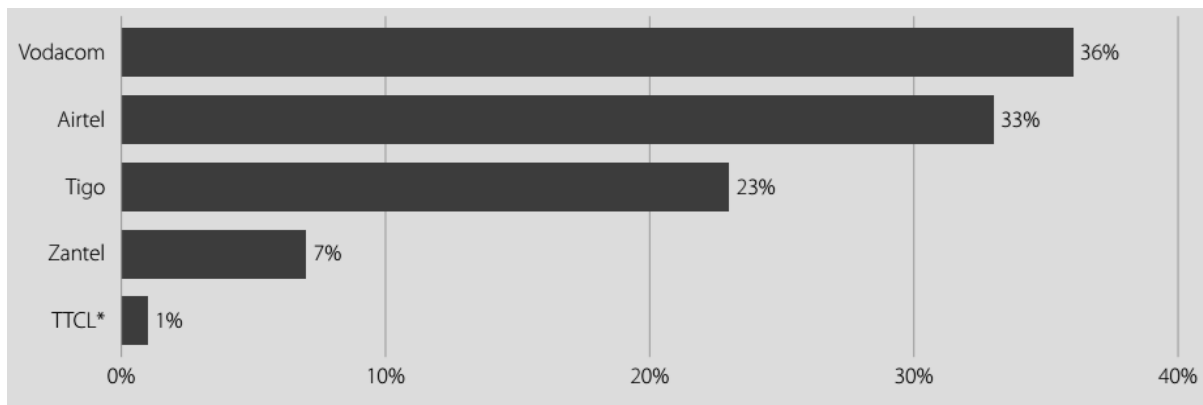
At present, through the National ICT infrastructure backbone project, Tanzania has 4 330 kilometres of internet connectivity and almost all the regions are connected (URT, 2011). The project has made possible the construction of a total of 22 service stations in Dar es Salaam, Morogoro, Iringa, Dodoma, Tanga, Mbeya, Sumbawanga, Singida, Babati, Moshi, Arusha, Shinyanga, Tabora, Mwanza, Biharamulo, Bukoba, Musoma, Kigoma, Lindi, Mtwara, Songea and Makambako. Moreover, nine other stations have been built along the national borders at Kabanga and Manyovu (Burundi), Rusumo (Rwanda), Mutukula (Uganda), Namanga, Horohoro and Sirari (Kenya), Kasumulo (Malawi) and Tunduma (Zambia). The 11 local and foreign ICT service providers (TTCL, Airtel, Simba Net, Zantel, MTL (Malawi), Rwandatel, MTN (Zambia), MTN, RDB, Airtel (Rwanda) and UCOM (Burundi) benefit from this National ICT infrastructure backbone (URT. 2011, p. 202).

3.3.1 Mobile phones

The building of the National ICT infrastructure backbone has attracted many ICT companies to Tanzania. Various companies have invested in voice telecommunication services (Esselaar

and Adam, 2013, p. 8). These companies are Vodacom, Airtel, Tigo, Zantel and TTCL. Vodacom Tanzania leads the other companies in that it has the greatest share of the market (see Figure 3.2 below). However, in recent years other new companies have established themselves in Tanzania (e.g. Sasatel, Benson) though they are not popular throughout the country.

Figure 3.2 Mobile operators' market share in Tanzania



(Source: Esselaar and Adam, 2013, p. 8).

Because of the above developments, there has been a progressive increase in mobile subscriptions, particularly in 2013 when the registration of SIM cards was officially announced. However, data show that the registration process has caused a minor drop in mobile subscriptions particularly between 2012 and 2013 (Esselaar and Adam, 2013).

3.3.2 Computers and the Internet

The survey conducted by Research ICT Africa (RIA) in 2012 indicates that the use of the internet and computers in Tanzania is still minute despite the price reduction by the service providers (e.g. in 2010 and 2011 there were big price reductions in the country). A great concern is the extremely low rate of computer and internet use between 2008 and the time when the RIA Tanzania ICT survey was conducted in 2012. The survey shows that the use of the internet went up from 0 per cent to a mere 0.8 per cent over the period of four years between the two surveys. Contrarily, the use of the internet in other East African countries, for example in Kenya increased from 2.2 per cent to 12.7 per cent within the same time interval.

Table 3.2 - Internet and computer use in some selected African countries

		Botswana	Kenya	Namibia	South Africa	Uganda	Tanzania	Mozambique
Computer	2008	4.50%	5.50%	11.20%	14.80%	1.20%	1%	3.80%
	2012	15.70%	12.70%	14.70%	24.50%	2.20%	1.60%	7.20%
Internet	2008	0.10%	2.20%	3.30%	4.80%	0%	0%	0.90%
	2012	8.60%	12.70%	11.50%	19.70%	0.90%	0.80%	3.60%

Source: Esselaar and Adam (2013, p. 26).

According to the RIA survey of 2013, Tanzania had 1.4 million internet subscribers by the end of 2013 (Esselaar and Adam (2013, p. 9). These subscribers accessed the services from several internet service providers (ISPs). The estimate by TCRA shows that by 2013 Tanzania had 9 312 272 internet users. When the number was translated into the level of penetration, it reached 21 per cent (TCRA, 2013). In fact, this figure contains the estimates of organisational/institutional use, internet café users, and individual and household use. However, a thorough analysis and the mixture of diverse sources and approaches makes such an estimate very untrustworthy and so such an elevated level of penetration is very questionable. The TCRA percentage seems to be overstated – because it comprises all phones that are internet-enabled. Such over-counting has the consequence of under-emphasising the massive challenges that the country faces in its efforts to improve internet diffusion (Esselaar and Adam, 2013). Hence, the findings of RIA Tanzania ICT Survey of 2012 benchmark the overall number of internet users at 3.5 per cent of the entire population, starting with the group age of 15 years.

All in all, the United Republic of Tanzania recognises the significant role of ICTs and innovation in supporting socio-economic growth as part of the Development Vision 2025. This realization goes together with the establishment of the two key support policies: the Science, Technology and Innovation (STI) Policy and the National ICT Policy of 2003 as part of the ICT development initiative (see section 3.3.1). In an effort to engineer the growth of ICT in the country, Tanzania has significantly improved the digital infrastructure with the construction of a fibre-optic network, investment in Local Internet Exchange Points, migration to the Internet Protocol version 6 (IPv6) and the construction of the National ICT Backbone (NICTBB) that was connected to African cable system (SEACOM) in July 2009; and to the Eastern Africa Submarine System (EASSY) in April 2010 (URT, 2011, p. 13). Table 3.3 below is the general overview of the country’s ICT sector statistics.

Table 3.3 Tanzania ICT sector overview data

Size of ICT market	USD1billion in 2012
Mobile subscribers	Approximately 27million mobile customer SIMs
Mobile penetration (subscribers as % of population)	Approximately 61% penetration (nominal, due to high incidence of multiple-SIM ownership)
Mobile average revenue per user (ARPU) (national)	USD21/month
Population coverage (mobile networks)	89%
Geographic signal coverage (mobile networks)	54%
Rural penetration (mobile)	Approximately 25%

(Source: Esselaar and Adam, 2013, p. 5).

Associated with the low income per household, is Tanzania's extremely inadequate electricity infrastructure, with only 15 per cent of its population having access to the national electricity grid (World Bank, 2012). Such factors have a remarkable effect on the penetration of the internet and mobile phone, making the country frequently lag behind in ICT ranks. Nevertheless, the latest developments have led to the rejuvenation of the ICT sector and radically speeded up mobile broadband and mobile voice diffusion. Such progress has been possible due to the extended submarine cable connectivity, the launch of the Tanzania's National ICT Broadband Backbone, price competition and much reduced tariffs for customers. All these have led to a drop in the price of broadband connectivity both locally and globally (Pazi and Chatwin, 2014).

Next, the discussion focusses on the efforts to promote the use of ICTs in the country that shapes the implementation of various sectoral ICT-related projects, including the CAS in the education sector.

3.4 EFFORTS TO PROMOTE THE USE OF ICTS IN TANZANIA

In 1995 the Tanzanian government formulated the Tanzania Development Vision (TDV) 2025. This vision envisages re-positioning Tanzania from being the least developed country to a middle-income country by 2025 with a high level of human development (URT, 1995, p. 2). The vision consists of five main aims:

- a) a high quality livelihood;
 - b) peace, stability and unity;
 - c) good governance;
 - d) a well-educated and learning society; and
 - e) a competitive economy capable of producing sustainable growth and shared benefits
- (URT, 1995, p. 3).

In one of its driving forces for the realization of the vision 2025, section 4.2 (competence and competitiveness) stresses the importance of education and technology in achieving its objectives. In sub-section (iii) – ‘promotion of science and technology education’ – the vision emphasises the need to instil a culture of science and technology and provide a high standard of education to all children between the ages of 6 and 15 years. Also, the vision gives priority to the basic sciences and mathematics in order to cope with the current technological age. What is more, the vision under the same section, in sub-section (iv) commits itself to the promotion of ICTs. It recognizes that technological advancements (micro-electronics and ICTs) are central to a socioeconomic revolution. Indeed, the costs of ICTs are falling all the time while their capabilities and consequent improvements in profitability are on the increase (URT, 1995, p. 21). In realizing the importance of ICTs to propel national economic growth, the government realised the need to have a guiding document for that purpose; hence in 2003, the National ICT Policy was launched.

3.4.1 The National ICT Policy

The Tanzania’s National ICT Policy was launched in 2003 by the government with the goal of providing philosophies and intents that support the positioning of ICTs as an engine for different aspects of national development such as its application in good governance. The broad objectives of the policy are to: (a) provide a national framework that will enable ICT to contribute towards achieving national development goals; and to (b) to transform the country into a knowledge-based society through the application of ICT (URT, 2003, p. 9). The overall mission of the policy is ‘to enhance nation-wide economic growth and social progress by encouraging beneficial ICT activities in all sectors through providing a conducive framework for investments in capacity building and in promoting multi-layered co-operation and

knowledge sharing locally as well as globally' (URT, 2003, p. 2). Nevertheless, the implementation of this policy has been irregular since some anticipated projects are already in advanced stages of implementation while others have still been delayed.

As part of Tanzania's Development Vision 2025 that highlights the significance of leveraging ICTs in all development sectors, the National ICT Policy of 2003 articulates ten key focal areas in which ICTs' advantages should be harnessed in the country, these include:

- a) strategic ICT leadership;
- b) ICT infrastructure;
- c) ICT industry;
- d) human labour (capital);
- e) legal and regulatory framework;
- f) productive sectors;
- g) service sectors;
- h) public service;
- i) local content; and
- j) universal access (URT, 2003, p.2).

In implementing the focal areas of the policy, Tanzania collaborates with different stakeholders from both the public and private sectors. The Ministry of Communication, Science and Technologies (MoCST) is in charge of the implementation of the policy. The MoCST collaborates with all other government ministries, departments and agencies (MDAs) that are required to prepare appropriate sector-specific ICT strategies for the efficient application of ICTs. In order to achieve this, the plan also involves various development partners, and non-governmental organizations (NGOs). To a large extent, the implementation is strongly supported by the Tanzania Commission for Science and Technology (COSTECH) that plays a role in promoting ICTs together with other technologies for development. It also assists the government sectors and ministries in the development of ICT strategies. Some of the priority areas championed by COSTECH for the development of ICT strategies include the health and education sectors as well as in the area of good governance which concerns mainly local government sector reforms.

The policy recognizes that the development of the infrastructure of ICTs plays a key role in the development and use of microelectronics in the country. It also identifies the potential of ICTs in the development of the education sector, an aspect that is also emphasized in the Development Vision 2015. Therefore, the ICT Policy is a replication of the national aims, purposes and ambitions of the Development Vision 2025 that situates the digital prospects which Tanzania can harness as indicated in the Table 3.4 below:

Table 3.4 - Priority areas for Development Vision 2025 versus the ICT policy of 2003

Priority areas for Development Vision 2025	ICT policy of 2003 focal issues
High quality livelihood	Service sectors and the availability of universal access
Peace, stability and unity	Strategic ICT leadership, legal and regulatory framework (trust, security and values)
Good governance	Public service (e-Government) and ICT infrastructure (effective use of unutilised ICT capacity and infrastructure)
A well-educated and learning society	Human capital (gender issues and disadvantaged groups) and local content
A strong and competitive economy capable of producing sustainable growth and shared benefits	Productive sectors (adverse effects of globalisation) and ICT industry.

(Source: URT, 2003).

Indeed, the complex nature of ICT-related issues, including the factors that influence them, the national ICT policy implementation, and the resulting success of its aims and intents are the concern of the entire government at all levels and in all sectors. These matters are also essential to the education sector where the implementation of any ICT-related project demands collaboration with other sectors stakeholders or departments since education issues are interrelated.

The purpose of the above brief description of the ICT Policy was to provide an overview of the government's on-going efforts towards the development and utilization of ICT in different sectors. Therefore, the following section provides a brief synopsis of the implementation of e-Governance in Tanzania – where the CAS is being implemented.

3.4.2 Adoption of ICTs in E-Governance: Tanzania's e-Government Strategy (2012-2017)

In recognizing the significance of ICTs in the public sector, the government prepared the National e-Government Strategy 2012-2017 which was officially launched in 2012. The strategy aims to offer essential guidance to the exploitation of the opportunities of ICTs and to address the challenges of the public sector services delivery. Tanzania's government ascertains that the adoption of ICTs in e-Government is a vital impetus for sustainable socio-economic growth in the country. The country has a very high political will to deploy and implement ICT projects in its various ministries through e-Government. The strategy realizes that, 'e-Government is a key enabler for accelerating work processes, delivering services to citizens (G2C) and businesses (G2B), increasing transparency and accountability, while also lowering costs of operation' (URT, 2012a, p. vi).

The overall objectives of the Tanzania's e-Government strategy (URT, 2012a, p. 15) are:

- a) to provide high quality services to the public with enhanced convenience, openness, and effectiveness;
- b) to reinforce the coordination through all government sectors with its stakeholders, and increase production and information sharing; and
- c) to offer unified, safeguarded and innovative answers that may help to enable the delivery of the high quality services and work processes advancement (URT, 2012a).

Basically, the start of e-Government in the Tanzania's context is to be followed by a common global model with four key stages namely: the digital presence, interaction, transaction, and transformational stages (URT, 2012a, p. 2). The start and implementation of e-Governance in Tanzania takes advantage of the numerous available technologies, including various mobile devices, computers, radio, television, the internet and many others that facilitate service delivery to the public. Tanzania exploits such technologies to improve its relationship with its citizens, government employees, business communities, and other governments. The strategy has led to the formation of the e-Government agency (EGA) in 2012 which is intended to oversee the implementation of various government e-Governance projects. Towards meeting the above goal, the country implements e-Governance projects by concentrating on seven fundamental areas: government business re-engineering (processes), ICT governance and

performance indicators, ICT capacity building for key stakeholders, sharing ICT infrastructure, widely shared systems (systems integration), the establishment of electronic services (e-services), and the establishment of institutional framework (Bakari, 2013).

Tanzanian government admits that any successful implementation of e-Governance needs deliberate efforts to reform and interconnect the whole government. Correspondingly, rationalised and synchronized business processes within government sectors are unavoidable. The MDAs are supposed to function in a collective, allied manner and diminish the existing disjointed operative systems that segregate one institution or sector from the other (URT, 2012, p. 4).

Before introducing e-Government to Tanzania, the situation analysis for e-Government's readiness was piloted by investigating the government itself in regards to the organizational arrangements, IT-based human labour, financial resources, communication flows for inter-MDAs, the country's infrastructure, the capacity levels of ICT experts, the availability of ICT-related policies, the need for public-private partnerships (PPP), and many other significant issues. The analysis came to realize that, for effective implementation of e-Government in the country, various compelling issues (URT, 2012, p. 9) needed to be addressed. These include:

- a lack of adequate policy, institutional and legal framework for e-Governance initiatives;
- hesitations in terms of the 'e-Readiness' for e-Governance;
- inefficient infrastructure for service delivery and disjointed channels of delivery;
- the presence of the isolated e-Governance initiatives (systems);
- the lack of bilingual local content in most e-Governance projects;
- issues relating to the sustainability of the adoption of ICTs in the context of public sector service delivery;
- little awareness of the part of the public concerning the opportunities of e-Governance;
- the scarcity of specialists and experts to implement and service the ICTs;
- peoples' attitudes and the social-cultural challenges in using ICTs;
- the lack of robustness and the security issues concerning the infrastructure of ICTs;
- the absence of interconnected information systems;
- the absence of a framework for leveraging resources of private sector and public involvement; and

- inadequate innovation research on the e-Governance field in the country (URT, 2012).

The Tanzania's vision of the e-Government strategy (see Appendix 1) states that it aims 'to be an effective and better Government providing innovative public service delivery enabled by ICT' (URT, 2012, p. 15). The guiding principles of the strategy in developing e-Government services and other initiatives are geared to giving substance to the e-Government motto of 'Responsive Government – Enabled by Technology' (which in Kiswahili means: *Serikali sikivu – inayowezechwa na Teknolojia*) (URT, 2012a, p. 15). Next follows the description of e-Governance in higher education, particularly the CAS that founded the objects of this study.

3.5 ICTS DEPLOYMENT IN HIGHER EDUCATION GOVERNANCE SYSTEM

The deployment of ICTs in higher education governance system has become an essential initiative in this era of cross-border higher education (where most people are moving from one nation to the other securing higher education studies). ICTs use in HEIs has been viewed as a step forward for easing among others the admission process where applicants who seek admissions into various HEIs can easily make their application online or by downloading the application forms, fill them, scan and send back to HEIs. In Tanzania for example, the use of ICT has enabled full automation of the admission process where all undergraduate applicants are currently channelling their applications online through the CAS. Before discussing how ICT has been utilised in admission, here follows the synopsis of Tanzania's higher education: *history, size, shape/structure, growth and regulation.*

3.5.1 History of higher education in Tanzania

Historically, the higher education system in Tanzania has experienced a number of swings that occurred in the effort to provide higher education that is relevant and responsive to its society. The history of higher education in Tanzania dates back to the early 1960s with the establishment of the University of Dar es Salaam in 1961, as an affiliated college of the University of London (Ng'ethe, et al., 2008, p. 129). Later, in 1963 it became a constituent

college of the University of East Africa. Seven years later (in 1970), it grew into an independent national university along with two other constituent colleges of Makerere (Uganda) and Nairobi (Kenya). At the time, the Tanganyika African National Union (TANU) party provided the premises for its newly built headquarters for the new University College in Lumumba Street in Dar es Salaam city. This was purposely done so that the party could demonstrate its commitment to university-level education. However, in 1964 the college moved to its own splendid buildings on Observation Hill, 16 kilometres northwest of the Dar es Salaam city centre (Mkude et al., 2003, p. 1). This shift was possible due to the huge mobilization of local and foreign resources.

As soon the University College became autonomous, the president of the country was appointed as chancellor. It is argued that this link between the university and the government aimed to give the university a high profile in national politics, sometimes with appalling consequences. Being influenced by the belief that the university was a tactical weapon to combat poverty, ignorance and disease, the party-political leaders exerted great effort to incorporate it into the planning of the central government, to such an extent that they even dictated the criteria for admission. An obvious example of this was the Musoma Resolution of 1974, which stated that students would be eligible for higher education only when they had attended one year of obligatory national service. Additionally, the resolution demanded one to have at least two years' satisfactory work experience and positive commendations from employers (Mkude et al., 2003).

According to Mkude et al. (2003), this was a fundamental move away from the practice that had triumphed at the university just ten years after independence. Since then, the university system functioned in line with the systems of other universities elsewhere in the British Commonwealth. For example, admission was primarily based on 'advanced secondary education' performance, while all courses and programmes were planned and packaged in correspondence with those at other universities within Commonwealth countries. In addition to that, there were three terms in one academic year, each having a duration of approximately 10-11 weeks. Students' academic progress was measured mainly by term papers and examinations at the end of the year. Even though the university depended entirely on the government for funding, it was somewhat autonomous in determining admission conditions, the content and structure of the course, as well as the modalities of evaluation.

Because of its history and remarkable experience in higher education delivery, it is argued that most of public higher educational institutions have their origins in the University of Dar es Salaam (Mwollo-Ntallima, 2011). Such institutions, among others, include Sokoine University of Agriculture (SUA) that was established in 1984 as the University of Dar es Salaam's Faculty of Agriculture, Forest and Veterinary Science, Muhimbili University of Health and Allied Sciences (MUHAS), Ardhi University (ARU), Mkwawa University College of Education (DUCE) and the Dar es Salaam University College of Education (MUCE). Moreover, even some recently established universities have been getting experience from UDSM, particularly in the development of curricula and administrative experiences.

3.5.2 Shape/structure of higher education in Tanzania

Higher education in Tanzania, according to the National Higher Education Policy of 1999 (URT, 1999), covers all study courses that lead to the award of an advanced diploma, a first degree, a postgraduate or any other equivalent higher level degree. According to this definition, Tanzania's tertiary education system has two prongs: (i) universities and university colleges, and (ii) non-university HEIs (institutes and colleges), that mostly offer three-year advanced diplomas in various specialised fields, such as engineering, accountancy, community development, materials management, social welfare, business administration and associated fields of studies (Cloete et al., 2011, p. 17). All of Tanzania's public universities and its university colleges are under the authority of the Ministry of Education and Vocational Training, while the public non-university institutions are controlled by different government ministries.

All universities are regulated by the TCU (URT, 2005) through its mandate accorded by the Universities Act of 2005. Non-university tertiary education institutions include those that provide courses of up to two years' duration which lead to the award of a diploma. However, there are also occasions where non-university HEIs are permitted to offer courses leading to the awarding of a degree that is more or less oriented towards the development of particular technical skills. Any approval for offering such degree programmes is granted by the NACTE which is also legally mandated to regulate technical education in the country. It is argued that the degrees granted by NACTE-regulated institutions are different from those awarded by

universities under TCU because the former only focuses on the development of technical skills (TCU, 2009, p. 1).

3.5.3 Growth of higher education in Tanzania

Before the 1990s, the development of higher education in Tanzania was relatively trivial, due to the fact that the existing policies did not allow the establishment of private HEIs. Nevertheless, the early 1990s was marked by various socio-economic reforms that led to a liberalisation of the education sector, allowing private providers of higher education to operate and cooperate with the government in the country for the first time (Nkunya, 2009). Such liberalization made the higher and tertiary education sectors experience a substantial expansion. This is apparent in the rapid increase in the number of private and public institutions (see the institutions that participate in the CAS, section 3.5.3). As noted above, at independence there was only one university, but today the country has more than 50 universities and university colleges. At the time that such reforms were being implemented, there was no national higher education regulatory framework. Such a framework is pivotal in assuring and hence ensuring the quality of the emerging private higher education system. Drawing from that gap, the government with the higher education stakeholders, identified the need to establish an agency responsible for accreditation and quality assurance in 1995.

By the year 2007, there were 12 public universities and colleges that were able to enrol about 39 000 students, including those who were enrolled in the Open University of Tanzania and who made up almost one third of the total enrolments. Moreover, there were 20 privately owned universities and university colleges that had more than 12 000 students enrolled in various programmes. Also, there were 14 public and two private non-university institutions of higher learning that enrolled about 16 000 students (Cloete et al., 2011, p. 17). According to Cloete et al. (2011), in the 2007/2008 academic year, a sum of 82 428 students (25 342 female students and 54 919 male students) enrolled in Tanzania's institutions of higher education, giving an increase of 9 per cent from the 2006/2007 total enrolment. As a result of this increase, the government continued to encourage the private sector to establish more HEIs so as to support the government's struggle to provide more access to higher education. Such efforts had fruitful results and, in 2007/2008, a total of six private universities and university colleges was

established (Cloete et al., 2011, p. 17). At the present time, there are several private universities and university colleges (see Table 2.5 for more information).

UNESCO (2008) indicates that the Tanzanian general enrolment rate (GER) in 2004 was about 1 per cent compared to 3 per cent for Uganda and Kenya; and 5 per cent for overall sub-Saharan Africa. Such a low level of enrolment at institutions of higher education might be accredited to the low enrolment at secondary schools and the generically limited capacity of the whole system of higher education in the country. For instance, the TCU's statistics show that in 2005 only 30 per cent of those who had applied for higher education were admitted to the University of Dar es Salaam (TCU, 2013).

3.5.4 Regulation of higher education in Tanzania

As explained above, an increase in the number of HEIs in the country necessitated the establishment of the former Higher Education Accreditation Council (HEAC) in 1995 by an act of parliament. It had the mandate of regulating the establishment of private universities, and consequently the accreditation of these institutions in the country (TCU, 2010). Being restricted only to private universities, this mandate was seen as discriminating against the promotion of a feasible public-private partnership approach in providing higher education services (Nkunya, 2009) as specified in the National Higher Education Policy of 1999. Therefore, the need to establish a harmonious system of higher education in the country, that would include a 'uniform and fair quality assurance system', steered the enactment of the Universities Act No. 7 in 2005. According to this Act, the TCU was established. TCU is a body corporate that is mandated to recognize, approve, register and accredit universities operating in Tanzania, through procedures that are elaborated in the Act (URT, 2005, p. 10). The Act forbids any institution or a person in the United Republic of Tanzania to begin or conduct university-related education operations, activities or functions without having been granted approval by TCU, or without having been granted a charter by a statutory authority after TCU scrutiny (Nkunya, 2009, p. 64).

To ensure that higher education system does not lead to compromised independence and autonomy of institutes of higher education, each university is required to function under its

own charter, that is granted by the President of the United Republic of Tanzania after it has been administered through the TCU. The central functions of TCU are clustered into the three main categories that will be discussed next (<http://tcu.go.tz/index.php/about-us>). The functions are:

- a) *regulatory* (conducting periodic evaluation of universities, their systems and programmes in order to oversee quality assurance systems at the universities and in the process leading to the institutions' accreditation);
- b) *supportive* (ensuring the orderly performance of the universities and maintenance of the set quality standards, TCU plays a supportive role to universities in terms of coordinating the admissions of students, offering training and sensitization interventions in key areas, like quality assurance, university leadership and management, fund raising and resources mobilization, gender aspects in university management and gender mainstreaming, etc.); and
- c) *advisory* (advising government and the general public on matters related to the higher education system in Tanzania, including on programme and policy formulation on higher education, and on the international issues pertaining to higher education (<http://tcu.go.tz/index.php/about-us>)).

The TCU implements its supportive role according to the one main objective of the Commission: 'the promotion of access to higher education and coordination of admissions' which is implemented by setting requisite academic criteria for student admission into universities; approving admissions into institutions of higher education; and providing a central admissions service for university institutions (URT, 2005).

The TCU's coordination of admissions of students into universities in Tanzania hopes to ensure that the process is orderly and adheres to the candidates' attaining the minimum qualifications for university entry. This mandate is accomplished by collaborating with other regulatory and professional bodies that have a stake in higher education (such as National Council for Technical Education, Pharmacy Council of Tanzania (PCT), Tanzania Nursing and Midwifery Council (TNMC), etc.) to ensure that the admissions process is efficiently conducted to achieve the intended results (TCU, 2010, p. 1). Therefore, in order to accomplish its objectives, the TCU has been given an autonomous legal mandate which guarantees no government interference in its operation. However, the exponential expansion of the demand for higher education worldwide has encouraged access to higher education across borders and provisions

that require higher education regulatory agencies to oversee quality assurance mechanisms that sustain the global view, preferably demonstrated within East African regional or global framework (Nkunya, 2009, pp. 63-65). These challenges and others as further explained in the next section, remain the reason behind the establishment of the CAS.

Table 3.5 Milestones of higher education in Tanzania

1961: Establishment of the first university, the University of Dar es Salaam as an affiliate college of the University of London.
1963: Establishment of the East Africa University as a regional University for three East African countries (Tanzania, Kenya and Uganda).
1970: Dar es Salaam University College becomes an autonomous university.
1984: Establishment of Sokoine University of Agriculture (SUA).
1992: Establishment of the Open University of Tanzania (OUT).
1995: Establishment of the Higher Education Accreditation Council (HEAC).
1996: Emergence of private universities (six of them were established).
1999: A launch of the National Higher Education Policy.
2004/07: Several public institutions were established (as completely new or through upgrading the existing non-university institutions and colleges).
2005: Replacement of HEAC by the current Tanzania Commission for Universities (TCU).
2007 ⁺ : Sporadic expansion of universities and university colleges
2010: Establishment of the CAS

(Source: TCU, 2007, p. 1).

3.6 AN OVERVIEW OF ADMISSIONS BEFORE THE ESTABLISHMENT OF THE CAS

By the year 2000, the enrolment trend in higher education was generally low; the university-age enrolment rate was 0.27 per cent (Pillay, 2011, p. 178). According to Pillay (ibid), this was attributed to the low budgetary allocation to secondary education when compared to primary education. All admissions to HEIs then were manually processed. Applicants had to travel to institutions to acquire the application forms. Only few institutions had websites from which such forms could be downloaded and completed by applicants. Those who wished to apply from different institutions incurred the cost of an excessive application fee. That was done for the purpose of increasing the chance of being selected (TCU, 2009). This created various challenges in terms of assuring the quality of higher education in the country. Mchome (2013) argues that, before the establishment of the CAS, there was no guarantee of fair, equitable and objective access to higher education since each HEI had its own admission standards and

process mechanism. There were also multiple admissions due to manual selection through the institutions, and because undergraduate degrees offering institutions were competing for the same applicants.

After completing the selection, it was noted that applicants who had multiple selections received the government loan twice through their bank accounts. Moreover, multiple admissions led to the underutilisation of available programme capacities (slots) in HEIs. For example, in 2009 before the establishment of the CAS there were about 7 000 applicants (equal to 19.7 per cent) with multiple admissions out of 35 355 applicants in that year (TCU, 2010c). Another challenge was that it was very difficult to detect applicants' forged certificates visually; thus there were many cases of applicants who were admitted and pursued higher education without genuine certificates. Many applicants spent a lot of time and money in applying for admissions. In some cases, applicants had to travel to the institution, purchase admission forms, fill in the forms and submit them, sometimes through postal systems and thus they were not even sure whether or not the forms were ever received. Consequently, this had an undesirable effect in terms of money, time, access and equity.

All these challenges were dominated by the manual processing of applications to HEIs. Such processing involved the manual verification of applicants' grades and qualifications which was tiresome and demanding. This situation made the need to automate selections for undergraduate admissions become apparent.

3.6.1 The Adoption of ICTs in Higher Education Admissions: The Central Admission System

The CAS is an electronic system whose functions are to register applicants, validate their applications, select them based on their choices and set criteria for admissions into HEIs (TCU, 2010a, p.1). The introduction of the CAS aimed to reform the higher education governance system in order to strengthen the quality control of undergraduate admissions. As noted above, the mounting number of HEIs in Tanzania and the successive increase in the enrolment of students, coupled with the complexity of the selection for admission, generated a number of challenges during the previous years' admission cycles when admissions were done manually.

Reforming the old manual admission practices thus became a target for improving the higher education governance system in the country, particularly in admissions-related matters. Thus, the goal of the CAS is to ensure a fair and transparent admissions system for all applicants. A fair admissions system is one that provides equal opportunity for all individuals, regardless of background, to gain admission to a course suited to their ability and aspirations (Schwartz, 2004, p.5).

The planning and implementation of the CAS was effective in 2008 when the team of experts visited in Oman to learn and adopt their admission system. The early planning involved several key stakeholders including prospective applicants of HEIs (who were only involved in testing the system). The general operationalization phases are hereby graphically represented below in Figure 3.3.

Figure 3.3 A diagrammatic representation of the CAS's operationalization and stakeholders' involvement and exclusion

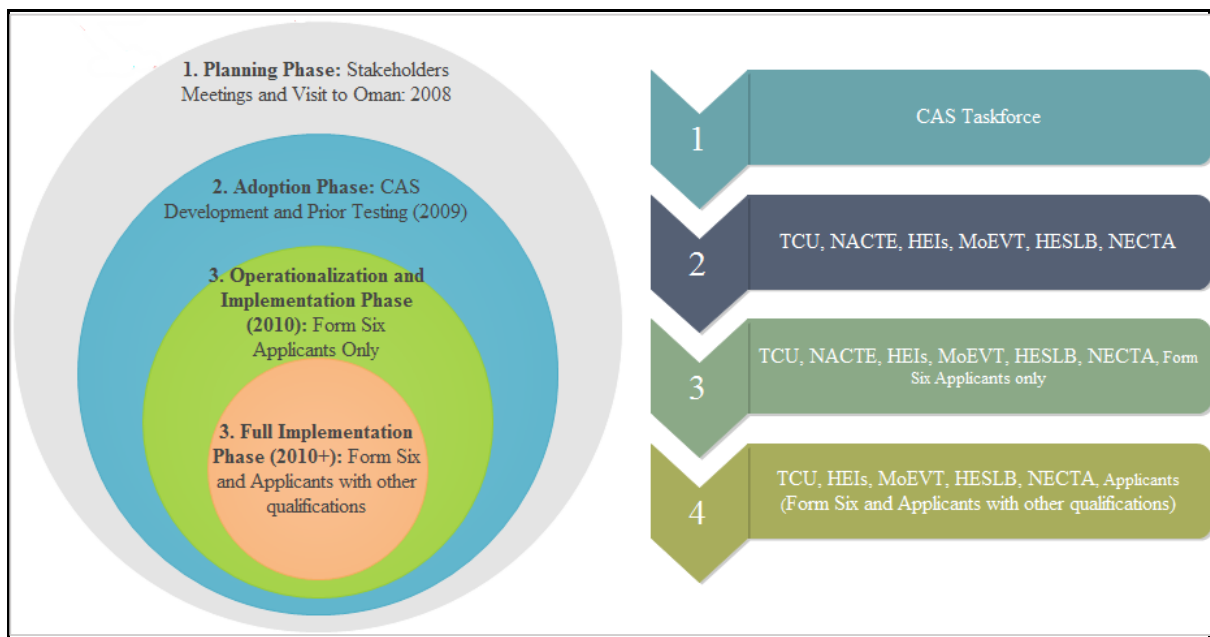


Figure 3.3 above shows that the CAS is comprised by various stakeholders. In this multifaceted configuration, everyone has its essential role in the operationalization of the system. It is from this perspective that the system is considered as a complex sociotechnical e-Governance system. The functioning of the system depends on each other (the human social and non-human aspects).

3.6.2 Admissions through the Central Admission System

The CAS technological innovation for the coordination of undergraduate admissions was born of a rather chaotic situation in 2010, when the handling of undergraduate admissions was fully decentralised. During the time, it was very difficult for one to determine the real number of applicants at any given institution for every academic year, since all applicants applied for admissions through an individual institution. Higher education as a whole is managed by the TCU in collaboration with the NACTE and HEIs. However, its implementation involves other key stakeholders such as the Ministry of Education and Vocational Training (MoEVT), the Higher Education Students Loan Board (HESLB) and the National Examinations Council of Tanzania (NECTA).

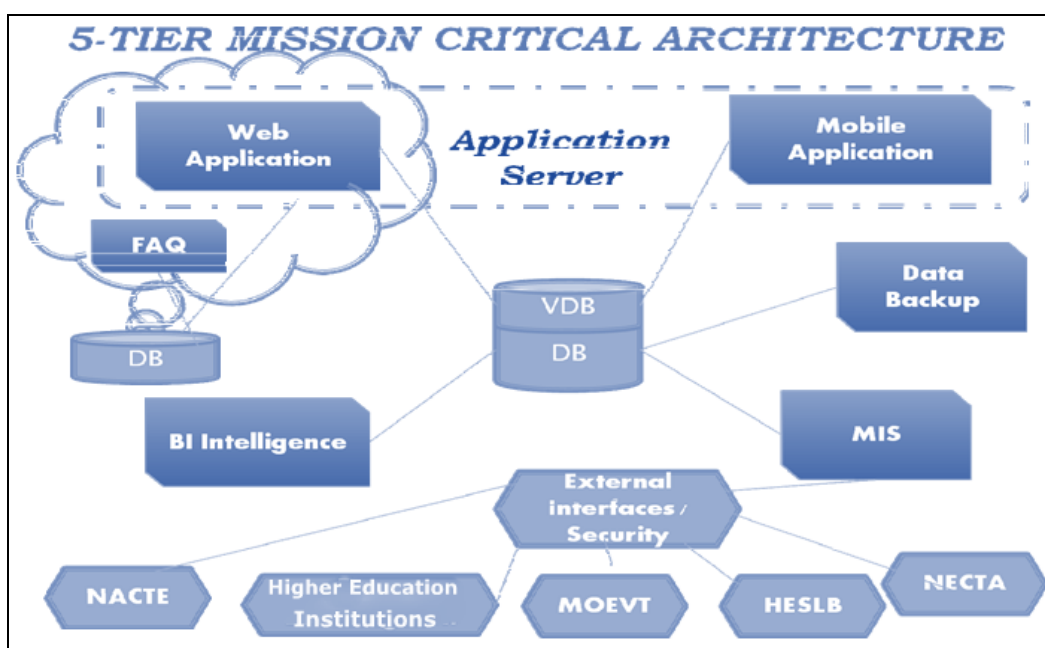
The very notion of automating admissions was made in 2007 by the then Minister for Science, Technology and Higher Education, P.M. Msolla. The process started in July 2009 when the Tanzania Commission for Universities' team visited Oman to learn from their online admissions system (TCU, 2009, p.2). The idea was then implemented for the first time in the academic year 2010/2011 by the TCU in collaboration with the NACTE and HEIs under the close supervision of the Ministry of Education and Vocation Training. The Oman electronic admission system (http://www.heac.gov.om/admission_systems/index.php) for students seeking higher education courses became the first in the Middle East. The TCU then adopted this system in its reform in the area of governance system to address various challenges as seen above that face undergraduate admissions in the country.

Before the introduction of the CAS, applicants were often required to travel to a number of institutions to lodge their applications. For example, an applicant from Mara region in north-eastern Tanzania, could spend up to US\$350 (<http://www.worldbank.org/en/news/feature/2012/10/24/increasing-access-to-higher-education-for-the-poor-in-tanzania>) in travel costs to apply to universities in various regions of the country for the purpose of lodging applications at various institutions. The following is a synopsis of the situation which exerted pressure for resulted in the operationalization and implementation of the CAS (TCU, 2010). The purpose was to curb various challenges which were facing the old admission with the purpose of.

- eliminating students' multiple admissions and the use of forged certificates during application;
- allowing only applicants who meet the minimum entry requirements to proceed with the admission process by eliminating the unqualified before the process goes further, hence saving time and resources needed in the process;
- tracking selected applicants via their registration at their institutions, their performance and progress in subsequent years until graduation;
- abolishing multiple loan applications and disbursements;
- reducing the burden of high admission costs to applicants who were obliged to visit institutions and pay each individual institution for which admission was sought;
- enabling the timely commencement of academic years which were previously delayed due to admission irregularities; and
- accommodating many candidates for higher education so as to assist some HEIs to meet their admission capacity.

The CAS consists of five-tier architecture (see Figure 3.4): web application, mobile application, business intelligence, data backup, and management information system. The aim of this study is not to explain these components in detail, but rather to portray the generic context of the operationalization of the CAS with its stakeholders (external interface) whose role is to access the admission data from the management information system (MIS) database.

Figure 3.4 CAS general operationalization framework



In principle, selection into HEIs is merit based just like in other countries. In selecting applicants, the CAS is linked with the database of the National Examinations Council of Tanzania (NECTA) in order to access applicants' Ordinary and Advanced Secondary Education examination results. For the Form 6 applicants who have foreign certificates, the system processes their applications after submitting their academic certificates with all required other documents. Moreover, the CAS is able to process applications for all other qualifications like diplomas, full technician certificate (FTC) and those with prior learning qualifications, who are categorized as 'Recognition of Prior Learning (RPL)'. All these categories are handled by the CAS (TCU, 2010, p. 2). Below is figure 3.5, showing the general context of the CAS users.

Figure 3.5 CAS general user context

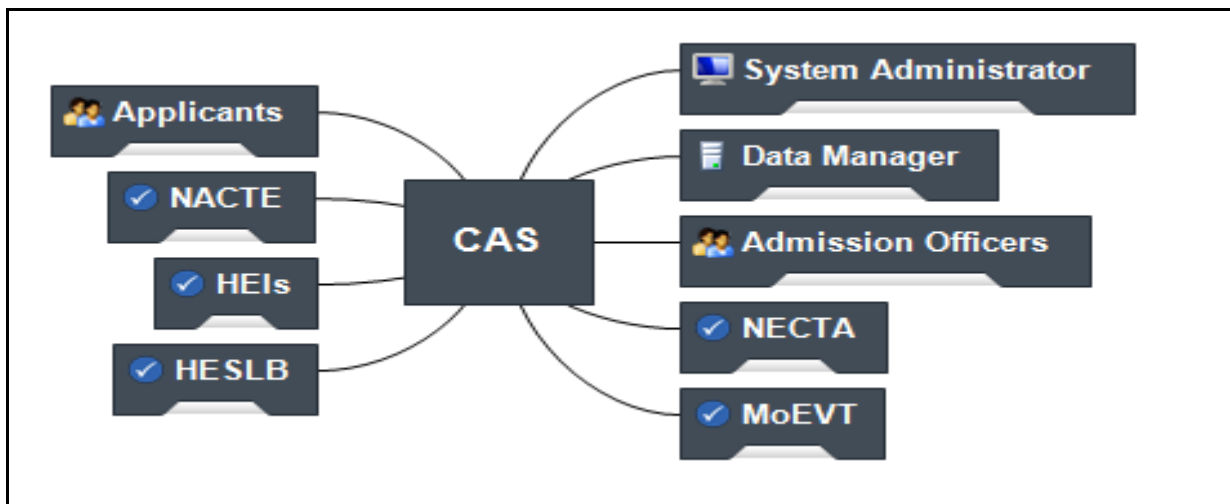


Figure 3.5 above shows the general users context composed of different stakeholders in the CAS whose roles differ in some ways. Applicants are the main end-users of the system (registering and applying for various programmes). These are supported by admissions officers, from both the higher education regulatory agencies and from HEIs. Nonetheless, most of the technical support is offered by the admissions officers from the regulatory agencies (TCU and NACTE). The role of system administrator is to make sure that the CAS performs according to the standard required of it and that all stakeholders have access to the system, based on their assigned roles (e.g. a person in-charge of admission matters). On the other hand, the data manager is responsible for various data/statistics, including ensuring that applicants' secondary

education examination results are up-to-date and to prepare various CAS reports from the system.

Other stakeholders like the MoEVT, HEIs, HESLB and NECTA also have an important role in the operationalization of the system. The MoEVT is responsible for overall supervision of the education in Tanzania, including managing all education projects in its institutions. On the other hand, the HEIs are the key actors and are the owners of the CAS. The running of the system is dependent upon these institutions. This is due to the fact that all selected applicants will consequently report in these institutions where they will be registered and become students. The HESLB is an agency responsible for issuing loans to selected applicants for them to finance their studies. So as for the CAS to be able to validate the applicants' qualifications, it depends on the NECTA's database which is linked to the system. All these institutions including the TCU and NACTE who foresee the general implementation of the CAS are under the MoEVT. In fact, the automation of undergraduate admissions has triggered several sociotechnical concerns by the public, particularly the prevailing challenges related to the use of ICT in the country. These are discussed in chapter 4.

3.6.3 The Central Admission System: Participating Institutions

During the implementation of the CAS, the Tanzanian Government directed that, from the 2010/2011 academic year onwards, HEIs should admit students through the CAS (TCU, 2010). Meanwhile, institutions that did not participate in the CAS were directed to continue processing admissions through their institutions; though after selection they are supposed to send the selected applicants to TCU and NACTE for approval.

With so many institutions (most of which are owned by religious institutions) participating in the CAS, the enrolment trend has dramatically changed since 2010 when the system was launched. The trend from 2010/2011 to 2012/2013 admission cycles shows that there is an enormous increase in admissions when compared to the previous manual admissions time. According to Abel (2010, p. 14), an increase in the student enrolment in Tanzania's higher education is attributed to:

- the increase in the number of Tanzania's universities and university colleges;

- the growth and introduction of new undergraduate programmes in the existing and new universities;
- the establishment of the University of Dodoma in 2007 with the capacity of enrolling nearly 40 000 students;
- improved access to higher education due to the establishment of the higher education student loans board (HESLB);
- the introduction and implementation of the Secondary Education Development Programme (SEDP) which triggered the increase in the number of secondary schools in the country from 1 291 to over 4 000 pupils and an enrolment growth of from 630 245 to 1 566 685; and
- an improved public awareness of the significance of education and the public acceptance of higher education cost sharing policy (Abel, 2010, p. 14).

All these acted as triggers to the increase in enrolment that made it necessary for higher education regulatory agencies to find the best way of improving the quality assurance in various areas, including in undergraduate admissions.

3.7 CONCLUSION

This chapter provided an overview of ICT development in Tanzania and its deployment in e-Governance, particularly in the context of regulating higher education. The chapter outlined the country's coverage of and access to ICTs which define how Tanzania has been moving towards the utilization of ICTs in e-Governance projects that aim to improve public service delivery. It has shown that the on-going advancement of ICTs paved the way for most government sectors to make use of ICTs in order to improve management systems, particularly in service organizations. This chapter builds a foundation for the contextual description of the CAS implementation, which is the case under study. Furthermore, it also serves to situate the growth of higher education and the establishment of regulatory agencies responsible for overseeing the quality assurance in higher education in the country. The need for quality assurance necessitated finding a way of controlling the quality of higher education admissions, which led to the establishment of the CAS. This chapter helps to situate the ICT applications in e-Governance, particularly the CAS within the broader context of HEIs and acts as a benchmark for understanding the challenges, costs, advantages and disadvantages of the system

across various group users. Following this background information, in the next chapter follows the presentation of the CAS implementation in HEIs and its influence on work organization and workplace relations.

CHAPTER 4

NEW TECHNOLOGY AND WORK ORGANIZATION

4.1 INTRODUCTION

The ultimate interest in this chapter is to present, analyse, interpret and discuss the data which address the following research question: to what extent and in what ways does the implementation of the CAS influence work organisation and workplace relations in HEIs? Data collected from interviews with admissions officers at TCU, NACTE and in HEIs were used for answering this research question. In presenting, analysing, interpreting and discussing the findings, where suitable, quotations from interviews are provided as illustrations to give the flavour of discussion and to augment and confirm the analysis (Adler and Adler, 1994). As previously indicated in section 1.2.1, the sociotechnical orientations to e-Governance implementation, namely sociotechnical framework as involving complex interaction of the human and non-human which are assumed to have influence on each other, were used as a lens in the analysis and explanation of the findings.

4.2 THE CENTRAL ADMISSION SYSTEM AND REORGANIZATION OF ADMISSIONS

The literature has shown that the impact of technological innovations on work organization and workplace relations differ across various settings depending on the type of technology and the context in which it is being implemented. The findings in this research have provided insights regarding the impact of the CAS on admissions work organization in HEIs. Though the CAS as a ‘computer-based application for registering and selecting applicants is perhaps the most evident change in the coordination of admissions in Tanzania’s HEIs point of view, its effects on the admission work processes and the impact of the system on officers working on admissions matters go far beyond that. CAS has changed the context of admission work processes and the context of organizing admissions in HEIs. The system has become a catalyst for new admission model and strategies (a shift from manual to online validation of applicants’ qualifications), and even the institutional admissions arrangement. Furthermore, the CAS has

triggered new ways of conducting admissions business (e.g. how to handle all matters related to the approval of admissions through the joint admission meeting (JAC)) the business which has changed to a large extent. Formerly, the JAC was responsible for approving all selected applicants whose names were printed in various booklets for all institutions for confirming applicant's qualifications as submitted from HEIs. It is obvious that such work was very demanding and could not thoroughly and precisely be done within a short time due to the large number of admitted applicants annually. Such scrutiny was part of confirming the selected applicants' qualifications (quality control) as a second phase of admission process before such applicants get approval through the JAC. However, with the introduction of the CAS, such business is no longer relevant. Indeed, on one hand it can be said that the CAS has changed the admissions processing business landscape, making it far more modest and the workplace for admissions officers considerably more fast-moving.

Generally, the introduction of the CAS has also affected the management of admissions in HEIs. Managing admissions online brings new challenges and opportunities, especially for people whose work skills are sharpened in a more old-fashioned manual and face-to-face settings. The great challenge here is workers' capability to adapt their working styles to the institution in which much of the sociotechnical interaction occurs online (within the CAS network) and often such interaction is uneven. Things like timely response to some urgent queries that might be raised by one part within the CAS sociotechnical network remains to be a matter of concern. This was evident as reported by Sharifa:

I was receiving students here at the college whose names are not in the list that I accessed through the CAS cPanel. In fact I had to request clarification from TCU as to whether they were real admitted through the system or not. However, such information was sent to the Deputy Principal Academic and could not reach me on time. Because of that, I could not register these applicants on time till when I got a consent from my boss (admissions officer, RUCO, 30 July 2013).

The workplace communication channelling has been also affected by the introduction of the CAS. There is a current trend whereby some of the communications related to admissions are done between TCU and admissions officers, while others are done direct between TCU and the HEIs managements (e.g. Deputy Vice Chancellors Academic, Deputy Vice Principals Academic, Deputy Vice Provosts Academic). In fact a normal inter-institutional

communication is supposed to be between the TCU or NACTE and the top management in HEIs, but sometimes such formality leads to delay of handling some admission issues that need urgent attention. This kind of communication was reported by Prosper (System Administrator, TCU, 05 July 2013) who insisted that it is new and it was not common before the introduction of the CAS. Prosper explained that within TCU for example, all matters related to admissions were first reported to the management which is responsible for assigning an officer in-charge for further handling. This shift in the way current communication is done on matters related to admissions is claimed to have influenced by the introduction of the CAS.

According to Sharifa (admissions officer, RUCO, 30 July 2013) the number of physical visits to the TCU offices has also decreased because most of the issues are solved online by HEIs admissions officers through the CAS cPanel. This is possible as all CAS participating institutions have been given the access in the system to view and download the lists of all selected applicants in excel format which then are sent to the senates or management for further approval. This is different from the time when admissions were manual and paper based; the admissions officers had to travel to TCU offices in Dar es Salaam city to submit the lists (hard copies) of selected applicants. Sharifa admitted that before the automation of the admissions, there was frequent physical interaction between the TCU and HEIs admission officers in institutions:

During manual selection, various selected applicants were withheld by the TCU due to questionable applicants' grades. So we used to have frequent interaction with our fellow admissions officers at TCU who requested us to clear such students so as to approve their admissions. But now such cases are no longer existing and that has reduced our physical interaction (admissions officer, RUCO, 30 July 2013).

Sharifa offers an indication that physical (face-to-face) interaction on matters related to admissions is decreasing due to the CAS online-mediated interaction. Such shift in workplace interaction is evident within HEIs, at TCU and NACTE. It was cited that within institutions the interaction between workers and managers on issues related to admissions has become very occasional because most of the admissions data are accessible directly through the CAS (e.g. reports on the number of selected applicants per programme, reports on transferred programmes, etc.). This has largely reduced the extent of physical contact between admissions officers and the management. On the other hand, the interaction between HEIs and higher

education regulators (TCU and NACTE) has also changed. As informed by Prosper (Admissions Officer, TCU, 05 July 2013) that in previous years there were several meetings that brought together representatives from HEIs to discuss and resolve matters related to higher education admissions. Prosper added that nowadays the TCU and NACTE can only conduct one Joint Admission Committee (JAC) meeting to approve all admissions in a specific academic year. This decrease of meetings has been said to have influenced by the introduction of the CAS, and on the other hand such decrease of the meetings contributes in saving the costs by HEIs, TCU and NACTE.

Further, during the interviews the researcher learned that to a large extent the CAS has changed the admission work business and workplace relations (both among workers and between workers and managers). For example, the responses from interview with Sharifa (admissions officer, RUCO, 30 July 2013) show that the institutional meetings on matters related to admissions are no longer frequently conducted as used to be, thus affecting workers' relations to a great extent:

Introduction of the CAS has changed the frequency of physical meetings with the management because the remaining role on our side is to approve and register the selected applicants. Such work today does not demand frequent meetings as compared to the time before CAS when we had to conduct several meetings to clear various issues including late applicants, withheld applicants, suspected forged certificates, and many others (admissions officer, RUCO, 30 July 2013).

This study further revealed that value of workplace teamwork was strong long earlier before the introduction of the CAS. As to-date the admissions officers particularly at TCU and NACTE are independently working on their own with computer screens. The meetings and brainstorming sessions, for example, that occurred in the face-to-face mode and which were very common during manual admissions system are rarely done since most of the required admissions reports are readily available through the CAS. Moreover, most of the briefings on the progress of the system during application sessions are commonly offered by the system administrator as hereby informed by Imani:

As admissions officer, I can see a big shift in the way we used to provide briefing on admissions matters. One used to have several documents containing the names of

selected applicants from HEIs which in one way demanded a team work to discuss various observed issues, however, I cannot experience that after automating the admissions. Also, I have realised that some of my responsibilities are currently being accomplished by system administrator. You know this system demands some advanced IT skills for one to be able to handle some of the challenges facing applicants. Only IT expert can solve such problems (admissions officer, TCU, 16 August 2013).

As claimed by Amani, the CAS is also reported to have created a grey demarcation between the tasks that are to be performed by admissions officers and those to be performed by the system administrator. It was revealed that in assisting applicants most of the technical related application problems facing them during application are solved by the system administrator (IT expert) who is in good position to trace the essence of such problems. In fact, the major role for admissions officer at TCU and NACTE is to make sure that programmes requirements are clearly stated so that they can meet the selection criteria. However, there are other small technical problems which can be handled by the admissions officers both at TCU and NACTE. Therefore, one conclusion that can be drawn from this context is that the system administrators both at TCU and NACTE are also performing some works that were supposed to be done by admissions officers as part of their job responsibilities. This is so because most of the admissions officers are not professionally IT experts, though they have basic ICT skills which were previously essential for handling manual admissions.

The accounts above suggest that the automation of undergraduate admissions has reduced unnecessary costs to higher learning institutions that were incurred by HEIs in financing the travels of admissions officers to the TCU offices. On the other hand, this seems to be a disadvantage to the officers. As stated by Caizer: ‘travelling to TCU offices helped us to gain extra income (per diem)’ (admissions officer, NACTE, 16 August 2013). Amina (admissions officer, SUA, 29 April 2013) acknowledged that the introduction of the CAS has reduced the number of annual Joint Admission Committee meetings that are responsible for approving the selected applicants. Such meetings involved an extensive volume of printing of documents for the meeting, thus the TCU and NACTE incurred high costs for organizing such meetings. The decreased number of meetings between the TCU and universities has benefited all HEIs and higher education regulatory agencies in terms of cost saving. However, Amina (admissions officer, SUA, 29 April 2013) raised the view that regular interaction through meetings was essential for admissions officers since some admissions issues cannot easily be handled online

because they need physical contact and discussion in order to get people's views and share experiences on various admissions issues (e.g. clarification of the transfer of selected applicants from one institution to another or from one programme to another within an institution).

The impact of technological innovations on workplace changes and organization as seen in the literature has been an important subject of discussion for a long time. In examining the discussion of the impacts of the CAS on work organization, the study also revealed that the new admission system has initiated significant changes in employment trend (no more needs for more admissions officers due to automation of the admission processes) and changes in incentive packages among admissions officers. For example, at TCU and NACTE, the current focus has been to employ more IT experts who can work both as IT people as well as admissions officers; the requirement which was not a priority during the manual coordination of admissions. This trend has also been reported in HEIs as well whereby the ICT among others is now set as one of the key qualifications for anyone seeking to be employed as admissions officer (Josiah, admissions officer, MNMA, 7 January, 2014).

The potentials centred on the opportunities created by the CAS on facilitating the admission work process in HEIs has on the other hand made admissions officers to be less responsible to the whole process of admitting applicants into HEIs. Such feeling happens due to the fact that they are less responsible with the challenges facing applicants during application and have no chance to intervene on the admission work processes. However, they normally guide the applicants who visit their institutions to seek support on how to apply through the system. This is an indication that admissions officers have lost their core functions for which they were employed for as their titles are reflected. For example, Mwenda clearly explained this concern:

I can admit that most of the core functions I used to do as admissions officer (e.g. participating in the process of manual selection of applicants) are now out of my hands. It has become a history now as the CAS does it on our behalves. I can hardly provide support and guidance to some few applicants who visit our institution to seek support and academic guidance before they apply through the CAS (Admission Officer, 16 August 2013).

Mwenda went further explaining that currently there is less interaction with applicants because most of them complete their application online through the system at their homes. The visits to

HEIs by some few applicants offer an indication that still applicants need more clarification and guidance on various issues related to admissions. In fact, the focal people for that purpose is admissions officers in particular HEI where one intends to apply for. However, the role of applying through the CAS remains to be of the applicant (who has to apply with the guidance of the admission guidebook, see part of the guidebook in appendix 2), unless one requests for assistance from admissions officers in HEIs.

The explanations by Mwenda suggest that the advisory role played by admissions officers in HEIs remains to be fundamental to some applicants who seek admission into HEIs. It happens that some of these applicants lack prior knowledge regarding the system of higher education essentially on issues related to admissions. It is through admissions officers who can clarify and guide applicants on such issues, the guidance which seems to be of great importance. Caizer admitted on the matter:

Some applicants end up missing the chance of being selected, not because they lack qualifications, but due to lack of academic guidance and counselling. So, their visits to HEIs are beneficial to them; however, since everything has been automated, they rarely come here (admissions officer, NACTE, 16 August 2013).

In fact, one may note that the establishment of the CAS has undermined the key components of admissions workers' tasks as part of the possible re-organisation of work in the context of the institutional changes. So to say, it is obvious that the CAS has enabled the fast processing of the admissions (Chapter six focuses on these issues) but also the trajectory of such change has undermined the admissions officers who used to process the same manually through the HEIs. Moreover, some institutions (e.g. HKMU) had their own special way of organizing admissions whereby before introducing CAS, the selected applicants were further interviewed to see their feel towards their studies particularly in the programme of Doctor of Medicine.

Indeed, the operationalisation of the CAS – as an initiative in higher education admissions quality control has been responsible for restructuring of the admissions officers' tasks and consequently workplace relations. Kyando explained it clearly:

Before the introduction of the new admission system, our institution used to organize interviews with the selected applicants into doctor of medicine programme to assess

their readiness to join this special vocation. But now you cannot interview the selected applicants through CAS who join the programme because there is no way you can reject them in case you find that they have no vocation to join the MD course; and if that could be done then we might not be fair to them. ... Currently, there are no such plans, but previously we used to re-locate those who proved lack of vocation to join other programs (Kyando, Deputy Vice Chancellor Academic - HKMU, 29 April 2013).

Kyando's explanations propose that the introduction of the CAS has influenced the way admissions were processed in some HEIs. As expounded by Kyando, programmes related to medicine are very sensitive as they deal with human life; so in order to establish whether a person who wished to follow a medical career was suitable, he or she would be interviewed and advised accordingly.

Indeed, these are hard times for workers. As the workplace has transformed, research on technology and work organization has investigated these changes and the restructuring of work. Studies have explored the impacts of technological change on workplace changes on both the level of the institutional and at individual worker levels (Marjoribanks, T. 2000, p. 7). Automation of admissions in fact, has to a large extent changed the way admissions officers used to perform their work. As for now, the processing of admissions is centralised, less labour intensive, and dependent largely upon skilled labour (IT experts); whereby the admissions officers both in HEIs, at TCU and NACTE remain with the major role of offering support to applicants. They are no longer participating in decision making as to who should be admitted with what qualifications, the work that has currently been automated. The next section takes a closer look at the effects of the CAS on users' skills.

4.3 THE IMPACT OF THE CAS ON THE ADMISSIONS OFFICERS' SKILLS, PROFESSIONAL IDENTITY AND STATUS

In the previous section, the focus was on how the CAS has influenced the general organization of admissions work processes in HEIs. As to what follows is the examination of the impact of the CAS on users' skills with a focus on admissions officers' skills, professional identity and status. As is the case of other e-Governance initiatives and their impact on workers and

workplace restructuring, the CAS has been conceived as being influential on admissions work and admissions officers' skills, professional identity and status. It is difficult to escape the conclusion that the effects of technological innovations are extremely diverse and vary from one institution to another. The literature has shown that technological effects are indirect and involve different time scales. Such effects on skills cannot be overnight, it can take a period of time to realise such changes (Green, 2011). There is a closer synergetic connection between the CAS, the organization of work in HEIs, and discussions about skills and workers' deskilling. As seen in the literature, the deskilling for example does not happen by coincidence, rather it occurs when employees' skills are under-utilized. Through sociotechnical model used in this study, it has been revealed that admissions officers also suffer the deskilling effect which Braverman predicted under 'monopoly capitalism'. This study has highlighted the way CAS shapes and continues to shape the admissions officers' skills through progressive routinisation of admissions processing which are annually done through the CAS, and that the current processing of admissions done through the CAS demands high skills. Because of that most of admissions works can only be done by IT experts (thus the admission officers' skills for admitting applicants are being weakened).

As previously seen, work restructuring among admissions officers was also reported as the consequence of the CAS. In HEIs admissions officers were responsible for preparing application forms, make screening of the applicants' applications and participate in final manual selection. After introducing the CAS all these have been automated, consequently have replaced the admissions officers' tasks and jobs which are part of their job descriptions. Josiah provided evidence on this concern:

I remember in my job description letter among others, I was supposed to prepare, print, disseminate and receive application forms as well as participate in screening and selecting qualified applicants. But, all these are now done by the CAS; what is on our side now is to participate in the preparation of the entry requirements for Admission Guidebook which are essential for the operationalization of system. I also accomplish other admission-related issues as instructed by the institution or TCU (Josiah, admissions officer, MNMA, 7 January, 2014).

Josiah's claim about the way CAS has taken some of the admissions officers' responsibilities is an indication that there is a need for reviewing job description to match with what admissions

officers are currently performing. Injecting ICTs in higher education governance systems implies injecting changes in work process, thus there might be a need to review the job descriptions of the available admissions officers in order to adapt and cope with the work practices that have been changed due to the implementation of the CAS in HEIs.

Sorrentino and Virili (2003) in their sociotechnical model have indicated that the motivations to change may necessitate the restructuring which in one way may lead to conflict with other institutional arrangements. Some interviewed admissions officers admitted that there is a great shift on what they used to do and what they are currently doing within their admissions offices. Josiah explained:

In fact, I feel uncomfortable when I compare and contrast my previous tasks with what I am currently accomplishing. I had no imagination that one day admissions will be automated. You know I had my own expectations in this position which now are shattered. Previously, I had a strong belief that through my participation in processing the admissions, I would have the position to increase earnings because the exercise involved extra payments. Apart from that, I am now working below my skills level as admission officer, because the current work of registering the selected applicants can be done by anyone (Admission officer, MNMA, 7 January 2014).

This study found that because CAS has almost taken out from admissions officers all processes related to admissions, including the role of deciding who is to be admitted based on applicant’s qualifications. Some of these processes are clearly presented in Table 4.1 below.

Table 4.1 Previous Manual and the CAS Admission Processes

During manual admissions (by admissions officers)	Admissions through the CAS
Preparing and issuing application forms to applicants	Preparing admission guidebook and the CAS
Receiving and filing the filled application forms from applicants	Opening and allowing applicants to register and apply through the CAS
Screening and validating the applicants’ applications	Closing the application period and running various trial selections

During manual admissions (by admissions officers)	Admissions through the CAS
Selecting students and announcing the results	Running final selection
Holding meetings with the senates/boards	Providing access to HEIs to download the lists of selected applicants through cPanel
Sending the lists of selected applicants to TCU or NACTE for quality assurance and approval	Running several other selections to accommodate those who were previously not selected due to various reasons
Holding the Joint Admission Committee meeting for approving the admissions	Holding the Joint Admission Committee meeting for approving the admissions
Receiving and registering the selected applicants in institutions	Continue with monitoring of selected applicants through admission audit in HEIs with the aid of CAS.

The admissions officers' responsibilities that were accomplished during manual admissions through HEIs are reported to be almost entirely devoid of admissions officers' autonomy.

Caiser commented that the selection done by the CAS is just part of the general admission process as it does not end there. Admission normally continues in HEIs and becomes complete only after one has been registered into a particular programme and is given the identification number. What the CAS does is to allow qualified applicants to register, verify their examination results through the NECTA examinations database and allow the qualified ones to apply for admissions. As indicated above in Table 4.1, admission officers have the responsibilities of verifying the selected applicants (e.g. cross-checking the authenticity and the real owner of certificates used to apply for admission, the activity which cannot be done by the CAS) and registering the cleared students into various programs of studies.

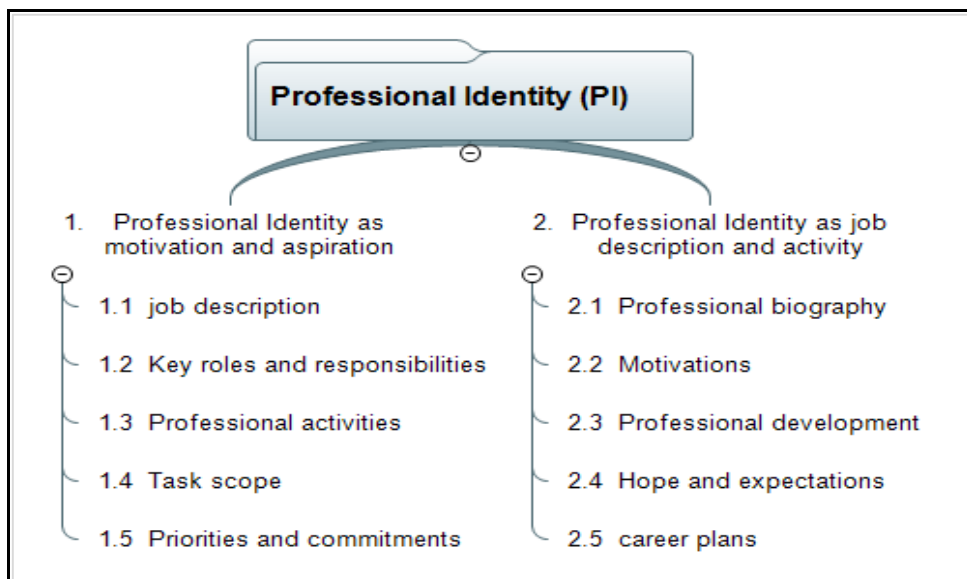
While clearer in deskilling, the CAS also is reported to have upskilling effect among the admissions officers. As argued in the literature that upskilling underscores the developing significance of workers' flexibility (autonomy, choice, discretion, and so many), capability and familiarity in using various technologies that aim to help perform work processes. This study has revealed that the admissions officers at TCU and NACTE have benefited from a series of

trainings on the CAS since its establishment to date. Such trainings have been offered by the first developers of the CAS and thereafter by those who upgraded the system to the CAS version two.

The general implication one may draw is that despite the deskilling effect of the CAS, several other uncertainties also exist in the CAS work processes. In various cases throughout the admission processes, admissions officers at TCU and NACTE have depicted the existence of upskilling effect of the CAS, while the admissions officers in HEIs reported to have been isolated from their core functions of their profession (discussed in details below). This agency bore strong relation between the CAS and organisation of the admissions work in HEIs.

The influences related to the introduction of CAS on admissions officers’ professional identity were also acknowledged in this study. The findings indicate that admissions officers agree with the fact that the implementation of CAS implies more control on the admissions work processes and most significant is about the deskilling of their previous skills and knowledge on manual admission processes. So far, data suggest that the introduction of the CAS has shaped the multiple identities of admissions officers in HEIs. The analysis of these variables is based on the dimensions indicated in Figure 4.1 below.

Figure 4.1 Study dimensions for the examination of professional identity



Workplaces of today are furnished by various modern technologies like the CAS that intend to increase efficiency in public service delivery. However, such technologies have shown to have diverse consequences on workers' professional identity. In inquiring the influence of the CAS on admissions officers' professional identities, it was established that there is a great shift in admissions professional knowledge due to the introduction of the CAS, hence undermining their capabilities. Some of the interviewed admissions officers admitted this shift. Joan put it clearly that:

It is very obvious, we were employed as admissions officers and our major roles (as described in job contract) among others need us to participate in processing applications, selection and admission of applicants into HEIs, the work currently done by the CAS. So what do you expect would be our core functions? (Joan, admissions officer, MU, 04 December 2013).

As previously seen in the literature, technological innovations in institutions have a tendency of imposing an undesirable impact on the professional status and job satisfaction of workers. In fact, the introduction of CAS in HEIs not only increases, but also extremely challenges admissions officers' professional identities by making their previous admission expertise obsolete. In this case study, it was cited that the admissions officers who had previously participated fully in the process of admitting applicants gained professional status and satisfaction from their work (Gaudence, admissions officer, University of Iringa [UoI], 16 August 2013). However, today they are reduced to being receivers of the 'ready processed admissions', thus experiencing a decrease in their professional status and less job satisfaction in their admissions work. As argued by Gaudence: 'Participating in decisions on who should be selected was meaningful to me based on my title – "admissions officer"' (Gaudence, admissions officer, UoI, 16 August 2013). Gaudence insisted that: 'The title tells; I have to admit applicants. So I feel that status has shifted to the computer; and if the system does not produce what we expect, then it holds responsibility of being blamed and not me' (Gaudence, admissions officer, UoI, 16 August 2013).

As insisted by Zuboff and Maxmin (2003) that new technology may necessitate the re-definition of the workers' roles and responsibilities, similarly the CAS shows a demand for reviewing admissions officers' job descriptions so as to cope with a new working environment. Caiser (admissions officer, NACTE) admitted that there is a need to review job descriptions to

cope with the new working environment: ‘I think management should amend the available job description because some of the activities we used to do as admission officers as stated in job description are done by the CAS’ (16 August 2013).

A similar response was also given by Josiah (admissions officer, MNMA) who stated that ‘even if we participate in selecting applicants for other programmes such as diplomas and certificates, there is a need to review the available job description particularly for areas that demanded us to participate in undergraduate admissions’ (07 January, 2014). However, focusing on the scope of the admissions tasks, especially for undergraduate applicants, Josiah acknowledged that it remains for them to register the selected applicants through the CAS, and that all undergraduate admissions tasks are now performed by the CAS.

On issues concerning the hopes, expectations and motivation of people in the workplace, in the context of the automation of undergraduate admissions, respondents in HEIs felt that the CAS has had a negative impact. However, admissions officers within regulatory agencies reported high motivation and expectations, particularly in furthering their careers when working with this new admissions system. This was expressed by Imani (admissions officer, TCU) who stated:

This system is complex; thus the need for training is essential. One needs to have more ICT knowledge since applicants’ challenges are dynamic and keep on emerging with different scenarios. I think that is one area admission officers can be motivated and meet their expectations in fulfilling their admission roles and responsibilities (16 August 2013).

The assertions above show that admissions officers in HEIs have no crucial role in the system that may influence their expectations, hopes and motivation at their workplaces. The feelings of the admissions officers in HEIs is that their access to the system is just extracting the names of selected applicants for further processing by HEIs including securing approval by the university senates and college boards. Additionally, the admissions officers admitted that they have less interaction with the system; and they become active as end-users only when they offer support to applicants who face difficulties in using the system. This is contrary to their fellow admissions officers in higher education regulatory agencies who have interaction with the system as the principal attendants to applicants’ queries and challenges.

Various sociotechnical theorists have registered similar findings. Charles (1989), for example, documents that ‘the on-going technological innovations in institutions have fundamental influences on professional identity and aspects of work content’ (p. 98). In fact, the influence of new technology on work organization is perceived differently by different professionals in different contexts (Fook, 2002). The nature of specific technology and the settings where it is implemented may result in various perceptions, which may be either positive or negative (Herold et al., 1999). Within HEIs, the admissions officers reported experiencing both upskilling (which is experienced through learning new skills of handling the admitted applicants through the CAS cPanel and their general interaction with the CAS when assisting applicants) and deskilling of their old skills (that were essential for handling manual admission work processes). The reported findings in fact are to a great extent similar to the most e-Governance projects worldwide. Frequently, when new technological innovation is introduced at the workplace tends to restructure the old workers’ skills and creates a room for workers to learn new skills for handling the new system. Mumford argues that:

The machine is ambivalent. It is both an instrument of liberation and one of repression. It has economised human energy and it has misdirected it. It has created a wide framework of order and it has produced muddle and chaos. It has nobly served human purposes and it has distorted and denied them (cited in Granter, 2009, p. 78).

As argued by Mumford (cited Granter, 2009, p. 78), similar situation has been registered with the introduction of the CAS in HEIs. While the CAS is viewed as the liberating admission tool for reducing admissions officers’ workload it has been responsible for causing a great shift on the way admissions work is measured and reported. During manual processing of admissions, the admissions officers had to have several admission work processes (see Table 4.1). However, such undertakings no longer exist. The admission officers also reported on the shift in ‘incentives’ for their profession due to the fact that most of the manual admission tasks that deserved motivation are now done through the CAS. Whereas computerization in the workplace ‘is often thought to herald the death of the professions’ (Beirne and Ramsay, 1992, p. 201), in other situations it is the tool of workers’ promotion. This was also registered by the admissions officers within higher education regulatory agencies (TCU and NACTE) who expressed their feelings that the introduction of the CAS has increased their social network and professional status. This opinion is shared by Caizer (admission officer, NACTE):

CAS has widened my social network due to high interaction with clients during the application period. I think you know that all technical issues are handled here. So, most applicants, who face problems, or their parents and guardians require assistance from us; so you become known to many different people nation-wide (16 August 2013).

The findings generally offer an alarm that workplace technologies are responsible for restructuring work organization and in influencing the traditional skills and professions among employees. Indeed, admission profession/occupation seem to be a central discourse across HEIs workplaces. The link between the admission tasks at hand, the CAS, the resulting output and a sense of individual's professional self are entangled. Before introducing the CAS, admissions officers were able to demonstrate their workplace competence, efficiency, focus on the job and mastery of their work; the possibility which in one way has been influenced by the CAS. Consequently, the admissions officers' works are subjected into an ICT based system – making their part of jobs being accomplished by IT people who are closely working with the CAS, particularly in handling the difficulties facing applicants. This is an indication that the admissions officers at TCU and NACTE whose ICT skills are less to be able to handle the CAS challenges might need an intensive IT training course that would lead them to be IT experts so as to cope with the new workplace which is often changing. Failure to do this, in a long run such admissions officers might find themselves unfit working with CAS and their places might be taken by IT experts who need to understand only admissions requirements for them admit applicants through the CAS.

4.4 CAS AND THE MANAGERIAL CONTROL OF WORK

During the interviews with admissions officers the researcher learned that the control of admissions work processes has been common and it is done directly through the CAS. The managements in HEIs as well as at TCU and NACTE are currently able to track all on-going activities through the CAS, things like who logged in, at what time, and the changes (if any) that have been made into the system (Prosper, system administrator, TCU, 05 July 2013). In fact, office automation denotes a further modernisation of office work, a practice that was inaugurated with the typewriter and the adding machine in the 19th century (Roy, 2005, p. 304). From interviews with Hyera (admissions officer, IAA) show that managerial control of admission work processes is one way of curbing corruption temptation:

In the past, there were ‘loopholes’ for corruption and admitting some applicants on nepotistic grounds. But now everything is controlled and managed by the system ... That is possible because the system can track the selected applicants in the institutions. Thus, one cannot increase the number of selected applicants manually (30 May 2013).

Basically, the CAS in Tanzania offers the facility to monitor all matters relating to undergraduate admissions malpractices. One of the shortfalls of the manual admissions system was the corruption and nepotism in the whole exercise of admission, which currently has become more controlled. Hyera’s statement, however, contradicts with that of Gaudence, (Admissions officer, UoI, 16 August 2013) who still has the suspect of continued corruption that might be done intelligently through the CAS. The argument of Gaudence is that ‘if the system was built by the hands of human being, then everything can be made possible through the system e.g. IT expert can be corrupted to cause someone be selected into a desired programme’ (Admissions officer, UoI, 16 August 2013). Nevertheless, responding to such claim, Prosper puts it clear:

There is close monitoring of these processes. It is not the matter of someone logging into the system and alter the credentials of applicants. First of all, there is no permission to change or interfere with the NECTA’s examinations database to allow one to be selected in a programme that he/she cannot compete. Moreover, the exercise is very transparent, if someone with lower grades is selected while leaving one with higher grades in the same programme then that might be a technical error. If such cases happen, we correct it in the system for the sake of maintaining fairness and transparency (system administrator, TCU, 05 July 2013).

When someone makes changes into the CAS, the architecture of this system can track such changes and keep the logs for further reference. This has been made so as to ensure that there is no one who can temper with the system, and on the other hand it is the way of controlling dishonest officers from doing unethical issues. It should be noted that admission is a process, and such process does not end at TCU or NACTE through the CAS. All selected applicants need to be verified and approved by particular senates or managements in HEIs, so in case one is admitted with wrong qualifications, that might distort the image and the mission of the CAS – quality control in undergraduate admissions.

The researcher learned that the suspect of corruption continuity keeps managements to have closer control and follow up of the admissions work processes online through the CAS as a countercheck mechanism. There is great possibility for admissions officers to add the applicants apart from those selected through the CAS due to the fact that the accessed lists of selected applicants are extracted in excel format and one may be tempted to add some other qualified applicants for whatever reasons. Thus the best way of controlling this is through the CAS cPanel verification. When asked what are the views regarding this possibility, Prosper (system administrator, TCU, 05 July 2013) admitted that it is possible for one to do so, though through institutional admissions audits (that are conducted after students reporting into the selected HEIs) such malpractices can easily be identified. Prosper further explained that due to the existence of academic malpractices done by dishonest employees, admissions check is very essential to verify that those who were selected by the CAS are real the ones who have reported into HEIs.

Researcher also found that the automation of undergraduate admissions through the CAS has helped regulatory agencies to control the quality of applicants effectively, hence facilitating the work of the admissions audit at HEIs. Taking away from admissions officers the decisions to determine who should be admitted and who should not, is a one way of controlling quality of admitted applicants into HEIs. Previously, the admissions officers were key people in HEIs who used to screen applicants' qualifications through application forms manually on the basis of the applicant's performance as indicated in the attached certificates – the work that is currently done by the CAS.

Though admissions officers in HEIs enjoyed their full control of admissions processes during the manual system, this study revealed that some of them misused their authority by assigning some applicants the grades which were not authentic. Whether they did it purposely or not, they in fact created an alarm that there is great problem of academic malpractices going on in higher education admissions. For example, a student would be given a 'B' instead of a 'D' grade (Amina, admissions officer, SUA, 29 April 2013). This was possibly because applicants submitted their application forms with attachments to the particular institutions and the role of admission officers was to record the grades manually as they appeared in the certificates. In so doing, it was possible for some admissions officers to assign incorrect grades to some applicants' entry qualifications.

It is an indication that some applicants were approved to join a particular programme on the basis of incorrectly recorded grades. In probing this scenario, it was reported by Imani (admissions officer, TCU, 16 August 2013) that manual selection was accompanied by many challenges including wrong recording of applicants' grades which made it difficult for TCU and NACTE to cross-check manually the authenticity of applicants' marks. Nonetheless, such admissions officers have been controlled and monitored through the CAS. This is clearly explained by Sharifa (admissions officer, RUCO):

This system has managed to control dishonest admissions officers, who used to cheat the applicants' grades to favour some unqualified applicants. But there are still some concerns as to whether the CAS can also be used to cross-check those applicants selected through the non-CAS HEIs, because if that is not possible then there is possibility of continuing admitting unqualified applicants (30 July 2013).

The views above suggest that, because the applicants' grades were not recorded accurately, some of the well-qualified applicants were not selected in favour of those whose grades were raised to justify their admissions. This also persuades one to believe that during manual admissions processes, the dishonest officers admitted some applicants based on either nepotism or corruption. This observation provides a clue that there could possibly be some graduates who completed their studies with forged entry qualifications. The implication of this is the nation having a mushrooming of fake degrees (that individuals acquired using forged entry requirements).

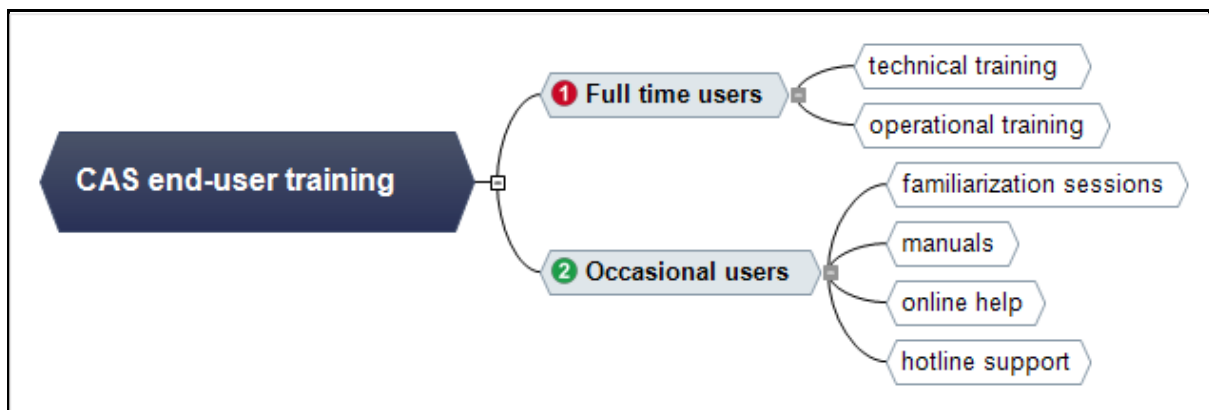
In a nutshell, responses from interviewees indicate that the introduction of the CAS has imposed control mechanism in all areas of admissions work processes ranging from HEIs to TCU and NACTE. This has to a great extent influenced the way admissions officers feel about their profession. In fact, closer control does not give admissions officers the chance for workplace creativity as they are monitored in whatever they do and the CAS has monopolised all admissions work processes leaving admissions officers being attendants of the system. Such trend suggests that there might be a possibility for admissions officers to be assigned other responsibilities if continued automation would be anticipated particularly in registering selected applicants into various courses in HEIs.

During the interviews, the admissions officers in HEIs also highlighted the need for training on the use of the CAS; the subject which will be presented and discussed in the following section.

4.5 THE CAS AND TRAINING NEEDS

Just like other ICT based e-Governance systems worldwide, this study has established that the needs for training among admissions officers and other end-users of the CAS are essential. Usually, technology training (the process of transferring the required knowledge and operational skills to users of IT) is an important part of the support to the end-users (Mahmood, 2003, p. 264). According to Mahmood, the essential purpose of such training is to provide users with useful skills that will enable them to use the ICT's applications effectively. This study examined whether the CAS end-users required training and whether such training had in fact been done. An analysis was done by focusing on two groups of main users: the full-time users (admissions officers at HEIs) and occasional users (applicants), as indicated in Figure 4.2 below.

Figure 4.2 Training needs for the CAS end-users



During the study it was discovered that the full-time users of the CAS (i.e. admissions officers at TCU and NACTE) received training on both the technical and the operational aspects of the system (Prosper, system administrator, TCU, 5 July 2013). According to Prosper, the training was conducted by the Dar Technohama Business Incubator (DTBI), the company that had upgraded the system to the second version (CAS v.2). During this training, various aspects were covered, including updating programme requirements, handling issues of the mismatch

of applicants' names, updating applicants' passwords, accessing various admissions reports and statistics, handling applicants' transfers, adding new institutions and programmes, and handling application payment vouchers (these are scratch cards used by applicants to register into the CAS and make application). These skills are essential for the staff at TCU and NACTE who deal with admissions issues in order to enable them to offer efficient support to all other end-users, particularly to applicants and admissions officers at HEIs. The training documents that were analysed triangulate the information reported by Prosper. In fact, this training was done especially for admissions officers and other CAS supporting staff from the TCU; thus, it did not involve admissions officers from HEIs.

The interviewed respondents expressed their concern that the CAS novelty and its on-going upgrade necessitate the training of stakeholders, particularly for the admissions officers in HEIs so that they can cope with the continuous system changes. For example, this was echoed by Gaudence:

What I recall is my attendance in the previous meetings, which were hosted by the TCU during the early stages of preparations of the system. Since then, and despite the ongoing changes being made in the system, I have not attended any kind of training. Instead, I have to use more time for self-learning (admissions officer, UoI, 16 August 2013).

Josiah (Admission Officer, MNMA) added that:

In my view, there is an assumption that every admission officer knows how to use the system, but that is wrong. The implementers (higher education regulatory agencies) forget that technology is changing every day and the need for refresher courses for users I think is very essential. Remember, since the system started in 2010 no training has been done to us. We expected to have knowledge on how the selection is done, how to access the selected applicants, etc. Instructions are given through emails or sometimes through telephone (07 January, 2014).

The lack of training among admissions officers in HEIs was mentioned as one of the factors contributing to the admissions officers' failure to explain certain issues to some 'customers' of higher education, who visit the institutions. This was evident in Sharifa's explanation:

Applicants do ask us various questions and we fail to provide answers. For instance, one student wanted to have reasons as to why he was selected in the last programme choice (out of five choices) because he performed well in his advanced level secondary examinations. Fairly, I answered it in simple way that 'it is due to competition', but I think there would be more explanations on this, which applicants deserve to know. Such scenario can only be clarified by someone who has received prior knowledge on how selection is done and why one might be selected in the second or third choices (admissions officer, RUCO, 30 July 2013).

The admissions officers in HEIs recognize that training in the CAS is one way of helping them to interact confidently with the system. Based on their responsibilities, they are expected to offer assistance to applicants and to access admissions data from the system for further processing and use. The interviewed admissions officers expressed their desire to have special training on the use of the newly upgraded CAS. This is evident in the words of Caizer (admissions officer, NACTE):

Training for this new admission system for us is very essential ... Sometimes you face very challenging cases in helping applicants during application; and I believe it is through training we could be in a position to support the performance of the system. Just an example, we are supposed to understand how to access admission data from the system because sometimes we receive students during registration whose names are not found on our list ... Some of us have less knowledge in accessing the list of selected applicants through the system (16 August 2013).

Further examination focused on whether the occasional users (applicants) were empowered to use the system. Essentially, the inquiry focused on the familiarization (awareness sessions), the available manuals, online help and hotline support. This was essential since the workplace dynamics for admissions officers entails an interplay of applicants, which is an essential sociotechnical subsystem in the operationalization of the CAS. In this study, it was revealed that the best way of assisting applicants is by providing various manuals, including the admissions guidebook (which acts as a core document for the implementation of the CAS), and brochures. It was reported that sometimes applicants gain awareness through various forums (e.g. a higher education exhibition or a higher education forum), media (television, radio,

newspapers) and stakeholders' websites. However, further investigation revealed that the awareness offered to applicants through media did not cover the important aspects of operating the system other than giving the public a general understanding of the system. As argued by Amina: 'Basically the awareness offered through media such as television, radios, newspapers does not help applicants because it is merely general awareness concerning the system' (admissions officer, SUA, 29 April 2013).

The interviews with admissions officers in most HEIs visited obvious depicted that for them to be able to use the system properly, they demand training. The implications of the CAS have been also on the emergence of the new relational and training needs resulting from the use of this new system. In effect, the study has noted that there is an intermediate step between CAS implementation and workers (particularly admissions officers) training based upon the user training needs as raised by admissions officers during the interviews. The assessment shows that the current workplace changes and admission officers' needs ascending from the implementation and use of new admission system demands them to have enough knowledge about the system. Although admissions officers at TCU and NACTE received basic training on how to use the CAS, almost all interviewed admissions officers from HEIs reported the need for having training on the use of the system. They were concerned on their role of accessing the lists of selected applicants through the cPanel where they extract such names for scrutiny and approval by their senates (Joan, admission officer, 4 December 2013). This was clearly addresses by Gaudence who viewed such training as essential because the CAS is being upgraded now and again:

They say this system is ours but I have never attended any training that aim to empower us as admissions officers in HEIs. You know, the CAS implementers forget that the admitted applicants are our clients, similarly this system works because there are HEIs, why then they don't think of us as the main stakeholders? Someone is just sending us an email providing the username and password for accessing the lists of selected applicants through the cPanel. They overlook us to a great extent, assuming that we know this system (Admission Officer, IUCo, 16 August 2013).

Although some CAS users particularly admissions officers already had prior knowledge to ICT which was the basis for their employment as admissions officers, gave their recommendations to the CAS implementers that due to the newness of the system and continuous upgrade of the

system, it is important for them to get such training. While there is continuing debate about the need for admission job redesign, whereby admission work processes in HEIs have been and are continuously being altered by the new admission system, which tends to eliminate all routineous and monotonous admission tasks, admissions officers are still emphasizing on the need for training on the new admission system so that they can acquire new skills necessary to cope with the on-going system upgrades. Training needs for admissions officers are necessary for realistic and effective CAS implementation. Most of them were concerned on what the CAS does and what they have to do thereafter as admissions officers (i.e. their interaction with the system should focus on which areas, apart from accessing the selected applicants through the CAS cPanel). The study found that the admissions officers in HEIs are still in need of skills that will enable them to use the CAS to access the selected applicants through the cPanel. The following testifies to this:

We are supposed to extract the list of selected applicants direct from the system, but how to do it? I just received the username and password through email. But this is new technology and needs to have orientation. Myself, I can say that there is an over assumption that admissions officers know the system – that is not true (Gaudence, admissions officer, UoI, 16 August 2013).

In fact, the admissions officers who are among the CAS end-users vary widely in terms of their ICT background, and their experience in using the CAS. Most of the admissions officers in HEIs reported to have ‘self-taught’ on how to operate the CAS (Josiah, Admissions Officers, MNMA, 7 January 2014); and they are often uninformed of other useful features of the CAS. Being a new system in the country, they could not even be able to transfer skills and knowledge learnt from similar technological innovations. Those admissions officers at TCU and NACTE who received structured training in the use of CAS, reported that they are now able to extend their understanding of the system by discovering various other features and functions they were familiarised to during the training (Imani, Admissions Officers, TCU, 16 August 2013).

It is an implication that admissions officers in HEIs continue to have individual training needs that remain unmet despite having had their CAS at their workplaces for some years. The findings on the training needs depict the fact that when training needs for admissions officers are not acknowledged as essential requirements, then the admissions officers in HEIs are left to rely on their own resources, using trial and error, or keeping on consulting admissions

officers at TCU and NACTE to understand the CAS. Nevertheless, the ‘teach yourself’ become more difficult since up-to-date the CAS has no wading through manuals or online tutorials for admissions officers in HEIs and other end-users to learn various issues related to the CAS.

The diverse social environments of the CAS users particularly applicants are of great concern in the arrangement for training or awareness. The applicants who are the key users of the CAS come from different locations, families with varied economic income. For them to access the CAS they need special consideration in the plans of training. In emphasizing the importance of training, sociotechnical analysts argue that training of the end-user remains central to the implementation of new technology in the workplace (Schelin and Garson, 2004, p. 49). A similar feeling was also expressed by Mbunda (system developer, DTBI) who indicated that the training of end-users, particularly prospective applicants to higher education, is significantly more critical as it affects the admissions exercise and, ultimately, the achievement of the CAS in Tanzania:

This system is still new and will continue to be new to the applicants. I am saying that because every year the CAS receives new applicants. So there must be a sustainable plan that focuses on students in advanced secondary schools where the majority prospective applicants are easily accessible annually (8 July 2013).

Mbunda (system developer, DTBI) added that:

It would help us to assist such applicants in the areas that really demand more clarification and assistance. But they come to us while knowing either little or nothing at all about the system. So you have to start teaching them instead of doing other official duties. We use more time to explain it to them (8 July 2013).

Besides the available manuals (admissions guidebook, brochures) and ‘hotline support’ to the applicants, it was noted that currently there is no convenient ‘online support’ offered to applicants. Even though it was anticipated that the CAS’s general operationalization framework (see figure 3.3) would consist of FAQs to help applicants understand common issues, this facility is yet to be implemented. Sharifa (admissions officer, RUCO, 30 July 2013) reported that the CAS lacks ‘live online help’ where applicants could direct their questions and

get immediate assistance, particularly during peak times when the available hotline numbers become congested.

The findings suggest that the need for training both the full-time users and occasional users may arise directly from the skills, knowledge and attitudes required to operate the newly established technology. According to sociotechnical researchers, the end-users who receive training are likely to use new technology with less frustration and this may contribute to the prolific use of e-Governance systems in institutions (e.g. Compeau and Higgins, 1995). As argued by Buckley et al. (2009, p. 61), such needs for training may arise from the spin-off effects that may have transformed the work organization at the institutions. That is why Buckley et al. (2009, p. 61) avow that the automation of public services may lead to the need for the training of a broad range of staff.

The Latin proverb, *Nihil simul inventum est et perfectum* means ‘nothing is invented and perfected at the same time’ (Dodgson et al., 2005, p. 1). Any technological innovation behaves like a human being as it changes through ‘system upgrading (system improvement is always done in responding to the on-going challenges facing the users and or including new features that would help users to enrich the system usability). Most innovations do not stay the same and the pursuit of an innovation that is perfect at birth is an on-going quest for innovators. The continuing changes occurring in the CAS that result in the improvement of a range of new features are part of that quest. Thus, the findings above further suggest the need for system upgrades that should be parallel with end-users’ training. Case studies show a direct cause-and-effect relationship between adequate training on new technology and measured efficiency improvements in the offices.

In fact, technological innovations and new ways of service delivery have spread to such an extent that they influence white-collar jobs in public institutions (Bresnahan et al., 1998). Therefore, an on-going rate of change in technological innovations means that training of the end-users is a recurrent challenge. Because new technologies form the modern work processes for many service institutions, workers require new understanding, skills and competencies in accomplishing their daily activities. Nonetheless, Khosrowpour (2005, p. 963) shows that in implementing new technology, training is one of the overlooked dimension by several institutions.

There is little doubt that the needs for CAS training among HEIs admissions officers and applicants' awareness remains to be pivotal. The CAS users apart from admissions officers keep on being new every year and that there must be a way of assisting such users on how they can apply for admission through the system. Moreover, admissions officers like other employees in any institutions may at sometimes leave the job, and if that happens someone new might get in. In this context one must be trained on how to use the system. So to say, the CAS implementers should have a long term sustainable plan that will help end-users interact with the system without frustrations. By acknowledging the diverse social backgrounds of users, such need is important.

4.6 CONCLUSION

The influence of new technology on work organization, as shown in this chapter, shows that any technological innovation introduced into the workplace is accompanied by unintended consequences that occur alongside the core purpose of the particular technology. Such unintended consequences have been also registered by the CAS. As discussed in Chapter 1, the purpose of the CAS (improving admission services and admission quality assurance) has been accompanied by the restructuring of admissions tasks among admissions officers. Also, the system has revealed its capability in monitoring the officers who are in charge of admissions both in HEIs and in higher education regulatory agencies. Apart from that, the CAS has also paved the way for understanding that new technologies in the workplace may require training of end-users to use the system better. That is marked as an essential condition in implementing e-Governance projects in institutions. The findings indicate that technology in the workplace imposes various changes on workers' jobs, and that some changes are not anticipated in advance. As argued by sociotechnical scholars (e.g. Hodson and Sulliva, 2008), 'the difficulty, for workers and analysts alike, is anticipating the consequences of these changes in the nature of work. All changes have multiple effects; some are likely to be benign, others not so benign' (p. 415).

CHAPTER 5

CHALLENGES OF NEW TECHNOLOGY IMPLEMENTATION IN THE PUBLIC SECTOR

5.1 INTRODUCTION

Chapter 4 presented the general overview of CAS implementation and admissions works organization in HEIs. This chapter presents, analyses, interprets, and discusses the findings that answer the first research question: ‘What are the sociotechnical challenges of implementing the CAS in Tanzania’s higher education system?’ Data collected from documentary analysis and interviews with the CAS applicants, admission officers, CAS developers and other CAS key stakeholders were used to answer this research question. As clearly described in section 2.9, data from interviews was transcribed using ‘InScribe’ software, and then the computer-based software - NVivo 10 QSR - was used to facilitate data organization, presentation and interpretation.

The general synopsis of the development and use of ICTs in Tanzania and the sociotechnical framework (see section 1.2) that underpins its operationalization and implementation (as presented in Chapter 3) provides the backdrop to the operation of the CAS. The generic overview of ICTs in the country also offers the context for the study site, which is in HEIs. The ideal was to ensure the quality of the admissions in HEIs and this was the driving force for the installation of the CAS.

Discussion on the challenges, costs, disadvantages and benefits of implementing the CAS in Tanzania’s higher education governance system is done to provide necessary substantiation of the general sociotechnical relationships between the elements (human and non-human) and the way such elements influence each other. Again, it is hoped that the sociotechnical framework will provide the basis for further theory-description when employed to explain e-Governance implementation practice in higher education quality assurance.

5.2 OPERATIONALIZATION OF THE CAS: STAKEHOLDERS' INVOLVEMENT

This section aims to identify the extent to which CAS stakeholders are/were involved in the planning and implementation of the system and whether the support provided to the CAS users (CAS applicants) responds to their needs and expectations. As shown in section 1.2 of this thesis, the performance of any sociotechnical e-Governance system depends on the 'mutual dependence' of both the technical and non-technical aspects. Assessing the involvement of stakeholders in the implementation of CAS, of course, involves two main user groups: applicants and admissions officers (in both HEIs and regulatory agencies - TCU and NACTE). The mutual fit of the technical and non-technical aspects is essential for the successful implementation of the CAS, and the idea has been emphasized by the 'sociotechnical model' proposed by Sorrentino and Virili (2003) (see Table 1.1).

As seen in section 1.2, users' involvement in the sociotechnical system in general and in e-Governance implementation in particular has been emphasized by various scholars. In this case study concerning the implementation of the CAS, it was revealed that all key stakeholders were involved. These include: HEIs, MoEVT, TCU, NACTE, NECTA and HESLB, with the exception of the CAS applicants. Inevitably, the TCU and NACTE (as CAS implementers) become the key stakeholders within the CAS sociotechnical network. However, the literature has affirmed that user involvement is contextual, and in some cases, the system designers and developers may also carry the user role depending on the context and type of the system being developed. Such exclusion of the end-users has been found also in the context of this case study. The analysis shows that exemption of applicants in all phases of the CAS planning was purposely done due to the fact that, the CAS is a regulatory tool that aim to control quality in admissions (e.g. online validation of applicants' examination results through their secondary school certificates). One may conclude that such exclusion might be one of the characteristics of the e-Governance sociotechnical systems that aim at controlling quality in various settings. In fact, when the control system is set there is a likeliness of implementers to exclude end-users due to their minimal role in determining 'how' they have to be controlled in a particular service. This may seem to be the inherent characteristic of similar control e-Governance systems.

Nevertheless, those who are responsible for making sure that quality is assured must all be involved from the initial preparations due to their crucial role in delivering a particular service and their determinant factors towards achievement of such a goal. Similar observation has been witnessed with the implementation of the CAS in Tanzania. Applicants were not involved in the design and development of the CAS rather than using them during the testing of the system. However, all key stakeholders, particularly the CAS participating HEIs, were involved from the initial stage of planning, development and operationalization of the system. As affirmed by Prosper (System Administrator, TCU, 05 July 2013):

This system is not ours; it belongs to the HEIs (CAS participating institutions). I am saying this because we are just assisting HEIs to coordinate admission, but at the end of the day, it is HEIs which will decide through their senates as to who should be admitted and who should not. What we do through the system is just part of the admission process, and this gets completed in HEIs where selected applicants are registered and they now become the students. Therefore, we have to involve all HEIs in every aspect of CAS operationalization, without them the system cannot run.

According to Prosper, stakeholders' involvement is pivotal and, their involvement in the operationalization of the CAS remains to be essential. The CAS is developed to the extent that for it to be able to provide the end results (selection of applicants) it depends on among others the programme requirements (the requirements which were previously used during manual selection) to be integrated into the system in line with the applicants' examination results (grades). Since admission requirements vary by programme and by institution, HEIs are responsible for setting and modifying (where needed) them. As seen above, Prosper was trying to explain the ownership of the CAS in the sense that its operationalization depends totally on the positive response of the HEIs to timely prepare and submit the programme requirements to TCU and NACTE.

The CAS as an e-Governance system adapts to the sociotechnical 'joint optimization' principle for it to be able to register, process and select applicants for admission into HEIs. It is a matter of fact that the coordination and control of the admission processes in Tanzania (for both public and private institutions) through the CAS entails complex network of both human and non-human components. Thus, just like other human-made systems, the CAS cannot work on its own; for example, so as the CAS to be online, HEIs must submit the programme requirements

for all offered courses so that they can be configured into the system and be made available in the Admission Guidebook (see appendix 2) for applicants' use during the application process. This suggests that any programme that is not submitted by HEIs (even if it was offered in the previous years) will not be configured into the CAS; hence, such a programme cannot receive applicants in a particular year. It is from this perspective that Prosper admitted that the system really belongs to the HEIs even if the CAS operations are supervised by the TCU and NACTE, the involvement of HEIs in the system operationalization of the CAS remains to be mandatory.

As seen above, the implementation of the CAS involves various key stakeholders, however, their involvement is not the same. For example, the MoEVT is involved due to its overall responsibility for overseeing education in the country. It is the MoEVT which received fund from the World Bank on behalf of the government for funding various projects in HEIs, the CAS inclusive. Thus, it remained essential for MoEVT to automatically participate in the implementation process of the project. On the hand, the HESLB is involved due to its role of issuing loans to the qualified and selected applicants. The mandate given to the HESLB in the country is to participate in funding higher education by issuing loans to the qualified and selected applicants into HEIs. However, a large part of such responsibility is dependent on the admission data (the number of admitted applicants in specific academic year determine the number of students who might benefit from the loans). Because of such dependence, the OLAS will only run when the names of selected applicants are submitted to HESLB. In other words, even if there are other criteria for loan consideration, the principal criterion is for one to be admitted into one of the HEIs; the role which is accomplished through the CAS, and hence with such dependence and interaction, the HESLB remains one of the key stakeholders of the CAS sociotechnical system.

As clearly explained in Table 2.5, the implementation of the CAS is also dependent upon the applicants' examination results which are only available at the NECTA databases. The registration into the systems by applicants and authentication of their grades (only for applicants who completed their secondary education in Tanzanian) as well as the selection process depend on the examination results from the NECTA. Therefore, it was found that the easiest way for capturing such data is to link the CAS to the NECTA database. Hence, for this to happen, it was necessary for the NECTA to be a key stakeholder for the operationalization and implementation of the CAS. From the testing to the implementation of the CAS, the NECTA remains a key stakeholder to date. It is through the sociotechnical interaction that

makes it possible for the CAS to access the NECTA examination databases whenever they are updated.

Similarly, the HEIs are the critical key stakeholders in the CAS implementation due to their ownership of the system (all selected applicants are the HEIs' customers) and their main role of preparing the programme's entry requirements for the admissions guidebook and for uploading them into the CAS. During an interview, Prosper (system administrator, TCU, 5 July 2013) insisted that 'admission officers and people in charge of academic affairs in institutions (e.g. DVC-Academic, Deputy Principals/Provosts Academic) are the important persons in the operationalization of the CAS. They foresee all matters related to programmes requirements and capacity for each programme in the course of CAS implementation.

The prospective applicants (the CAS main users) are grouped into categories (TCU, 2010): direct Form 6 applicants (local and holders of foreign certificates), diploma holders and other qualifications. These categories are further clarified below:

- a) Form 6 applicants who completed form 4 from the year 1988 onwards;
- b) Form 6 applicants with foreign certificates who completed their advanced level certificates from 1988 to date;
- c) Applicants with a diploma in teacher education who completed their studies between 1988 and 2013;
- d) Applicants with Full Technician Certificates (FTC) who completed them between 1988 and 2013;
- e) Applicants who completed their ordinary diploma in technical education (NTA Level 6) from 1988 to date;
- f) All applicants with other diplomas (non-NTA level 6) from Tanzanian institutions recognized by TCU/NACTE;
- g) All applicants with diplomas from schools outside Tanzania which have been recognized by TCU/NACTE;
- h) Applicants with recognition of prior learning (RPL) qualifications who completed their RPL examination in the admission year (TCU, 2013, p. 3).

During the application period, these applicants are supported by admissions officers in case they find it difficult to use the system. The technical support is principally provided by the

admissions officers from the TCU and NACTE. Additionally, the admissions officers in HEIs are, among other things, also responsible for assisting applicants before and during application sessions. This is due to the fact that every institution has its own academic programmes for which applicants may apply through the CAS. But before doing so, applicants may need more information beyond that which is available in the admissions guidebook. The only person who is liable to give proper information is the admissions officer from individual institution. Partly, this is a kind of marketing of their programmes when they assist applicants during application.

The involvement of admission officers from HEIs, in fact, remains pivotal as they are in a good position to provide clarification on the programmes that tend to have complicated ‘admission requirements’ which in one way may end up having few students or none at all. As noted earlier the TCU and NACTE are just coordinators and supervisors of the CAS but the HEIs are the real owners of the system. All information needed for the CAS to run comes from HEIs and the admissions officers are the key responsible persons on all admission the matters. With assistance of their management, they have the role of preparing all needed information for the admission guidebook whose information is also configured in the CAS for applicants to be able to accomplish the application process. Prosper (system administrator, TCU, 5 July 2013) explained and insisted on the significant role of admissions officers in admission work processes. Prosper said:

For the CAS to run, we expect the timely submission of the programme requirements from HEIs. Of course, admissions officers are the ones who are key actors on this, thus you cannot neglect them. Their involvement is inevitable otherwise you are going to have the system which cannot run due to the lack of basic requirements from institutions ... You know every year there are new programmes and sometimes the old ones become obsolete, so no way you can assume that all programs will be taught in a specific year, thus you need to involve these key people to understand which programs will be taught so that they can also be configured in the system (system administrator, TCU, 5 July 2013).

The above assertion by Prosper suggests that not all approved programmes can be offered by HEIs in a specific year. As reported by Prosper, this can be attributed to the absence of lecturers in a particular year to lecture the programme. It was informed that sometimes lecturers travel outside the country for sabbatical leave or others may leave the institution. In accordance to

that you may find some programmes being not offered in some institutions, but that does not mean it is the end of those programmes. It was also reported that sometimes it is expensive to hire lecturers from other institutions, thus HEIs decide to pull out such programmes from the CAS until they get lecturers. It is on this ground that HEIs' involvement, the admission officers in particular, becomes significant.

Prosper (system administrator, TCU, 5 July 2013) continued explaining that the support offered by admissions officers in HEIs can be termed as 'occasional support' due to the fact that the system is installed at the TCU offices where many applicants visit or send their queries when they face difficulties in using the system. Thus, if one had to make a comparison, it would be seen that the admissions officers at TCU and NACTE become too busy in providing support to applicants than admissions officers in HEIs who rarely receive students who seek support in the application process. It was further reported that the interaction of admissions officers in HEIs with the CAS becomes frequent after completing the selection process. It is during this time when admissions officers in HEIs access the lists of selected applicants through the control panel for further managerial decisions.

The concern may arise as to why CAS applicants were not involved in the planning of the CAS from the initial stage as advocated by sociotechnical scholars. As seen in section 1.2 not all the time are the users of the e-Governance systems involved from the beginning. This suggests that the context and the purpose of the system (like the case of CAS) may dictate the point at which users may participate in the operationalization of the system. For example, the CAS could not involve applicants from the beginning because the system has just adopted what was manually done in HEIs during manual admissions. Rather, applicants were only involved during the 'testing' of the system so as to establish the viability and effectiveness of the CAS in the process of registration. During the interview, Prosper clarified as to why, at the planning stage, the applicants were not involved:

In the past (during the previous manual admissions), applicants applied direct through HEIs using application forms (Today: they register apply online through the CAS). Applicants' manual applications were screened to identify the qualified ones (Today: the CAS validates applicant's exams results through the NECTA database). Lastly, all qualified applicants were previously ranked and selected based on their performance and programs preferences (Today: the CAS automatically ranks and select applicants

based on their performance and programme choices. As you can see, even during the manual admission system applicants were not involved. Similarly, the CAS has just automated 'manual admissions' as it was traditionally done in HEIs.

The clarification given by Prosper suggests that the involvement of prospective CAS applicants, particularly in the planning phase (when user requirements are basically discussed), was less important. However, applicants' involvement during the system development was done during the testing session to see if it does what is intended to do. Different from other e-Governance systems, the exclusion of applicants in some processes of the CAS adopts what HEIs were doing during manual admissions. Thus, as seen in the literature, the applicants' role/involvement is carried by the CAS developers who try to predict what applicants may face in accessing the system. This study argues that such assumption cannot take a holistic view of sociotechnical challenges that end-users of the CAS particularly applicants might face. Next section provides the detailed challenges facing the CAS implementation in the country.

5.3 CHALLENGES OF THE IMPLEMENTATION OF THE CAS

The e-Governance implementation worldwide has never been without challenges which are varied to a large extent. This variation is attributed to the diverse nature of the e-Governance projects and the contexts in which they are implemented. Accordingly, the operationalization and implementation of the CAS project in Tanzania falls into the same situation. The establishment of the CAS in the country was driven by the need to respond to on-going concerns regarding the quality in HEIs globally and, specifically, the low enrolment rate in Tanzania's HEIs. In theory, this system seems to be a panacea of sorts to admission-related matters, but actually on the ground it is a different story. The explicit purposes of the CAS project are, among others, to increase access to HEIs. The extent to which this purpose is being achieved and the challenges it encounters have been examined by analysing a sample of the comments made by the system's users (applicants) and information from people who are very familiar with the system, such as developers and admissions officers. This section presents various sociotechnical challenges that face the implementation of the CAS. Discussion is based on the three major types of challenges - infrastructural challenges, human challenges and political challenges - and sociotechnical system development methods.

The challenges associated with the infrastructure (internet penetration and costs, unreliable electricity, accessibility issues, ICT physical facilities) have been widely discussed by scholars of e-Governance (e.g. Heeks, 2003; Ndou, 2004; Reddick, 2010). The implementation of the CAS as well would not be possible without the internet. Internet infrastructure is a primary condition that enables the applicants of the CAS to access and use the system. It was revealed during this study that internet infrastructure in Tanzania is highly concentrated in the urban areas where many internet service providers have concentrated their infrastructures, making the users in the up-country disadvantaged in terms of accessibility.

Those applicants without convenient access to the internet infrastructure, which forms the base of the CAS implementation, and with little or no relevant ICT skills (or literacy), found it difficult or impossible to complete their applications through the CAS. As a result, they sought assistance from the internet café attendants in towns and or they sought assistance from their colleagues. In line with this, one may interpret that many such applicants were deeply isolated from the application process through the CAS and thus became more side-lined from digital life because of being deprived of such access. Consequently, this would result from nothing more than an increased gap between them and those with ICT skills (who keep on improving their ICT skills by frequent interaction with the system). In that way, the CAS as an e-Governance system in higher education then intensifies the unequal effects on applicants' access to online admission services. Imani explained the general picture of the internet infrastructure in relation to the CAS operationalization in the country:

The issue of internet facilities is very serious in the country and has posed critical concerns by the general public particularly politicians. We thought that applicants could use their mobile phones to complete their applications at home, but that was not the case. Only few applicants were able to make use of mobile phone when we tried to use it in 2010/2011 admission; but even these few who attempted to use mobile phones faced very critical challenges including sharing of the number during application which posed difficulties in capturing their examination results from NECTA database. That is why since 2011/2012 admission cycle, we decided to continue with internet only. But most of the internet providers have concentrated their services in towns, which makes applicants from remote areas face difficulties to access unless they travel (Admissions Officer, TCU, 16 August 2013).

Most of the e-Governance projects depend on the reliability and affordability of the internet. One may argue that ‘without the internet, there is no e-Governance’. During an interview, Alphonse complained that most of the IT-related facilities are concentrated in urban areas where internet services are commonly found:

I have neither smart phone nor computer connected to the internet, that I could complete the application at home. Therefore, I had no option than travelling all that long way to access the service from internet café in town (CAS applicant, 9 July 2013).

The spread of mobile phones in Tanzania has grown fast in the past few years. Thus it was assumed by the CAS implementers (TCU and NACTE) that applicants could make use of them while they were sitting at home. However, as briefed earlier that due to the challenges faced by the mobile phone users during the application process for the 2010/2011 academic year, it was decided to remain with the internet only. This decision suggests that the prior assessment of the CAS implementation on whether to use mobile phones or not in making application was inadequate; and there was no thorough study that could predict its viability. In fact, the adoption of any ICT-based technology should also consider sociotechnical aspects in the implementation chain. Planning on one side may go well, but the implementation on the other side may encounter many challenges as it involves several human and non-human elements (see section 1.2.2). Thus, having the internet as the only option for application through the CAS puts the onus on some applicants who have to travel from up-country to towns for accessing the internet services.

Basically, the CAS is expected by applicants to be available twenty-four hours. Of course, this is dependent on many factors including the availability of the internet and electricity. In Tanzania, like many other African countries, the available electricity is not reliable to the extent that many institutions (TCU inclusive) that have installed e-Governance systems are obliged to have extra power sources (e.g. automatic generators and back-up systems) so as to keep the systems running. It was noted in this study that the CAS system used to be online almost all the time. However, remote access of the CAS as experienced by applicants was reported to have various challenges including the slowness of the internet and unreliability of the electricity. Basil described what he experienced during application:

I went to the internet café three times without success. I hardly managed to make registration, but application was not possible because of two things: the internet was very slow and electricity most of the time went off ... the only option was to hand over my programme choices to the internet café attendant who assured me that he could do it when electricity is back (CAS applicant, 16 June 2013).

Similar experience was also reported by Bakari:

I have been selected in the programme that I did not choose ... No, I tried to do it myself but there was a power cut-off so I left my choices to the internet café attendant and I could not verify my programmes in the system. I believe, that man mixed up my programmes with those of other applicants (CAS applicant, 16 August 2013).

The internet slowness, connectivity and unreliable electricity are serious issues in running the e-Governance systems; and it becomes more challenging, particularly when one is alerted to the additional costs incurred by users. It was reported in this study that unreliable electricity and slowness of internet (of which users have to pay hourly) result in an increased cost among applicants in accessing the CAS services. For example, the available internet cafés where applicants used to make their applications through the CAS were reported to have unreliable internet connectivity and an erratic electricity supply. As stated by Bakari:

I went to the internet café and paid TZS 1,500 for using internet per hour; but all of a sudden, the electricity went off and I could not complete the exercise. I had to find another internet café to complete the process and I had to incur another cost. Apart from that I also incurred the costs for accommodation because I could not return back to my village due to transport problem and it was late hours (Applicant, 16 June 2013).

According to Bakari, the costs of the internet seemed to be high because the internet café attendants' charge is based on the type of power used. For example, Bakari averred that when the national electrical power was available one had to pay TZS 1 500 per hour, but if a generator was used then the costs went up to TZS 2 000 or 2 500 and yet one could not complete the process in one hour due to the slowness of the internet (Applicant, 16 June 2013).

Apart from the internet costs incurred by applicants during application through the CAS, the cost concern also was raised about the application fee which rose from TZS 30 000 in the 2010/2011 admission cycle to TZS 50 000 in the 2012/2013 admission cycle. Some applicants, particularly those from poor families, could not afford paying such large amounts on themselves. They had to seek assistance from elsewhere. Prosper offered one scenario that supports such claim:

Not all applicants are able to pay TZS 50 000. Just imagine, a normal fee for public secondary schools in the country is TZS 20 000 [and still some parents have difficult paying it]; how then can applicants afford paying TZS 50 000 [as application fee], for accessing the internet and travelling costs [because those from rural areas must travel into towns to access the internet]. Also, sometimes they have to incur the costs of accommodation in case they cannot return home after completing application (system administrator, TCU, 5 July 2013).

Prosper (system administrator, TCU, 5 July 2013) continued saying:

I can tell, I had to give my TZS 50 000 to one of the applicants who in one way or another was closely to deadline (closure of the system) and had no option ... No, I don't know the applicant but he just requested my assistance so that he could apply for admission like others.

The Prosper's statement indicates that the issue of cost particularly for pre-paid e-Governance services may deny the 'have-not' users or users from poor families to access the automated services. This is evident with the findings reported in this thesis whereby the payment of user-fees demonstrates the possibility of excluding some needy users to access the CAS services; and sometimes such users may incur additional or more costs in the course of accessing the internet-based services. In fact, applicants from rural and disadvantaged areas are subjected into these challenges because apart from the mentioned costs, it is the fact that most of them come from poor families whose daily income is less than US\$1. Such scenario signifies how the CAS developers and implementers tend to ignore and perhaps overlook some applicants' social realities by paying attention to the technical performance of the system. It is also an indication that having one option (internet only) adds the mentioned challenges to applicants from areas without internet penetration; consequently, they are poor yet they carry the burden

of additional costs of accessing the internet. Conversely, applicants residing in town areas are able to pay and are closer to the internet services. Indeed, the CAS challenges particularly the issues of internet costs and electricity reliability are of great concern, and can act as a catalyst for finding another convenient way of improving access to the disadvantages applicants. Such challenges have been also shown by Gupta (2011), who contends that poor infrastructure has been a serious challenge to the rapid adoption and implementation of various e-Governance plans all over the world (p. 6). Thus, strong human and technical infrastructure cannot be ignored in the planning and implementation of e-Governance systems.

Implementation of the CAS is also reported to have been challenged by the human related factors which include: digital divide among applicants, resistance to the CAS, lack of ICT skills and awareness/information, service transaction costs, and the provision of support. In an African context, debate over the human challenges in the implementation of new technology largely centres on these dimensions.

In the context of the CAS operationalisation, the digital divide has received great attention by the public. Satyanarayana (2004, p. 182) argues that, in developing countries, the digital divide enables the rich to become richer and the knowledgeable to become more knowledgeable about how to access the e-Governance services. The implementation of the CAS in Tanzania has depicted the great digital divide between urban and rural areas and within urban areas. Essentially, the established digital divide is a manifestation of both economic and social differences, which also has been well documented by Satyanarayana (2004, p. 182). The study cited that difficulties facing CAS applicants from up-country areas reflect the existing social stratification, which leads to more exclusion of applicants who have neither ICT facilities nor ICT skills to enable them use the CAS efficiently. Despite the general purpose of the CAS implementers to assist applicants to access the CAS services in their places of domicile, the exclusion of some applicants who are computer inexperienced from using the system on their own could have led to a further isolation and marginalisation of these people.

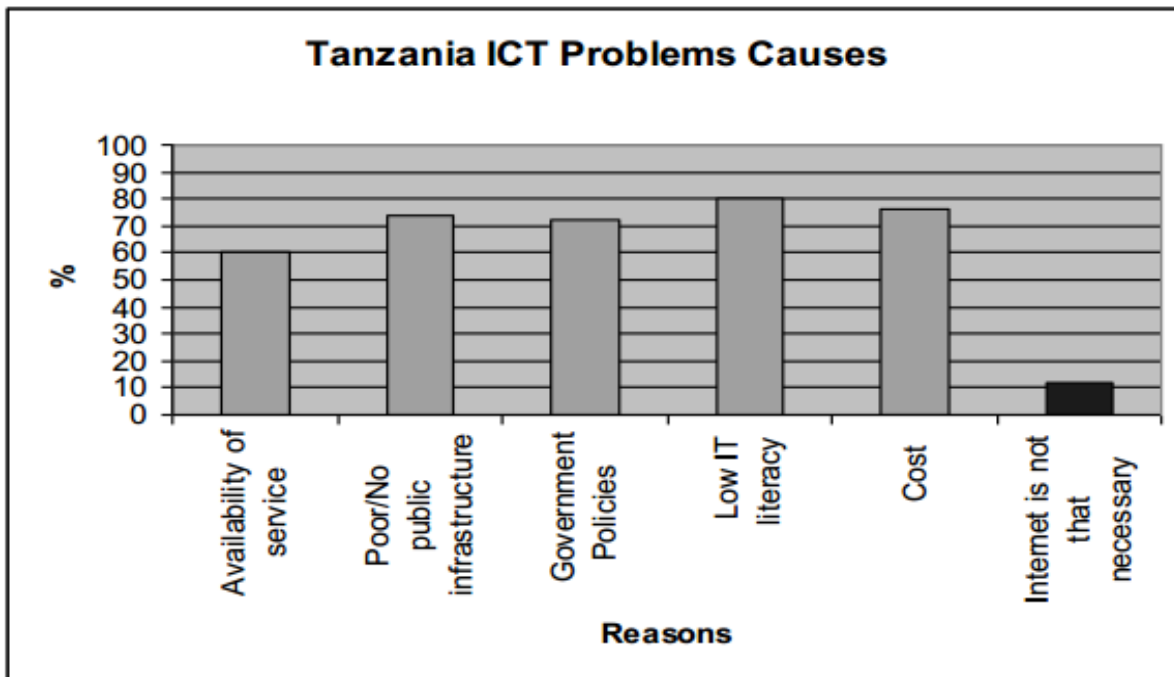
Indeed, the CAS applicants' experiences of using the system from 2010 to 2013 clearly show the existence of digital inequality. When one compares applicants from urban and rural areas, there is an indication that the urban applicants are abler to access the CAS services than those from up-country, and there is assurance of an immediate assistance to applicants particularly those who live in Dar-es-Salaam city where the system and TCU offices are located.

Centralisation of the admission services through the CAS is viewed as the way of creating fairness to users, though it disadvantages applicants from rural areas. Applicants from upcountry face numerous problems during application, and sometimes they are compelled to travel to TCU offices in Dar-es-Salaam city in case they fail to get immediate support for their difficulties. By travelling it is an indication that more cost is incurred rather than cost reduction as anticipated by developers of the CAS and other similar e-Governance services.

As mentioned above, the digital divide is more than issues related to access. Lack of IT literacy and technical skills are among other issues that are normally discussed within the subject of the digital divide. This study has registered that most of the CAS applicants faced the problems related to ICT skills in accessing the system. In interviewing the admissions officers and system developers, it was discovered that, because of unequal access, the challenges related to IT literacy and technical skills were very common among the applicants, particularly those from rural areas. Such challenges were reported either by visiting the TCU offices or through phones and/or emails (Imani, admissions officer, TCU, 16 August 2013). In fact, applicants acknowledged that a lack of ICT skills prevented them from completing the application process on their own, and that they even failed to verify their programme choices on the system.

The nature of the existing digital divide can be explained by the history of the development of ICT in the country (see Chapter 3). Yet, one should realise the available magnitude of the divide between the urban and the rural populations. For example, most of the internet café services are concentrated in town areas. Additionally, most of the rural people own phones that have no capability of accessing the internet (Prosper, system administrator, TCU, 5 July 2013). The available data indicates that, despite the on-going proliferation of ICTs in the country, its utilization is still low due to several factors. In their study on WiMax, Sedoyeka and Hunaiti (2008, p. 61) documented various challenges in an attempt to explain why there is still such a small number of internet users in Tanzania. Their summary of these challenges is seen in Figure 5.1 below, whereby the internet penetration in the country is still a problem despite the ongoing efforts of introducing various e-Governance systems in the public sector.

Figure 5.1 Major causes of low Internet use in Tanzania



(Source: Sedoyeka and Hunaiti, 2008, p. 61).

Various sociotechnical scholars (e.g. Ndou, 2004; Heeks, 2002) argue that the digital divide cannot be understood if it is purely regarded as a ‘technological phenomenon’ and will definitely never be reduced if the solutions put forward are only ‘tech-fixes’, promoting an ‘illogical exuberance’ particularly in developing countries to embrace ICTs. The United Nations e-Governance Report of 2005 notes, however, that if users of e-Governance services lack the literacy and technical skills it would limit them in their demands for online services (UN, 2005). Part of this report says:

The distance between the government and those with no-access, no-skills and no-prospects (e-have-nots) has increased. Those with no income, access, skills and resources or those who are disadvantaged fall outside the ambit of the benefits of the information society (UN, 2005, p. 3).

Thus in explaining the implementation challenges of the CAS in Tanzania one cannot ignore the influential role of the on-going digital divide among applicants whose ICT background is varied to a large extent. It is through this recognition that an intervention can be undertaken to either minimise or close such a gap through various initiatives including offering special ICT programmes specifically for prospective applicants of higher education. The initiatives could

be done in advanced secondary schools where such applicants are easily accessible. A lack of information accompanied by a low level of ICT skills/literacy, awareness and competence among applicants were identified as big challenges facing them to confidently use the CAS services. These challenges are closely linked to the digital divide. During the study it was registered that lack of adequate information made some applicants report late to HEIs because they were not aware of their selection. Even if TCU and NACTE used to post the admission results through their websites (www.tcu.go.tz and www.nacte.go.tz respectively), it was cited that some applicants could not access the TCU or NACTE websites because they were not informed if their admission results would be posted on the websites. Additionally, it was revealed that some applicants had never used the internet in their life. This made them face difficulties in accessing the updates through the TCU and NACTE websites where admission related issues are posted. Imani (Admissions officer, TCU) acknowledged:

We have been facing challenges of delivering proper information to applicants. At some point they were informed that they would access their results through their mobile phones, but that has never been possible since the time when CAS started in 2010. In that way applicants got confused on how they would access their admission results. On top of that, information offered through the TCU and NACTE websites does not reach the intended people on time, so some of the applicants often get late information ... Of course we are improving the system and we hope things will change in the future (16 August 2013).

Researcher further revealed that lack of adequate information on how to register and make application through the CAS made some applicants not to be able to complete all processes (registration and application) on their own, even if some applicants had prior knowledge on how to use the internet. The CAS stakeholders addressed this issue as among the challenges facing applicants during their interaction with the system. Of course, there were some awareness campaigns done via radio, television, newspapers (Imani, Admission Officer, TCU, 16 August 2013) and the like. However, because of the digital divide, such campaigns could not reach some potential prospective applicants of higher education. This indicates that the on-going awareness campaigns about the CAS are benefiting few individuals, and perhaps only those living in towns who have greater access to newspapers, Televisions, variety of radios, etc. While applicants residing in towns benefitted from such awareness campaigns, those living in disadvantaged areas (areas with unreliable electricity, no internet cafés, no connectivity with

telecommunication services, etc.) did not benefit at all. An awareness of new technology is an essential part of any e-Governance implementation. Azeez et al. (2012, p. 402) agree and suggest that the implementation of e-Governance projects must be accompanied by IT awareness and literacy programmes in the public service (national and local) as well as at schools (primary, secondary and tertiary). Whilst Azeez et al. (2012) insist on the need for conducting awareness campaigns among the applicants, one respondent commented on the strategy used by the CAS implementers to provide awareness to the public:

In my view, the timing of on-going awareness on this new admission system is not properly targeting to the main users – applicants (students). Providing awareness through televisions early in the morning does not help prospective applicants who at that time are either on the way to schools or if they are in schools they might not have access to television. On top of that, not all schools have access to these TV's channels. I would propose a physical visit to all advanced high schools where such applicants are available and conduct special sessions with them. If that is expensive, then CAS implementers may train local people, and that should be one of the area of concern (Gaudence, admissions officer, UoI, 16 August 2013).

Gaudence's remarks tally with the views of Al-Jaghoub et al. (2010, p. 6), who contend that awareness campaigns should target the main users and that they can be done through workshops, visiting different institutions such as schools and launching media campaigns. Interviewees argued that paying visits to advanced secondary schools where prospective applicants for higher education are available seems to be of greater importance than awareness campaigns done through television and radio to which prospective applicants have limited access.

It was further argued that some of the challenges facing applicants could be eliminated if they had received explanations and clarification before applying through the CAS (Josiah, admissions officer, MNMA, 7 January, 2014). The challenges surrounding the registration (which appears to happen annually) could be clarified during such visits to schools. Indeed, during the documentary analysis of different CAS reports, this study discovered that there are several challenges related to applicants' registration. Researcher revealed that some applicants registered in the system with email addresses and cell phone numbers which did not belong to them, making it difficult to contact and reach them. In other cases, applicants registered with

the system using invalid email addresses since the CAS checks only the format validity and does not verify the e-mail address. Consequently, in such a scenario it was informed that it was difficult for TCU, NACTE and HEIs to reach some selected applicants through emails or mobile phones which were used during application. Sharifa explained:

Most of these applicants do not own mobile phones and some do not possess email accounts. Because of this, they are registered in the system using someone's phone numbers or provided unregistered emails. In fact, when we wanted to contact them, it was very difficult ... Sometimes applicants' mobile phones were lost and they could not recover or renew their phone number due to the fact that they were essential in case we had to contact them particularly those selected applicants who live in areas where there is no internet connectivity (Sharifa, admission officer, RUCO, 30 July 2013).

Additionally, this study realised that some applicants were not well informed on the application categories of which they were supposed to channel their applications through the system (see section 4.2). This was attributed by the lack of enough awareness and clear information concerning the categories CAS applicants had to register and apply for admissions. Consequently, some of such applicants could not continue with the application process until they got assistance from the IT experts or admissions officers from TCU or NACTE. In fact, some applicants who reported such cases to TCU and or NACTE were assisted accordingly. This was reported by Flora, who made a similar mistake:

I registered in the Form 6 category (holders of foreign certificates); and I could not continue with application because the system showed me that I don't have two principal passes. So, I was advised to come to TCU office for further assistance. It is from there when I knew that I registered in a wrong category (CAS applicant, 16 August 2013).

Flora's concern was also evident during the documentary analysis, where several applicants' query forms and emails requested assistance on the same issue. Likewise, those holding foreign certificates registered in wrong categories, thus preventing the system from recognizing their credentials. Operationally, the CAS entails different categories of applicants in which everyone is supposed to register and complete the application process. However, this study found that, apart from the lack of IT skills, some problems resulted from the applicants' failure to follow

instructions and found themselves registering and applying in wrong categories. This was reported by Basil, who visited the TCU office:

I made a mistake during registration process. I registered in the category of Form 6 (Holders of Foreign Certificates) ... I did not follow instructions properly. However, this was my first time to work with internet and my friend was helping me, but we ended up doing that mistake. Therefore, I have come to seek assistance (CAS applicant, 16 June 2013).

Apart from registering in the wrong category, some applicants made obvious mistakes during registration in the system. For example, instead of registering proper secondary education examination (index) numbers, some applicants used unavailable attributes in the national format such as using the letter 'O' (e.g. S0234/0056/2011) instead of zero (e.g. S0234/0056/2011). In fact, many applicants flooded to TCU offices reporting the same problem.

The underlying reasons for the above challenges include the lack of awareness on the part of the applicants, poor ICT background skills and many other factors. It also appears that the applicants were not attentive enough when following application instructions. Kingo puts it very clearly:

Our youngsters have problems. You may find one asking you information on admission-related matters, while everything is in the Admission Guidebook. Sometimes, such questions come out while one is holding the booklet which entails all details about admission through the CAS. Indeed, we need to educate this young generation on the importance of 'reading culture' (Kingo, Senior Official, SUA, 17 July 2013).

Furthermore, this study revealed that the applicants from urban areas had the chance of receiving emails through their own email addresses and had the chance to use the mobile phone numbers of their parents/guardians. These are mandatory requirements for one to be registered through the CAS. Nevertheless, most applicants from up-country had never owned emails and some of them even had to use the phone numbers of their colleagues' parents. As noted earlier, these applicants registered email addresses that did not exist so the system could not verify

whether they are valid emails. The CAS checks only the proper format of the email. The observation by Prosper (system administrator, TCU, 5 July 2013) offers an indication that not all applicants own mobile phones, nor do they have email addresses or even their own postal addresses that are necessary during registration and application through the CAS. Thus, some mandatory fields in the system seem to favour the applicants who are digitally advantaged. The consequence of this was reported by Prosper:

We realised that some of the registered emails were not in use (were fake emails), and even some phone numbers did not belong to applicants themselves so it was difficult to reach them when we had to contact them and share crucial information ... Of course, we used to post the information on the website but some applicants have no habit of visiting the website ... Yes, perhaps due to lack of access (system administrator, TCU, 5 July 2013).

Prosper's claim that some applicants have no habit of visiting the TCU website (where most of the CAS announcements are posted) might not be the only reason. As portrayed in the literature, the issue of access is very serious to people from poor families (Kumar et al., 2008, 2004, p. 85). They insist that, since technology in e-Governance is applied in social settings, the implementers must thoroughly know the background of users/customers and their social standing. In the context of the CAS, applicants could not access the website perhaps not just because they had no money to pay for the service but also because of their place of residence. This is true when such applicants, particularly those living in rural areas, need to travel a long distance to access internet services. Additionally, it can be noted that most of the CAS applicants are ex-secondary school students who depend financially on their parents and guardians. The latter have other family responsibilities; thus, paying some money for their children to access the internet (for the purpose of tracking the status of their application) might not be a priority in the African context, specifically among the Tanzanian rural population.

Taking into account the importance of 'frequently asked questions' for online services, this study revealed that a lack of such guiding questions made some applicants incur additional costs by calling the TCU offices to seek clarification or assistance on issues which they could have been clarified through the 'frequently asked questions'. The interviewed applicants mentioned additional costs for calling landline numbers using a mobile phone. For example, Habibu explained:

I used TZS 10 000 for calling the TCU (landline) but my problem could not be timely solved, so I had to travel to the offices. I believe if such information was included in the CAS portal it could not cost me that much (CAS applicant, 13 February, 2014).

In fact, the overall operationalisation of the CAS depends largely on the presence of the undergraduates' admission guidebook (see appendix 2). This book is in fact a textbook for both the applicants (CAS users) and the configuration of the CAS itself. Suzan (CAS applicant, 13 February, 2014) advised that the CAS implementers should accept the fact that the system receives new users (applicants) every year, and sometimes there are improvements of some CAS features. Therefore, there is a need to provide as much information as possible to clarify the changes made in the system, and the guidelines on how applicants can get into the system to complete their application process, make improvements based on prior problems and to include FAQs as well as videos that show how to register and apply through the CAS.

Applicants and other stakeholders complained about the confusing information on modes of payment for accessing the CAS services. The general remark registered by this study is that the payment modality was very cumbersome to some applicants. As explained earlier, so as to access the online admission services, one must pay and get the unlock codes. Such payment is currently done through two options: (a) buying 'scratch cards' from the bank (any bank that signs a contract with the TCU to sell the scratch cards to applicants within a specific admission year) and (b) using M-Pesa (a mobile phone transaction currently used by diploma applicants who pay direct to NACTE M-Pesa account). This study revealed that in using the two modes of payment applicants confronted two difficult scenarios: first, some applicants bought scratch cards while they were supposed to pay through M-Pesa. Such applicants had to re-sell the scratch cards to their colleagues to get back their money to enable them to pay through M-Pesa. Second, some applicants who paid through M-Pesa made their transactions to the wrong institution. For example, instead of paying their M-Pesa to NACTE, they made their payments to NECTA. As claimed by Basil:

I wrongly paid the application fee to NECTA (National Examination Council of Tanzania) instead of paying to NACTE (National Council for Technical Education). Is there any possibility of getting back the money? ... I have no other option. Please help (CAS applicant, 16 June 2013).

This is an indication that applicants were not attentive when they were making payments with mobile phones and therefore made mistakes. Also, the abbreviations used by the two institutions (i.e. NECTA and NACTE) in completing transactions through M-Pesa seem to be confusing due to their close similarity. It was also noted that some applicants who faced challenges during application requested assistance through an ‘admission email’ (admission@tcu.go.tz) but, unfortunately, some of emails were not attended and consequently some applications were not helped to on time.

Since there were no clear instructions and guidance on the modality of payment for accessing the CAS services, several applicants travelled to the TCU offices to seek assistance. As Mwenda noted:

It is true we have received several cases where applicants bought our scratch cards instead of paying through M-Pesa. Currently we have no guidance on this. What we do is advise them to re-sell the cards to their colleagues who are supposed to use the cards (Mwenda, admissions officer, St. John’s University of Tanzania [SJUT], 30 May 2013).

In fact, an applicant would only be allowed to register by entering the payment code if paid through M-Pesa and/or attach a pay slip if one paid through a bank deposit. The confusion on the mode of payment for accessing CAS services occurred to applicants holding diploma qualifications whose applications were processed through the CAS subsystem which operates under NACTE. While other e-Governance systems do not involve any type of payments, it was advised that the CAS service providers should collaborate with financial institutions to analyse any implication of making payments through the mobile phones for applicants (admissions officer, MU, 04 December 2013).

Indeed, the use of mobile phone application and transactions was assumed to be convenient and the best solution for those living in places where there are no banks; however, that was not the case. It was revealed during the study that not all Form 6 leavers owned mobile phones. The reason for this is very clear: in Tanzania, students at secondary education level are not allowed to own mobile phones. Moreover, the issue of skills on how to use mobile phones for application was also cited as another challenge among applicants. Some of these applicants

raised the issue of usability as compared to the computer screen, so they felt comfortable with the internet rather than a mobile phone. This was affirmed by Imani:

You know, most applicants have no smart phones, and those who own smart phones are not able to use for application because once you send your message the communication slows down and you have to start afresh. So it is not user-friendly compared to the computer connected to internet (Admissions officer, TCU, 16 August 2013).

Skills like basic computer operations (e.g. being able to surf the Web, open an e-mail, register through the CAS, use scratch cards during registration, and many others) are of great importance in using the CAS. The observed digital divide featured prominently in these issues. Therefore, the time has come for the CAS implementers to re-consider the use of alternative modalities of making payments during the application through the CAS, e.g. the use of mobile money payment (e.g. M-Pesa, Tigo Pesa, Airtel Money). Moreover, the need to re-introduce the Unstructured Supplementary Service Data (USSD) is pivotal for accommodating applicants whose access to the internet is limited, the option which seems to be common even in the banking sector. In 2010 applicants were able to apply for admission using Mobile Application (through normal SMS – Short Message Service). However, this was very challenging and chaotic; thus it was operational only in the first round of admissions of 2010/2011.

As argued by Sorrentino and Virili (2003) that in the context of ICTs and their application in e-Governance, knowledge and expertise are inherently implicit. A decision by the CAS implementers to include mobile phones in the application process as one way of increasing accessibility would be significant if applicants had prior knowledge about the use of mobile phones. But in Tanzania's context, as introduced earlier, the secondary school students are not allowed to own mobile phones while they are at school, hence they would be limited in learning how one may use a phone for making application through the CAS. Further inquiry revealed that those who opted for the use of the phone short message service in making application incurred more costs because every message was charged and the service itself was not reliable. It is because of this scenario many applicants opted to use the internet for application.

Inadequate support on the other hand was also mentioned as a big challenge particularly to applicants who lacked or had inadequate ICT skills. As earmarked by the sociotechnical

scholars (e.g. Sorrentino and Virili, 2003) that ‘contexts are complex’, any implementation of the ICT-based project should recognise the varied nature of the users. The CAS implementation falls under the same demands because applicants come from every corner of the country and their backgrounds in terms of ICT skills, economic status and access to the internet are relatively different. It was reported during this study that provision of support to the CAS applicants is pivotal due to the existing digital divide. Because the access to ICT-based systems is socially and technically restrictive, and seems to be so for an extended time, the most important immediate action is providing continuous support and awareness to users. This study cited that support provided to applicants during the annual application through CAS is unreliable and faces lack of enough workers. Through interviews, Keto unveiled that applicants currently depend on hotline numbers, emails, and a physical visit since there was no proper ‘help-desk system’ for attending the applicants’ inquiries:

Currently, we rely on the hotline numbers of which applicants channel their queries. Also, we have applicants’ query forms of which [sic] applicants who come to TCU offices fill them. Such forms are also used when applicants from far regions call through our hotline numbers and their problems are recorded. We also have emails which applicants use to request or report on various admission issues. However, the hotlines are sometimes very busy to the extent that some applicants are not attended on time, especially at the peak hours. I think there would be another mechanism of attending applicants’ queries (admissions officer, 30 July 2013).

The absence of a formal ‘help-desk system’ suggests that the support provided to applicants during the application period is not reliable. Joan (admissions officer, MU, 4 December 2013) acknowledged that the available support system is not convenient to applicants since there is no proper support system. Joan explained that various admission information resources (such as brochures and an admissions guidebook) are posted through the TCU and NACTE websites in order to improve the access for applicants who cannot access the printed copies. But Joan affirmed that not all applicants have access to those websites because some do not know the domains of the TCU and NACTE websites. To Joan, websites might not be convenient to those who have limited access to the internet, particularly in remote areas. This argument was based on the reality that the CAS is a national system and currently there are no branches or zones to support applicants; everything is located in Dar-es-Salaam city. Based on those uncertainties, Joan proposed the need to improve the ‘CAS information dissemination system’ by

collaborating with other government entities like the Post Offices (that are available in almost every district), heads of schools, District Education Officers, schools inspection offices, etc.

As argued by Mancuso and Stahl (1996 p. 7), customer support in automated environments is critical because dealing with customers, who have various problems, might be very stressful. They caution that a lack of customer service support can lead to other major challenges for customers, for example the frustration and despair of using online services, excessive costs to users, etc.

Aside from understanding the way CAS users are supported during application through the system, further analysis was done to understand the richness of the available information to the CAS users, particularly the applicants. This was important due to the fact that the implementation of new technological systems is accompanied by various instructional materials such as the users' manual which acts as a guide to the use of the system. Through documentary analysis and interviews this study registered that the available information to applicants is satisfactory because various guiding and instructional materials are in place, such as an admissions guidebook and brochures. However, in order to properly assist applicants during application period, researcher explored the possibility of including pictures that show how to make application through the CAS. This idea was also suggested by Josiah (admissions officer, MNMA, 07 January, 2014) who explained that when this is implemented, applicants might easily access the system. According to Josiah such possibility would also involve the need of having screen shots for all steps that the applicants need to follow.

It was revealed that, in the course of application, the applicants encountered several problems, including how to get into the system and start the application process. Some who were close to the CAS participating institutions sought assistance from the admissions office. As Joan noted:

I received some applicants who failed to understand how to register and apply through the system. I think it is the time to include the pictorial images such as screen shots showing all steps applicants have to follow. This would also involve a well-prepared video that show all important steps on how to complete application exercise through the system. Thus, CAS implementers should not assume that everyone knows this system, users must be supported in various ways (admissions officer, MU, 04 December 2013).

The fast growth of ICTs and its use in various institutions suggest the needs to offer support to new users of such applications as technological innovations are becoming new now and again. As argued by Joan, the instructional materials (particularly ‘images’ or ‘audio-visual’ materials that show all steps applicants need to follow during application) would be an ideal for that purpose. This may assist end-users of the system to guide on how to use the system. It is important to note that most applicants lack ICT skills; therefore, such materials would be of great help. In fact, instructional materials are essential in learning new skills, particularly the ICT-based skills. In Tanzania’s context, the spread of ICT facilities, specifically computers and internet, is still challenging (see Chapter 3), and the situation is worse in rural areas. In fact, Joan’s view aligns with what has been emphasized by the sociotechnical theorists who advocate the ‘mutuality’ of both human and non-human components in the course of implementing new technology.

Another issue that faces CAS implementation is the resistance to changes. As seen in section 1.4, resistance to e-Governance systems in the public sector tend to occur in different scenarios and varies in terms of its types. Basically, the sociotechnical theorists frame resistance to new technological innovations based on the ‘poor fit’ between the social and the technical. In the context of workplaces resistance occurs because of the poor fit between work practices and the realities of technological innovation use. In this study, researcher found that resistance to the CAS has been attributed by issues related to loss of authority and power relations; geographical and religious reasons as well as political factors.

Prosper (system administrator, TCU, 5 July 2013) explained that some universities were founded by religious institutions and/or they target a certain group of people and they are worried that if they join the CAS the intended group of applicants might not be reached. During the interview, Prosper (system administrator, TCU, 5 July 2013) further avowed that some institutions simply have the idea that ‘the CAS will bring us students who are not our target’. For example, when the project started, one institution – the State University of Zanzibar (from Tanzania Islands) – joined the CAS but later withdrew from the system. Brown noted why some institutions are hesitant to join the system:

Some institutions especially those owned by religious societies intend to promote its people who historically are/were disadvantaged in terms of education. In that way, they are reluctant to join the system. To them, it might be difficult to join the CAS as

currently the system might fail to filter such targeted individuals (government officer, MoEVT, 16 August 2013).

Prosper (system administrator, TCU, 5 July 2013) further stated that HEIs are fairly hesitant to join the CAS because they are not willing to lose income collected through the application process. Aligning to what has been said by Brown, it was established by Prosper that some HEIs were established to serve a particular group which seems to be disadvantaged within Tanzania's community. This is another reason for such institutions to resist joining the CAS. Prosper said:

Their fear is obvious because the selection through the CAS is merit based, so if the institution wants to favour just a particular group indeed as for now that cannot be done in the system... However, if agreement is made and such HEIs decide to join the CAS, the system can be configured in the way that it can accommodate those individuals particularly for their institution (system administrator, TCU, 5 July 2013).

The explanations by Prosper (system administrator, TCU, 5 July 2013) suggest that resistance to join the CAS is more than the fear of the 'unknown' as there are all possibilities of accommodating the non-CAS HEIs with their concerns. In other words, through the system upgrade it is possible to take on board the issues raised by non-CAS HEIs. Prosper viewed the resistance by some HEIs as the fear of losing income. This has been revealed as one of the main causes of the on-going institutional resistance to the CAS, particularly by private HEIs who do not receive subsidies from the government. Kyando explained:

Before operationalization of the CAS, we were assured to get a share from application fees based on the number of students admitted per institution, but later it seems this decision was banned silently. Remember, we were getting a reasonable income from application fees that helped us to run our institution but now everything goes to the TCU ... As private institution, we don't get subsidies from the government. In fact, *hii ni danganya toto* [From Swahili, which means 'being tricked like a child']. However, we have not given up; we are still making follow up on the matter (Kyando, Senior Official, HKMU, 17 July 2013).

In fact, any generated income from user fees in a public institution is government money. Therefore, this study noted that it is very difficult to distribute the money accrued from application fees to the CAS stakeholders. Even if the CAS-participating institutions still demand payment from the collected application fees, it remains a hot issue that tend to endanger the participation of the private HEIs in admitting their students through the CAS. It was revealed that, because of losing income from application fees, there are some institutions which have joined the CAS, but they still admit some cohorts of applicants through their institutions. As Caizer confirmed:

Some institutions are still admitting small cohorts of applicants through their institutions under the umbrella of ‘privately sponsored’ after closing the CAS. Actually, this is not accepted because we are going back to manual processing of admissions (admission officer, NACTE, 16 August 2013).

In fact, the issue of income loss is continuously being debated. Currently, all income generated from application fees goes to TCU and NACTE and is used for running and maintaining the system and to sponsor other university services, such as meetings. Moreover, this study learnt that such fee is also featured in the general budget of TCU and NACTE, so there are no possibilities of distributing such income to the CAS participating HEIs as it would pose an audit query.

Apart from institutions losing income, definitely the automation of admissions has never been a blessing to employees, particularly the admissions officers. This is due to the fact that ‘computerization, particularly when it is oriented to the automation of the workplace, has been the subject of controversy and resistance on the part of the workers’ (Bauer, 1997, p. 7). The admissions officers in HEIs consider the manual processing of admissions as one of the activities that generated additional income, so automating the process means uprooting such benefits. Because of this, the CAS has been contested by both the institutions and other stakeholders since 2010 when it was operational for the first time. Currently, the institutions that have not joined the CAS include: The Muslim University of Morogoro (MUM) - which is in Tanzania mainland, the Zanzibar University (ZU), the State University of Zanzibar (SUZA) and the University College of Education Zanzibar (UCEZ), all of which are in Tanzania Islands.

It is well known that institutional participation is a key component of an overall effective admissions quality assurance in HEIs. In recognizing this, the CAS initiative has attempted to attract all HEIs to join the system as a means of amplifying and supporting the quality assurance efforts within HEIs. The concern then is why other HEIs still hesitate to join the system. In establishing the CAS, it was assumed that all HEIs would join the system; however, a few of them (as mentioned above) are yet to join the system. Resistance by some HEIs to join the CAS was said to be contributed by among others the interests of resisting institution. As previously noted, there are some HEIs which are purposely established to promote fellow members; and that is why they are reluctant to join the CAS in fear of getting the applicants whom are not their interests. Moreover, it was revealed that some HEIs institutions yet view the CAS as untimely and might bring problems to users due to wide digital divide. Moreover, in the context where there are more options, one is free to choose the either one (i.e. the government's instructions that private HEIs are free to join or not to join the CAS can also be used to explain why other HEIs are yet to join the system). Hence, resistance by some HEIs to join the CAS makes the coordination of admissions into HEIs to have two systems (online and manual). In fact, the presence of two systems to some extent diminishes the efforts of reducing multiple admissions that existed for long time.

Joel (system developer, UCC) tried to make it clear:

Having two ways of selecting applicants (i.e. application through the CAS and manual application through individual institutions) still creates multiple selection. You may find the applicant having been selected in three institutions. Such applicants must confirm as where he/she might be going to report so that the chance is created for others who have qualifications to join HEIs and are not selected. In fact, having two systems overshadows the purpose of the TCU to reduce multiple admissions among others, the reduction which was intended to create the chances for others to join HEIs (27 June 2013).

Moreover, it was informed that another passive resistance was shown by some CAS participating which HEIs still attempted to admit applicants manually through their institutions. In understanding this passive resistance, Imani (Admissions officer, TCU, 16 August 2013) explained that implementation of the CAS in one way has ignored the expectations and needs

of the HEIs who proposed to have a share from the CAS user fees charged from applications. Another scenario of fear and passive resistance was also reported to occur among some applicants. Some applicants were worried that they might not be selected into the programmes they wanted due to competition (which is a basic criterion of the CAS) in selecting qualified applicants. Thus, such applicants attempted to request application forms direct from institutions as explained by Kingo, who said:

Some applicants do come direct to our institution to secure admission. If you guide them to use the CAS, they tend to be worried of not being selected due to their low pass marks and competition, especially for medical-related programmes (Deputy Vice Chancellor Academic, SUA, 17 July 2013).

The fact that the scope and purpose of the CAS is to control quality and increase fairness in admissions processes – some HEIs would view this as a barrier for them to admit some applicants based on the social dimensions (e.g. quota system which gives priority to some applicants from disadvantaged groups) of which the CAS cannot take into consideration, because the criteria for one to be selected in a particular programme is grounded on the applicant's performance. All these stem as explanatory benchmarks that show how ICT-based systems are shaped by different institutional contexts within HEIs.

Building on the work of Derya and Gökhan (2013), this study registered both passive and active resistances to the introduction of the CAS. Indeed, by conducting constant awareness campaigns both with HEIs and applicants would help to lessen the stated fears. Prosper (system administrator, TCU) perceived the current awareness campaigns as inadequate particularly to applicants and recommended for more efforts to be made to inform the non-CAS HEIs about the benefits of processing admissions through the CAS.

It is argued that the implementation of technological innovation rests largely on people's readiness for change – and change is not always received positively (Kanter, 1991, p. 15) due to the fact that technological changes have great influence on some officers' power and relations (see section 1.3.2). Abu-Shanab et al. (2013 and Nkwe (2012) say that technological change creates a new working environment which involves control mechanism and altered work relations in such that some institutional members might feel challenging to cope with them. As argued by Mullins (2005), loss of institutional control over admissions processes has

been viewed as a trigger for some institutions to be reluctant to join the CAS. Tension as to whether to join or not to join the CAS depicts lack of 'mutual dependence' as assumed by the sociotechnical theorists. For example, having two systems of admitting applicants into HEIs provides an indication that any complex system entails the conflicting interests which in one way creates an alternative within a complex network. The fear and resistance by some HEIs to admit applicants through the CAS further show that there are other options for doing things.

The CAS as one e-Governance system in higher education is a revolutionary method compared with the traditional manual ways of admitting undergraduate students, which signifies a new environment entirely different to what existed in HEIs. The implementation of the CAS has therefore received all types of fear of and resistance to this new way of coordinating undergraduate admissions since 2010. In fact, the subject of resistance has already been documented in various studies of e-Governance implementation in both developing and developed countries (Abu-Shanab and Bataineh, 2014; Derya and Gökhan, 2013; Nkwe, 2012)

Implementation of the CAS in HEIs implies changes in admissions work processes which, in turn, induces changes in admissions officers' jobs. Therefore, such changes might not be accepted positively by admissions officers and other workers who consequently will not be happy and will remain in fear of their work. People who work with the CAS on behalf of the HEIs (e.g. admissions officers) need to be given the chance to learn about the CAS in order to minimise any kind of resistance. In the course of implementing the CAS, some of the admissions officers explained their concern of losing economic privileges (for example through overtime jobs which involved payments during the old manual admission system). In one way, this also triggers passive resistance to the CAS.

In fact, the conclusion that can be drawn here is that there is a need to improve the system to accommodate the demands and requirements of those who are reluctant to join the CAS. The best way of doing this is to streamline all their objectives into the CAS so that, after running the selection, they get the people they want. Consequently, instead of assuming that resistance contributes to the failure of new technology, resistance is a constructive force in technological innovation, giving technology its specific shape in a particular context. This approach would eliminate the on-going manual admissions from non-CAS institutions that are claimed to be tedious, erroneous and labour intensive (Imani, admissions officer, TCU, 16 August 2013). In a nutshell, resistance to the CAS arises from fear of getting students who do not belong to the

intended group, losing income generated from application fees, losing economic privileges, losing power in deciding who should be admitted and losing authority in terms of decision making. These factors signify a significant hindrance to the CAS implementation in Tanzania. However, so as to reduce the effect of this, it is time for the CAS implementers (TCU and NACTE) to continue emphasising the importance of the system in quality assurance and provide awareness to non-CAS institutions on the possibility of considering their concerns (apart from income) through system upgrade.

The cost issues are also mentioned as challenges to the CAS implementation. Scholars of economic sociology earmark the issue of costs in accessing automated services as one of the important aspects of the digital divide (Lubbe, 2003, p. 242). This has been a counter-point against the fact that many scholars register the issue of cost in a positive way (i.e. e-Governance users save the costs) which is essential in accessing the microelectronic services. Of course, the concern here is 'who saves the cost and why'. This question remains valid in the context of the CAS services delivery. This study has established the evidence that some of the CAS users, particularly those from disadvantaged areas, incurred more costs (e.g. travelling costs and accommodation costs) as they had to find the CAS services in towns. Associated with unreliable electricity and slow internet, it was reported that some applicants, who had travelled from the up-country to Dar-es-Salaam city, incurred additional costs over and above the costs of application, which was TZS 30 000 in the 2010/2011 admission period; the cost which is currently TZS 50 000. Apart from buying scratch cards (which are used to access the CAS for new applicants), other costs were also mentioned (including accommodation, food and transport), particularly by those from poor families and from remote areas. As avowed by Humphrey:

I am from Morogoro and I have used more than TZS 70 000, including application fee; I don't find any saving when one applies for admission through CAS. Maybe that applies to those who own computers and internet at home ... Such people have no reason to travel as they can get assistance at home (CAS applicant, 30 April 2013).

Such concern was also shown by Joshua:

I agree that to some extent the system has reduced the costs of application particularly in the context where one had to apply for more than one institution differently during

the manual system. But in my view, the claim that the system reduces the application cost to applicants overshadows other unknown costs, especially for applicants who live in disadvantaged areas where IT penetration is still low ... Such applicants must travel to at least district headquarter to access the application service. Therefore, they incur additional costs (such as accommodation costs, internet costs, meal costs) – all these are not voiced at the expense of justifying the system as good at a glance. You know people tend to generalize that everyone has got a relative in towns that is sweeping outlook (admissions officer, MUCCOBS, 10 May 2013).

However, the situation was reported to be different for applicants who had computers connected to the internet at home. These were able to complete the application process at home provided they purchased the scratch card which contains the numbers for registration and application.

Generally, the discussions with the CAS developers insisted on the significance of familiarity about the CAS to applicants and other stakeholders. In line with this, it may be doubted whether attempts to conduct seminars with the internet café attendants in zonal levels would help to minimize the problem of the digital divide. This is essential because providing informal learning can be seen as more important when institutions introduce new technologies in the countries/regions where the digital divide is biggest. In the effort to overcome the digital divide, the great concern is not only providing access to ICT facilities (e.g. computers), but also empowering and helping users to make effective use of the CAS. It is essential to give the CAS users the skills that are essential in using the system. With this view, the digital divide should further be re-defined in accordance with ‘computer skills inequality’ rather than merely ‘access inequality’.

So as to be able to understand the application process through the CAS, users have to be relatively confident and skilled. Those without (enough) ICT skills to fully use the CAS may be viewed as ‘digitally excluded’ even if they have physical access to the system. The attempts to overcome the existing digital divide need to guarantee that inexperienced CAS users are provided with the training and support necessary for them to develop confidence in using the CAS services. This is something the CAS implementers in Tanzania have never accomplished well, making the CAS challenges among users reappear every year.

Moreover, lack of staff and/or incompetent IT staff and poor ICT infrastructure may lead to the system's failure. For example, Keto argues that a lack of IT support may influence the offering of timely technical support to the users, particularly during the peak period of application through the CAS (admissions officer, MWUCE, 30 July 2013).

Documentary analysis shows that most of the applicants' emails were not attended to or were lately attended by the CAS support desk. As explained earlier, in 2010 the CAS had only one IT expert who could not attend to all of the technical challenges of the applicants (TCU, 2010), both from within and outside the country. This is an indication that the issue of 'unpreparedness', in terms of IT human resources to support the system, is evident. Although it is essential to the implementation of e-Governance, Heeks (2003) contends that the lack of human resources in IT and the costs of maintaining IT experts are among the contributing factors to the failure of many e-Governance projects in developing countries. Extending the discussion of the human resource-related challenges, Odat and Khazaaleh (2012, p. 363) add that the establishment of a professional workforce is one of the serious challenges facing the implementation of e-Governance projects in the public sector. Insisting on the same, Ndou (2004, p. 12) admits that most institutions are facing a scarcity of the IT staff needed to run huge e-Governance projects. To Ndou (2004), human capital development and life-long learning (skills, capabilities, education and learning) are essential for any successful implementation of an e-Governance project. Ndou explains that:

E-Government requires hybrid human capacities... technical skills for installation, maintenance, designing and implementation of ICT infrastructure, as well as skills for using and managing online processes, functions and customers, are necessary. To address human capital development issues, knowledge management initiatives are required, focusing on staff training, seminars and workshops in order to create the basic skills for e-Government handling (Ndou, 2004, p.14).

In handling such challenges, many public sectors use vendors/private providers to support the implementation of various e-Governance projects. From its early phase, the operationalization of the CAS also involved the private providers who developed the system and continued to provide technical support during the implementation phase. However, it was reported that the use of vendors to close the gap of IT experts in e-Governance projects has its own hurdles. Prosper offered his experience of the CAS by insisting that, in some cases, their support is

unreliable because they have various projects all over the country. This was evident during the interview:

The use of vendors is good and commendable because in IT industry you cannot be an expert of everything ... But, in deciding to use the vendors, you should accept various associated challenges because in some cases you will hardly get support through the phone. This is so because vendors have many projects all over the country, so they used to travel ... You know, the one who developed the system is a reliable person to provide support because he knows the architecture of the system. I can't handle some of the technical problems unless I get support from the CAS developer (system administrator, TCU, 5 July 2013).

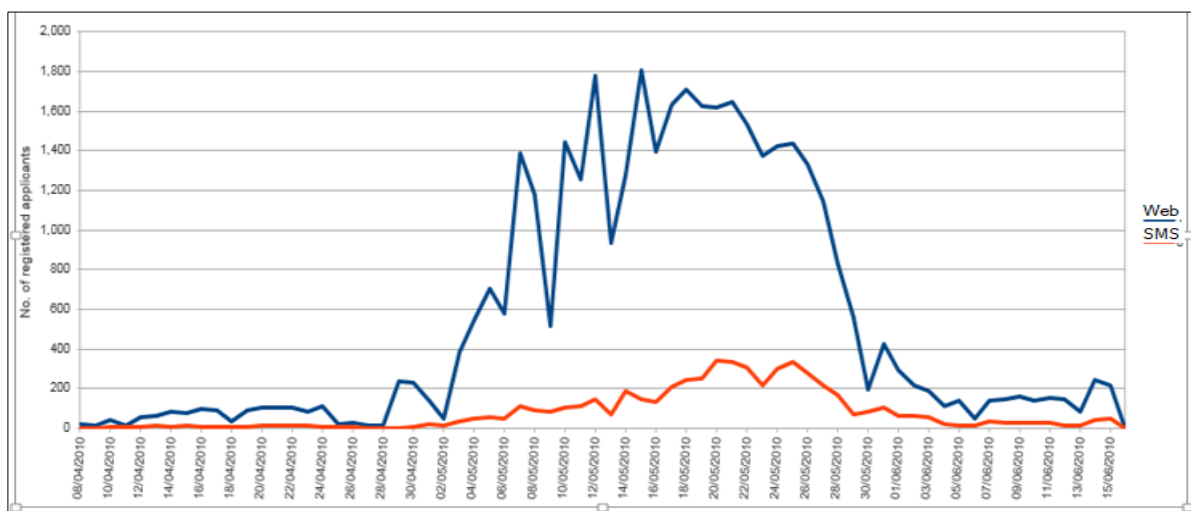
The scarcity of experienced IT staff to support the operationalization of the CAS is a serious problem. It is claimed that well-trained and motivated workers are critical in order to initiate and acclimatize the e-Governance processes. The development of a labour force and lifelong learning, ability and training are essential in structuring and managing effective e-Governance (Remenyi, 2005, p. 114). Similar findings are shown by Kettani and Moulin (2014), who indicate that the issue of scarce internal human resources for implementing e-Governance projects is serious and in most cases it occurs due to a lack of investment in training and local capacity building as demonstrated in the e-Government implementation for the city of Fez (eFez Project) in Morocco (p. 253).

Political challenges also were reported to appear in the course of implementing the CAS. Sorrentino and Virili (2003) in their sociotechnical model avow that politics are central and even an enabling aspect towards the successful implementation of the ICT-based projects. As seen in section 1.3.3, the deployment of ICTs in e-Governance demands a strong political will, participation, motivation, influence and support for speeding up the technological changes. These factors are important in determining the technological changes. For example, the change from the old manual admission system to the online admissions through CAS was highly contested by various politicians, particularly the members of parliament. Their key concern was the fact that the penetration of ICT in the country is yet to be realised in rural areas, and that might pose difficulties to some applicants in accessing the CAS. However, implementation of the CAS at the beginning took into consideration the applicants' social environments as asserted by Prosper:

The implementation of the CAS was not an ad hoc. The team of experts went to learn in Oman and they found that the same approach could be used here in Tanzania, so reasons raised by politicians are less important. Remember, applicants were even able to use mobile phones in making applications (system administrator, TCU, 5 July 2013).

The explanations by Prosper tend to be biased with the aim to justify the establishment of the CAS. The practical experience from secondary data and applicants shows that the general trend of application through mobile phones from 8/4/2010 to 15/6/2010 was very low as compared to that of applicants who applied through the internet (see Figure 5.2).

Figure 5.2 - Applicants Registration trend in the CAS through the SMS and Web/Internet



(Source: TCU, 2010b, p. 2).

As depicted in the figure above, the small number of applicants who used phones in their applications suggests the fact that most applicants opted to use the internet due to difficulties that were associated with the use of mobile phones.

Further analysis revealed that political influences, particularly the issue of a ‘union’ between Tanzania mainland and the Tanzania Islands, tend to have great influence on matters related to higher education admissions. As Josia argued:

You know this is engineered by politics. I cannot see the genuine reasons as to why some HEIs are reluctant and fear to join CAS because it is the government directives that all public higher education institutions should join the system. However, for private

institutions it is an option, but most of them have joined the system (admissions officer, MNMA, 7 January, 2014).

This study in fact has realized that the establishment of the CAS has been positively taken over by politicians. The success through CAS has been one of the successful efforts towards improving higher education development and quality in the country. However, the facts on the ground have shown the existence of many ICT challenges as seen in section 5.3.

Generally, it was informed that the operationalisation of the CAS is currently less influenced by politicians, though it may happen sometimes that a few political leaders offer instructions that have influence on the whole processing of the students' transfer. This is the only area that is influenced annually by some politicians as informed by Imani: the handling of transfer is very problematic, we get here orders and memos from politicians that influence the processing of the transfers through the system. It happens that some applicants must be selected into specific institutions and programmes.

Moreover, through the analysis of secondary data particularly queries that were sent by applicants through emails, the research found that most of these emails were not read and or answered by neither TCU nor NACTE. Most of such emails came from applicants outside Dar es Salaam city. Applicants requested several clarifications and assistance on matters related to admissions but their queries were not attended. This concern was also reported by Imani (admissions officers, TCU)

I know there are many emails that were not attended on time. But I believe at the end these applicants got our assistance because we have the phone services as well. I think we need to revisit the way of handling such cases in the coming admission cycle (16 August 2013).

The delay in answering applicants' emails is an indication that lack of dedicated and enough workers might be a contributing factor. Handling the big system like the CAS needs people to be assigned special work; for example, having a special person who can attend such cases. However, Imani (admissions officer, TCU) acknowledged that as to-date there is no special person assigned for handling such cases including reading emails from applicant, hence there is lack of responsibility and or accountability (16 August 2013).

5.4 CONCLUSION

This chapter has provided the general trend of the CAS operationalisation in Tanzania. The chapter focused on two main aspects: stakeholders' involvement (with the main focus on applicants and admissions officers in both HEIs and regulatory agencies – TCU and NACTE) and the challenges associated with the implementation of the CAS. The latter has focused on the following key issues: infrastructural challenges, human challenges, and political challenges. Generally, the findings show that the implementation of CAS faces many problems, most of them being those related to the digital divide, internet penetration and costs, unreliable electricity, accessibility issues, and political influence. These issues have also been reported by various sociotechnical scholars of e-Governance essentially in developing countries. Next follows the discussion of the CAS advantages and disadvantages towards its mission of improving admission service delivery and improving quality assurance in higher education admissions.

CHAPTER 6

ADVANTAGES AND DISADVANTAGES OF NEW TECHNOLOGY IN THE PUBLIC SECTOR

6.1 INTRODUCTION

This chapter presents data that responds to the third research question of the present study: ‘What are the advantages and disadvantages of the CAS in its efforts to improve admissions service delivery and quality assurance in HEIs?’ The chapter provides both the advantages and disadvantages of the CAS implementation within and beyond HEIs. Research in the sociology of work shows that new technological innovation produces a complex, contingent and contradictory blend of advantages and disadvantages. Moreover, it recognises that technological advantages to one group users may be disadvantages to another group (and vice versa). The chapter presents these advantages and disadvantages with the focus on HEIs as key stakeholders, admissions officers in HEIs and applicants as part of the CAS sociotechnical aspects. The chapter serves as a ‘mirroring tool’ of unlocking the realities of technological innovations that are being implemented in the public sector with the tag of ‘e-Governance’ that tend to a large extent be biased to technological benefits while forgetting to acknowledge the social implications of such technologies. Generally, this study registered that ‘CAS advantages outweigh its disadvantages’ (Joshua, Admissions officer, MUCCOBS, 10 May 2013) when it comes to the overall purpose of the system – quality control in admissions and improvement of the admissions service delivery in HEIs.

6.2 ADVANTAGES OF THE CAS

Enhanced quality assurance in admissions is among the advantages of the CAS. As previously seen, the implementation of the CAS intends to provide ‘one-stop’ quality admissions services and appropriate information about admissions, particularly to the stakeholders of higher education and the public in general. ‘Quality’, in this context, implies the acceptable qualifications of applicants to join HEIs in the country. Being implemented in collaboration

with key stakeholders, the CAS enables the higher education regulatory agencies to ensure that all applicants who join HEIs in the country are admitted with the required minimum programme entry qualifications as approved by specific HEI.

This study interviewed some key stakeholders to examine the extent to which the CAS helps to control the quality of undergraduate admissions in the country. Most of the interviewed respondents underscored the control of the forgery of certificates as an outstanding benefit of the system. For example, Kyando sees the introduction of the CAS as a vital innovation to curb admissions malpractices that have existed for several decades in HEIs. Kyando (Senior Official, HKMU) admitted that ‘the system has reduced forgeries and has increased access to higher education. It is a great initiative towards a modernized way of higher education quality assurance in the country’ (17 July 2013). Nonetheless, this study revealed that even if there is quality control particularly in the area of certificate forgery, it is difficult to authenticate the real owner of certificates because in some cases, dishonest people use others’ certificates to advance their careers. This is possible for those certificates which have no passport size or photography of the certificate owner.

The quality of higher education and the necessity for vigorous quality assurance mechanisms have become primary themes in various nation-wide strategies for the development of higher education (Materu, 2007, p. xv). Behind this move is the importance attached to higher education as a ‘driver’ of growth in attaining the Millennium Development Goals on one hand, and the proliferation of new types of higher education providers (beyond the public institutions) on the other hand (Materu, *Ibid*). At a regulatory level, the growing demand for quality assurance by the government, donors and the public at large, together with the desire to be comparable with the best, both nationally and internationally, is pushing the agencies that regulate higher education to pay more attention to their quality assurance systems in all areas, including admissions-related matters (Kohoutek, 2009).

Just as in other countries, aspirants to higher education in Tanzania used to apply for admission through various institutions, where applications and applicants’ details were manually processed and sent to the higher education regulatory agencies for verification and approval (see section 3.5.1). Similarly, with the introduction of the CAS, such verification is now done online by the system, using an integrated examination results database of the NECTA. This has assisted the regulators to automate surveillance, as remarked by Caizer:

Only qualified applicants are selected to join HEIs; no way one can forge the examination grades as the system checks all applicant's credentials online. Indeed, as stakeholders of higher education, we are proud of this technological innovation, particularly in controlling admission malpractices (admissions officer, NACTE, 16 August 2013).

Imani (admissions officer, TCU, 16 August 2013) expressed similar feelings to those of Caizer by arguing that the CAS has brought a new era of quality assurance of admissions. This is contrary to the manual admissions system where some HEIs were not quite truthful, particularly when keying in the applicants' credentials (e.g. applicants' examination results), which act as the basis for selection approval and their admissions. In fact, the argument by Imani offers a clue that the system helps to monitor who gets in from the very start of the admission process using a single path (the CAS), thus getting away from multiple paths (manual admissions from different institutions). As argued by Caizer, the system remains essential, especially at a time like this when cross-border education and the on-going growth of higher education worldwide pose various challenges related to academic malpractices such as the forgery of certificates (admissions officer, NACTE, 16 August 2013).

Essential to the views of Imani and Caizer, is the efficiency of the CAS in controlling admissions malpractices and in providing data integrity that helps to conduct the audit of admissions in HEIs. They view the CAS as one of the solutions for the problems in the admissions quality assurance system in Tanzania. These comments are somewhat contradicted by the fact that the system selects applicants by verifying their index numbers (examinations numbers) only. This means that there is a strong possibility of the CAS selecting an applicant who is not the bearer of the certificate as earmarked earlier. That is, it is possible for an applicant to use a certificate that belongs to someone else (Mbunda, System Developer, DTBI, 08 July 2013) to secure admission through the CAS especially those certificates which have no photographs. Nonetheless, it was reported that institutions used to scrutinize and positively identify the real owners of certificates during students' registration for various programmes in HEIs.

Convenience and improved access to admission services was another advantage of the CAS as reported by interviewees. Discussion of the convenience and improved access to the e-

Governance services is not new. Because one of the aims is to re-invent and modernize the public sector. Several studies have explored this topic, using various case studies (e.g. Bhatnagar, 2004). In the context of the CAS case study, the access, convenience and efficiency are examined in terms of applicants' ability to apply for admission into HEIs anywhere and at any time and have access to information concerning their admissions.

Identifying improved access to public services through online service delivery supports the previously reported studies (e.g. Vartanian, 2011; Chen et al., 2009; Nayak, 2005). Similarly, most of the interviewed respondents in this study reported the improvement of the access to admission services in terms of the application process, easily accessible application results, and easily accessible admissions data or statistics. Alphonse (CAS applicant, 9 July 2013) who made his application through the CAS said: 'it was very easy for me to complete my application using the internet within very short time'. Similarities between this study and earlier studies reveal that existing online services ensure that the users have improved access, as opposed to the old manual system of service delivery, when a physical visit was inevitable. One indication of the improved access to admissions services is the applicants' ability to accomplish the application exercise at home as insisted by Alphonse commented on the fact that he had completed application within a short time:

I must admit that the system has made admission services more convenient. You have no reasons of travelling a long distance to institutions for seeking admissions as previous time when admissions were manual. Myself, I was able to complete the application process in 30 minutes (CAS applicant, 9 July 2013).

It would appear that by means of the online application, applicants can use the internet at home (for those who have ICT facilities at home) or make use of the internet café after paying the application fee at the bank or by means of M-Pesa (mobile phone banking). Though, as to-date only applicants with diploma qualifications complete their payment through the M-Pesa. The remaining applicants still channel their application fees through the bank. Indeed, paying through M-Pesa has helped applicants residing in remote areas where banking services are not yet available. Though the method has its own challenges including delay in getting payment confirmation, hence leaving applicants in dilemma as to where they have to make follow up at TCU or NACTE.

The issue of access was also examined in terms of the application methods. In 2010, applicants were able to register and apply from their mobile phones by means of short message service (SMS). Nonetheless, this method was reported by some interviewees as being ineffective and was only used in the first and second years of the CAS operationalization. For example, Joel explained that the application by mobile phone was not preferred by applicants because it was difficult to use due to lack of some features which were only those who used on. Joel puts it clear:

We thought that application using mobile phone could be a solution to applicants residing in rural areas, but that is not the case. We noted that most applicants used internet during the applications of 2010 as compared to applicants who used SMS. This might be due to a number of reasons including phone usability (e.g. small phone screen) and limited features. Applicants lack awareness on how to use SMS and follow the commands properly (system developer, UCC, 5 July 2013).

The real picture of CAS application trend is clearly shown in Figure 5.2, which shows the CAS application trend (the internet users versus the mobile phones (SMS) users in the 2010 admissions cycle). From 08/04/2010 when the CAS was officially started and applicants started to apply through the system using both the internet and SMS, but the trend shows that applicants preferred to register and apply through the internet rather than through the mobile phone SMS. Researcher was interested to know what exactly caused such trend (whereby very few applicants used SMS application). Joel (System developer, UCC) provided the answer:

Applicants who tried to use mobile phone SMS faced many difficulties including limited access to the CAS details because SMS system was not integrated to the internet application. Moreover, once applicant completed application through mobile phone SMS, then could not view his/her application status or details using the internet. On top of that, some applicants shared mobile phones thus their results got mixed and it was difficult to recognise who was real owner of the examinations grades. Generally, it was too early to use the mobile phone SMS (though it was thought to be a convenient option for those from upcountry) (5 July 2013).

The fact that CAS provides opportunities to applicants to apply online at home implies that applicants have avoided personal interaction with the admissions officers, except in cases when applicants face problems in the course of application that really require the physical assistance of admissions officer. Sometimes personal interactions with admissions officers were one of the sources of corruption during manual admissions (Imani, Admissions officer, TCU, 16 August 2013). The lack of personal interaction has been a core feature of the e-Governance services, as recorded by various researchers (e.g. Meuter et al., 2000; Hansen, 1995).

In the course of this research, it was reported that the CAS has improved the access to information on higher education admissions, particularly the information related to the academic programmes, fees and required number of students per programme. As Joshua explained:

I remember during previous years; applicants were applying blindly by just filling the forms without knowing the detailed information for [the] programme. In fact, there were no comprehensive information for each programme – [a] situation which made some applicants not be able to join the selected programmes due to high tuition fees. But today, all information regarding higher education programmes is easily accessible at a single point – the CAS (admissions officer, MUCCOBS, 10 May 2013).

Through the CAS, applicants are now able to access all information related to a degree programme: minimum entry requirements, minimum admission points, programme capacity, tuition fees and loanable programmes. This is shown in Table 6.1 below.

Table 6.1 Programme information for admission through the Central Admission System

Programme ²	Code	Admission requirements: Form IV	Admission Requirements: Diploma (NTA Level 6)	Minimum Admission Points: Form VI	Admission Capacity	Programme Duration	Tuition Fee	Possible Loan Amount TZS	Loan Priority
Bachelor of Architecture	AR001	Two or more principal passes in any of the following: Mathematics, Physics, Chemistry, Biology, Geography and Fine Art. A subsidiary pass in Advanced Mathematics/ Basic Applied Mathematics or credit pass in O-level Mathematics is required.	Relevant Diploma with Second class OR Credit OR B average	2.0 (Science) 4.0 (Arts)	50	5	TZS 1,100,000 (locals) /USD 1,500 (foreigners)	1,100,000	Priority

(Source: TCU, 2013).

Insisting on the information such in the admission guidebook, Caizer (admissions officer, 16 August 2013) said that the available information is very helpful in assisting applicants to make decisions on their programme choices. In addition, the information helps parents and guardians find alternative sources of income needed for their children to fund their studies in case they are selected in programmes that are non-loanable. Adding to that, Bakari (CAS Applicant, 16 June 2013) condemned the old manual admissions system in HEIs for hiding such crucial information. He believes that such information was concealed for financial benefit:

As you know in previous time, most higher education institutions did not indicate the required number of students per each programme (capacity). Their intention, I think, was to make sure they get as many applicants as possible for the purpose of collecting more application fees from applicants. That is why most applicants sent their applications to various HEIs to increase the chance of being selected. But, with the introduction of CAS, applicant is exposed to all required information which can easily be shared with parents and guardians and reach proper judgment on programmes selection (Bakari, CASE applicant, 16 June 2013).

² One of the academic programme at Ardhi University

With such comprehensive programme information available to applicants, Alphonse (CAS applicant, 9 July 2013) views this as a great step towards breaking the information barriers since most applicants are socially disadvantaged and thus their access to such information from various scattered HEIs would be difficult.

Based on the above views, one may argue that, during the manual application system, applicants lacked information relating to fees which would help them to decide on whether they could afford to pay for certain programme or not. As a result, some of the applicants who were selected into programmes whose fees were too high could not join HEIs and had to wait until the following year. On the other hand, the applicants who could not be selected due to competition as reported by Keto (admissions officer, MWUCE, 30 July 2013), were given feedback through the CAS and were informed on the programmes that still needed more applicants. This enables unselected applicants to re-apply for admission without additional costs. Furthermore, applicants are given information on how to request a transfer from one institution to the other or from one programme to another (within an institution), the exercise which is also accomplished online through the CAS.

Through interviews, it was further revealed that applicants from outside Tanzania are now assured of their applications. The exercise has been made very easy and convenient as asserted by Prosper:

Applicants from outside the country can now lodge their applications very easily and conveniently. They can finish everything in a day and they are able to get confirmation of their application instantly. What follows is the applicants to send all required attachments to TCU for verification, including their certificates so that they can be considered for selection. This is contrary to the old manual application when one had to download or request the application form, fill it [in] and attach the needed documents and send them to various institutions. In fact, there was no acknowledgement after receiving the application by most of the institutions (system administrator, 05 July 2013).

Definitely, convenience of the online admissions services, especially for those living far away from the place where such services are available, was also explained by Remenyi (2007, p. 144) who noted that the ‘... potential benefits of online services to citizens: increase in customer convenience due to 24/7 availability, travel time saving, etc.’. In the same way, the CAS has played a great role in reducing national and international long-distance travel for seeking admissions to various HEIs. Applicants can now complete everything related to admissions from home. Gil-Garcia et al. (2007), in line with this, point to the efficiency and convenience, noting that, through new technologies, the users are able to effectively and timeously access and achieve their needs through the execution of e-Governance services from everywhere, at any time.

During this study, the researcher also registered that by having the improved access to higher education admission information, applicants are able to choose from a wider range of academic programmes. Contrary to the old manual admissions system, the CAS allows applicants to have a wider range of choices of programmes from different institutions participating in the CAS, thereby increasing students’ satisfaction with the online services. For example, during the 2010/2011 admissions cycle, applicants were able to choose their preferred programmes by referring to the admissions guidebook, according to which they had to choose a minimum of eight and a maximum of twelve programmes. As reported by Mbunda (system developer, DTBI, 8 July 2013), applicants selected a number of programmes from various institutions when one was only allowed to select a maximum of three programmes per institution. This increased the chance of being selected, especially for applicants who had low pass marks.

Scholars (e.g. Amit and Zott, 2001; Malhotra, 2001) accept that the deployment of ICTs has made a substantial contribution to the increased access to public services resulting in a significant increase in the efficiency of governance. These benefits are a key aspect of e-Governance initiatives in institutions. Therefore, it can be argued that the establishment of the CAS has significantly contributed to the reduction of the number of process inefficiencies. This is through the automation of the application and the selection processes as well as the facility that admission data is shared instantly between the CAS institutions, as well as with other higher education stakeholders. Furthermore, it has been possible to contribute to the eradication of mistakes due to the manual procedures and a reduction in the time required for admission business transactions. What is more, the efficiency in admission service delivery is also

achieved by streamlining and centralising the admissions processes by allowing quicker and more informed decision-making.

Moreover, saving costs and time are among the advocated socioeconomic benefits of the CAS. Mchome (2013) points out that the introduction of the CAS has reduced the cost burden to applicants, who used to travel from their home regions to seek admission to various institutions, most of which are located in Dar es Salaam city. Mchome (2013) uses the example of the costs incurred by an applicant from Mara region in Tanzania (this was for the admissions cycle of 2010/2011) as shown in Table 6.2 below. A similar conclusion was also reached by Bhatnagar (2004) who argues that e-Governance helps to reduce the cost incurred by poor citizens for services obtained from government agencies. According to Bhatnagar, automated services help citizens to spend less effort to find out how and where the service can be obtained from the information that is instantly available on websites which one may access from home.

Table 6.2 Application costs comparison for applicants from Mara region, Tanzania before and after establishment of the Central Admission System

Institution	UDSM	SAUT Mtwara	UoA	TEKU	SAUT Tabora	UDOM	Total	With CAS	Saving
Fare	60,000	120,000	60,000	100,000	120,000	60,000	520,000	10,000	510,000
Application Fee	20,000	20,000	20,000	20,000	20,000	20,000	120,000	30,000	90,000
Accommodation	35,000	35,000	35,000	35,000	35,000	35,000	210,000	5,000	205,000
Food	35,000	35,000	35,000	35,000	35,000	35,000	210,000	5,000	205,000
Internet cost	5,000	5,000	5,000	5,000	5,000	5,000	3,000	10,000	-7,000
Total	150,000	210,500	150,500	190,500	210,500	150,500	1,063,000	60,000	1,003,000
Total in USD	100	140	100	127	140	100	709	40	669

(Source: Mchome, 2013, p. 2).

While Mchome (2013) appraised the benefits of the CAS in terms of cost saving by applicants, other respondents have disputed this claim. For example, Josiah argued that:

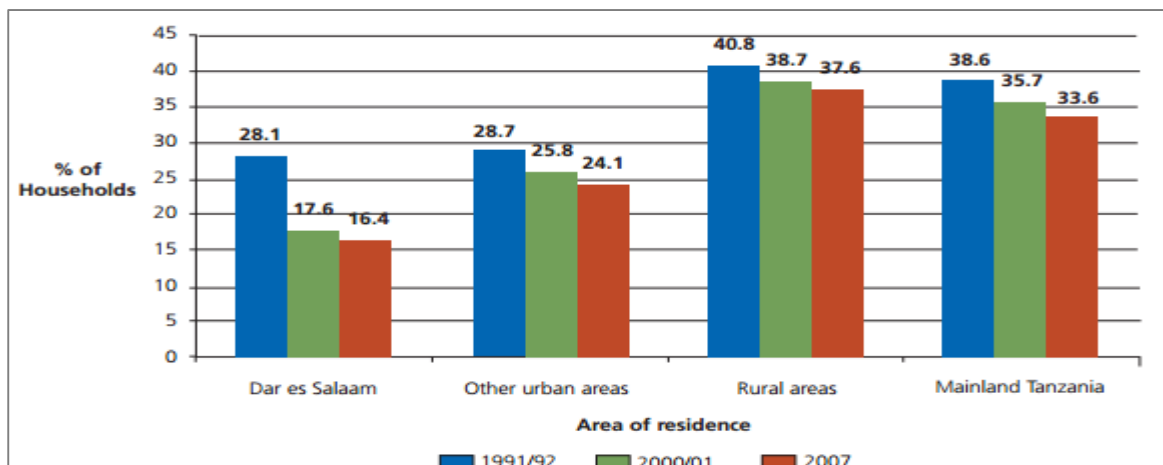
Cost saving depends on where one is residing during application. Take the example of the areas where there is poor reliability of electricity, very slow internet and the associated cost of accessing internet. In most districts the costs go to more than TZS 1 500 per hour (approx. US\$1.00). Applicants may use more money for accessing the internet until the completion of the application exercise. Some of them have to pay for

more hours to use the internet, and this basically makes them to incur additional costs (admissions officer, MNMA, 7 January, 2014).

For applicants, the process of admission seems to be ‘a breeze’, while for institutions and particularly admissions officers, it seems to be ‘a suffering’. The differences in the feelings can be attributed to the possible loss of income by both institutions and admissions officers. The truth is that the applicants are now able to apply for admission to several HEIs with a single payment. Josiah is not alone in his opinion. Others (e.g. Prosper and Caizer, admissions officers) also believe that some applicants still incur costs during application as they have to travel at least to the district level to access the internet. This also means that some prospective applicants may have to spend one night or more away from home during application period. This is due to the fact that they live far from the district headquarters and sometimes they face transport difficulties.

The diverse opinions expressed above indicate that cost saving is a subjective matter and might apply to those who are digitally advantaged, particularly the applicants who have access to the internet at home or in a town close by. Therefore, it can be argued that the claim that the CAS has reduced cost burdens on applicants may also depend on the income level of a particular applicant. In Tanzania’s context, the poverty headcount seems to be higher in rural areas than in urban areas. For example, in 2007 just around the time when the CAS was under preparation before its initiation three years later, the poverty head count in rural areas was 33.6 per cent while in Dar es Salaam city and other urban areas was 16.4 per cent and 24.1 per cent, respectively (see Figure 6.1 below).

Figure 6.1 Percentage of households living in poverty in mainland Tanzania - 1991/92 to 2007, by area of residence



(Source: Hoogeveen and Ruhinduka, 2009, p. 3)

Even if there are differences between the incomes of urban and rural applicants, Mwanjonda (government officer, HESLB, 22 May 2013) advanced a similar argument concerning the benefits of the CAS. He said that applicants have been able to save some money if you compare the current situation with that at the time when admission was manual. Mwanjonda said:

Applicants save the costs of application as they apply for several programmes from various institutions for the same cost. For example, in 2010/2011 admission cycle, an applicant could apply for 12 programmes for only TZS 30 000.

Sharifa (admissions officer, RUCO, 30 July 2013) concurred with Mwanjonda, when she argued that, ‘with CAS, an applicant is able to apply for admission into more than one institution at once, hence reducing application costs, time spent and the cost for travelling to different institutions where admission is sought’. Furthermore, Caizer (admissions officer, NACTE, 16 August 2013) and Sharifa (admissions officer, 30 July 2013) also accept that the system has to a large extent reduced the costs burden, not only on applicants but also on parents and guardians who support them by financing their applications.

Adding to the above explanations, Mwenda (admissions officer, SJUT, 30 May 2013) stated that the cost implication of manually processing admissions was not only felt by the applicants but also by institutions as well. In explaining such saving, Caizer (admissions officer, NACTE, 16 August 2013) reported that automation of admissions has helped the TCU and NACTE to

save the costs that were incurred in printing the bulk of pamphlets which were used by representatives from HEIs during the JAC meetings. According to Mwenda, the processing of manual admissions, for example, was costly and it took a long time to announce the results:

Manual processing of admissions took a long time and was subject to many errors and bias. I have to agree that this system has not only saved the costs to applicants, but to our institutions as well because the work demanded enough labour, and hence more money was needed to pay workers; though equally, we have lost our main source of income (Mwenda, admissions officer, SJUT, 30 May 2013).

Cost reduction has been pointed out by many researchers (Munyoka and Manzira, 2013; Scholl, 2010; Püschel and Eifert, 2004) as being one of the main benefits of the automation of public services. Theoretically, any e-Governance initiative may result in a substantial cost reduction. This claim rests on the belief that putting admission services online considerably decreases the application costs incurred by applicants. For example, as seen from the data above, an applicant would need approximately US\$100.00 to secure admission to a single institution; meanwhile, if such applicant applied to six institutions (which was the case during manual admissions), he or she could spend about US\$600.00 as indicated in Table 6.2 above. In fact, those who applied for admissions to various HEIs hoped to increase their chances of being selected. But currently applicants pay TZS 50,000 (about US\$35.00) to apply for admissions to various institutions (Amina, admissions officer, SUA, 29 April 2013).

The implication drawn from the above findings indicates that applicants from poor families failed to apply to several HEIs due to the higher costs. Based on this observation, one could agree that the first year of the operationalization of the CAS (in 2010) marked an increase in admissions (see section 6.2.6). This is an indication that the new admissions system ensures that the majority of applicants can afford to apply for place at HEIs.

Nonetheless, cost saving by institutions in processing manual applications implies a loss of income to institutions (as institutions are no longer receiving the application fees from students). Additionally, it is a loss of income to admissions officers who were assured of remuneration during the peak period of manual application and selection. It was this time when admissions officers were paid money for extra duties and special assignments.

It was further reported that the improved speed in processing the applications for admissions means that applicants are no longer traveling to institutions looking for the application forms; hence, it avoids time-wasting and road transports risks (Prosper, system administrator, TCU, 05 July 2013). Nonetheless, research by Jagun (2007) shows that people still need to travel because the automated services cannot be a substitute for all travel. There seem to be some online service users who still need personal meetings with staff at the HEIs for several reasons, including a lack of trust. Similarly, it was revealed from this study that some applicants still travelled to the TCU offices for several reasons, e.g. some wanted to change their choice of study programme but could not login back to the system again (as they had forgotten their login details/passwords).

Interviewees also admitted that through interaction with the CAS, applicants were able to acquire basic ICT skills (such as, how to hold the mouse, use the keyboard, open a page, create emails, create CAS account, choose programmes, switch to another page, login and logout, etc.). The acquisition of ICT skills (though in different scales) is one of the benefits of automating public services (Sebastian et al., 2013, Kim, Adeli, Slezak, Sandnes, Song, Chung, and Arnett, 2011). Similarly, Mwenda (admissions officer, SJUT, 30 May 2013) was under the impression that by interacting with the CAS, admissions officers and applicants have acquired basic ICT skills in the course of using and interacting with the system. The resemblances between the findings of these studies could be accredited to the reality that the introduction of new technology is, in most cases, associated with the learning of new skills; though some skills are invariably lost as well (see section 6.3). Such learning can be formal or informal. However, in the context of the CAS, some applicants, who have little aptitude to learn new ICT skills, would be at a disadvantage and would fail to complete their application through the system. As a result, they lose the opportunity to apply for higher education in that particular year. This contradicts the assumption of the CAS implementers (TCU and NACTE) who believe that the automation of admissions has granted applicants greater access to admissions services. It is a fact that not all prospective applicants have the ICT skills, and in cases where such applicants fail to get assistance during application, they miss the opportunity to join higher education.

Nevertheless, in the course of the interviews, some applicants reported positively that they had acquired basic ICT skills during application. This was acknowledged by Godfrey (CAS applicant, 30 April 2013):

In my life, I had never used computer either for typing or browsing the internet. But I was compelled to do that during application for admission this year. Indeed, that was not simple, I remember the handling of computer mouse ... was real challenging ... I decided to do it myself because my colleague sought assistance from the internet café attendant but when he visited his account, he found that all selected programmes were changed. It seems someone who was assisting him mixed up with other applicants' programmes, which were left in the internet café for assistance (applicant, 30 April 2013).

Alphonse (CAS applicant, 9 July 2013) stated that applicants who had prior basic ICT skills assisted their colleagues on how to apply through CAS. It is through that assistance they learnt basic ICT skills.

Moreover, apart from learning basic ICT skills, it is argued by sociotechnical scholars that computerization in institutions helps to control corruption and nepotism (see Chapter 4) in public service delivery. This assertion arises from the fact that the automated services reduce human interference because users work virtually online. This has been acknowledged by Flora (CAS applicant, 16 August 2013) who said that the automation of admissions services has eliminated the corruption and nepotism in admissions to a large extent. Flora continued, saying that:

The old manual undergraduate admissions processes were not that much open, thus it encouraged admitting applicants under nepotism and were subject to corruption temptations. For example, during manual admission process, the applicants had no opportunity to know why they were not selected to join certain programmes. But through CAS one is able to get the feedback as to why he/she is not selected in particular programme by establishing the cut-off point. Moreover, the CAS can show applicants the available programmes that are not full as an alternative for them in case one is not selected in any programme due to competition (Flora, CAS applicant, 16 August 2013).

Though not stated openly, the control of corruption (particularly in service organizations) is always on the agenda of any e-Governance initiative. Indeed, the speed, transparency, and accountability brought into government service institutions, coupled with the simplification

and rationalization of processes that are part of e-Governance, create an environment that discourages corrupt practices or, in some cases, makes it easier to identify them and discipline the wrongdoer. In response to the same issue, Keto explained that:

Through CAS things have changed to a large extent. There is no more corruption, 'who-knows-who' or nepotism because the system selects applicants based on their performance and the set minimum entry qualifications. There is minimal human interaction, particularly in application process. During selection, the system is not interrupted until it gives the final output (admissions officer, MWUCE, 30 July 2013).

Central to all of this is the equal chance given to all applicants during selection which is based on their performance, programme preferences, and the capacity of each programme. Moreover, another area that was subject to corruption and nepotism in undergraduate admissions was the transfer of students from one programme to another or from one institution to another. Sharifa stated that the introduction of the CAS has eliminated human judgement in the whole process of student transfers, which is now done by the system. It was explained by Sharifa that at present, the selected applicants can be transferred to other institutions or to other programmes timeously and easily; so the institutions can track the records through the CAS control panel (admissions officer, 30 July 2013). Apart from preventing nepotism and perhaps corruption in the transfer of students, Sharifa added that previously the transfer of students was cumbersome and difficult. Being manual, it was not simple to keep records because some selected applicants were transferred into other institutions and could not report to the receiving institutions. The handling of the process within the system, therefore, has been a way forward towards equity and fairness in undergraduate admissions (Sharifa, admissions officer admissions officer, RUCO, 30 July 2013).

One may draw the conclusion that the old manual admissions system was condemned by some applicants due to corruption and nepotism. In fact, manual admissions were influenced by human intervention to a great extent. In addition, there was a concern about the lack of crucial application information (e.g. programme capacities and fees). This information was essential for helping applicants decide on what to study and the possibility of being selected. Thus, those involved in the selection process used that opportunity to admit some applicants into competitive programmes that admitted only a few applicants (e.g. medicine and

telecommunication). This was done as a result of nepotism or corruption. As explained by Amina:

Despite the challenges facing the system, applicants are so happy due to the system's fairness in selection because, during the old manual admission system, in some competitive and hot programmes like telecommunication engineering and doctor of medicine, institutions admitted applicants on nepotism or 'who-know-who' or through memos. Applicants had no room of making follow up as to why they were not selected despite their high performance. However, things are totally different through the CAS; what matters is the applicant's performance and not otherwise (admissions officer, SUA, 29 April 2013).

The verdict by Amina (admissions officer, SUA, 29 April 2013) informs us that previously there was no possibility for the applicants, who had not been selected, to know the reasons for their non-admission to institutions because admissions were not done transparently due to the decentralization of the process. Moreover, the bureaucracy, autonomy and power given to HEIs contributed to the lack of explanation for why someone had not been selected during the use of manual admission system. Because higher education regulatory agencies play a central role in the interaction between HEIs and the community, applicants are ensured of transparency in admission-related matters. They can be told why they have not been selected for a particular programme by exposing to them the cut-off points (the points of the last selected applicant in a specific programme). Accordingly, applicants can be advised through the system by showing them all programmes that are yet to be filled and give them another chance of making application in case they are not selected in the first round. This opportunity was not there during manual admissions. Indeed, such transparency has been advocated by sociotechnical scholars as one of the benefits of computerization in institutions.

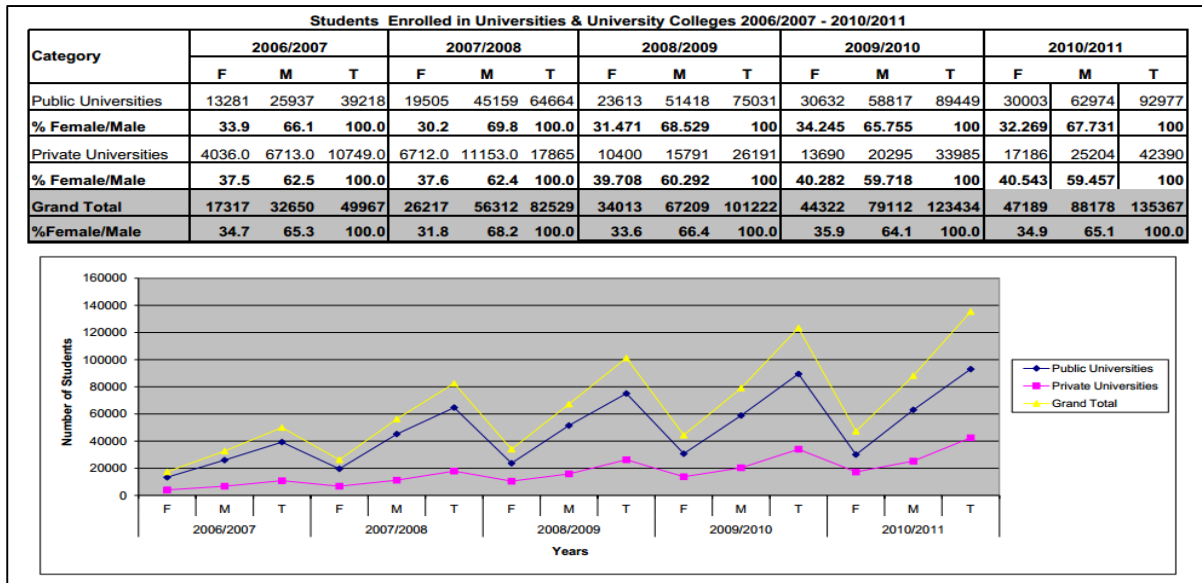
Elimination of multiple admissions is another advantage reported in this study. As seen in Chapter 2, currently there are more than 60 institutions participating in the CAS. Previously, in securing admission to more than one institution, applicants applied manually for admission to each institution. Eventually, this caused multiple admissions, which denied other qualified applicants' access to higher education. The introduction of the CAS, however, has managed to eliminate multiple admissions since the system allocates an applicant to only one programme out of many chosen programmes. Joshua admitted that the system has promoted fairness in

higher education admission process (admissions officer, MUCCOBS, 10 May 2013). Joan (admissions officer, MU, 4 December 2013) and Caizer (admissions officer, 16 August 2013) viewed automation of the admission services as a further step towards increasing access to higher education in the country.

The above explanations suggest that, during manual admission system, there was no inter-institutional communication that intended to sharing information on undergraduate admissions. Therefore, it was difficult to realise if one had been selected in more than one institutions. Based on the institutional programme capacity, most of HEIs were run under capacity while there were several applicants who in fact qualified to join the higher education studies and yet they had not been selected due to multiple admissions. This gives an indication that admissions in the first year of the CAS operationalization in 2010/2011 admission cycle increased because applicants who could not join HEIs during the manual admission system, were admitted during this academic year (see Figure 6.2)

As argued above, admissions into HEIs in Tanzania have increased in recent years. Among others, this increase is due to the new admission system that has eliminated multiple admissions, as discussed above. Moreover, the trend has been also attributed by the increase in the number of HEIs from one institution (the University of Dar es Salaam) in 1961 (Mkude et al., 2003) to more than 60 in 2013 (TCU, 2013a). Before the introduction of CAS, enrolment at Tanzania's universities and university colleges alone was growing slightly. However, in the 2010/2011 academic year, when CAS started to operate for the first time, enrolment had grown from 123 434 students in the 2009/2010 academic year to 135 367 students in the 2010/2011 academic year. This was an increase of 11 933 students at universities and university colleges alone (see Figure 6.2.). This increase was affirmed by Imani (admissions officer, TCU, 16 August 2013) during interview that partly was due to the increase of the number of HEIs and the establishment of CAS as it has widened the chance for applicants to choose many programmes from various institutions with the same cost, thus increasing the chance of the applicants being selected.

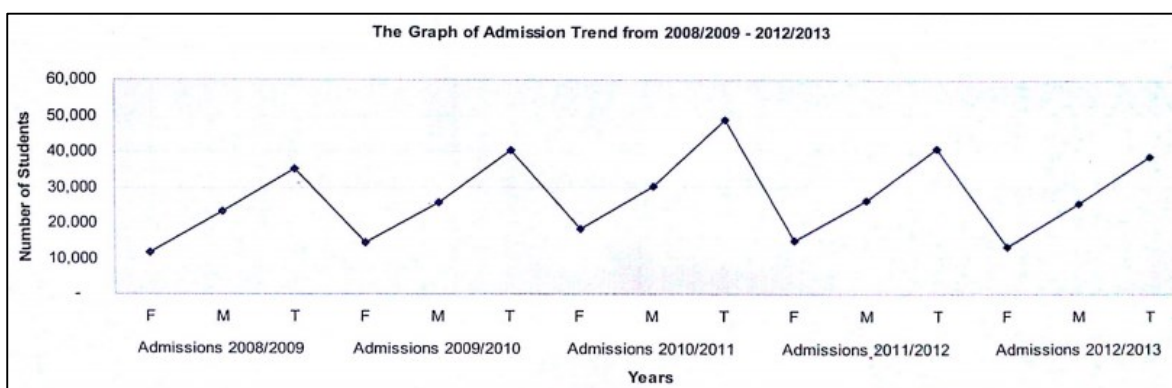
Figure 6.2 The enrolment trend at public and private universities over five academic years from 2006/2009 (before the CAS) to 2010/2011 (when the CAS was introduced).



(Source: TCU, 2011).

The increased enrolment trend provides an indication that there is increased access to higher education in the country. Sociotechnical analysts argue that automation of public services helps to increase the access of the services to the majority who may access them within their places of domicile by incurring lower costs (e.g. Beniwal and Sikka, 2013). Nonetheless, despite the presence of the CAS, with its goal of increasing access to higher education, there was a decline in the admission trend from 48,690 to 40,773 applicants selected in the 2010/2011 and 2011/2012 consecutive admissions cycles, respectively. The decline continued further in the 2012/2013 admissions cycle when there were only 38,617 selected applicants (see Figure 6.3).

Figure 6.3 The trend in admissions before and after the establishment of the CAS to 2012/2013 academic year



(Source: TCU, 2013).

Figure 6.3 shows that there was an increase of about 12 000 applicants between the period of 2008/2009 academic year (when admissions were manual) and in 2010/2011 when the CAS was operational for the first time. Caiser (admissions officer, NACTE, 16 August 2013) argues that the increase in enrolment occurred because of two possible reasons – first the increase of HEIs in the country (see chapter 2 – CAS participating HEIs); and on the other hand, the CAS ability to eliminate multiple admissions contributed to the increase of the number of selected applicants because one could only be admitted in a single institution as opposed by the previous manual admissions whereby an applicant could be admitted by more than three institutions, thus limited the chance for other applicants to join HEIs. As Caiser (admissions officer, NACTE) explains:

Before the introduction of the system, most applicants had no wider access to programmes selection from different institutions due to decentralised admission system and other financial constraints that made them to apply to only one institution. But with CAS, applicants are given wider choices, and the problem of multiple selection has been controlled by the system (16 August 2013).

A similar response was also offered by Imani, who said that: ‘the increase of admissions happened due to the fact that during manual admission system, the multiple admissions denied other qualified applicants to join HEIs’ (admissions officer, 16 August 2013). Even if the number of multiple admissions has decreased to a large extent, this is only for the admissions that are processed through the CAS. Still there are multiple admissions that are caused by the non-CAS institutions due to the fact that there are some applicants who still apply through the CAS and directly to the institutions (non-CAS institutions); hence, they cause multiple admissions as they are selected in both systems (the CAS and the manual systems). What does this imply? When admissions from non-CAS institutions are merged with those of CAS, there occurs several applicants who are admitted through CAS and non-CAS HEIs, hence causing such multiple admissions. Prosper (system administrator, TCU, 5 July 2013) explained that this has been common due to the presence of non-CAS institutions and he views this as the main obstacle to the ideal of ‘all admissions, at a single point’.

From above findings, one may argue that there might be some applicants who qualify to join HEIs who are still denied such opportunities due to the presence of non-CAS institutions that attract some applicants to apply using both the CAS and manually applying direct through non-

CAS HEIs. However, this is the result of running parallel systems within one major system of governance (higher education governance system). The institutions that resist joining the CAS are accountable for the on-going multiple admissions that reduce higher education regulatory agencies drive towards the total elimination of multiple undergraduate admissions and the promotion of automated quality control of admissions.

During interviews with admissions officers, it was affirmed that the CAS has helped to have the timely admissions and improved access to admissions information. Delays in the processing of undergraduate admissions were very common in HEIs. Such delays had consequences for the opening of HEIs and loan allocation to the selected applicants. However, with the introduction of the CAS, admissions to higher education are timely processed, and this has made higher education academic years commence on time. Also, the HESLB is able to allocate loans to the selected applicants on time. As Mwanjonda explained:

Among the issues that are serious in HEIs includes the students' strikes. These occur due to various reasons, including the delay in disbursing the loans to the qualified and selected applicants. During manual admissions, this was contributed by the delay of institutions to submit the names of selected applicants for loan allocation. However, centralization of admissions through the CAS has helped us to allocate loans on time ... Yes, institutions also benefit because if strikes persist for more than three days, a particular institution can be closed as per regulations I can say that strikes have reduced to a reasonable extent if you compare with the time when admissions were manual (government officer, HESLB, 22 May 2013).

The researcher probed further to understand why there was such a delay in submitting the lists of selected applicants from institutions. Mwenda clarified:

You know, handling huge applications manually is difficult and labour intensive, and the challenging part of it was keying in applicants' information, an exercise which was subject to many errors including entering wrong examinations grades and wrongly spelled names of applicants. This contributed to some applicants' disqualification for loans due to dishonest information. But such errors are not common if admissions are processed through the CAS (admissions officer, SJUT, 30 May 2013).

Apart from the timely processing of admissions, it was reported that access to admissions information, particularly statistical data, has been improved due to automation and centralization of the admissions. Such data are in high demand for researchers, government, policy makers and planners. By centralizing admissions through the CAS, stakeholders may access the admission statistics conveniently with high customization. As Caizer described:

In previous years, information on admissions was not easily manageable and obtainable. Every institution had its own way of submitting admissions data and was not time conscious. Some admissions officers submitted the information in different formats, which made difficulties to synchronize them in usable form. Today, such reports are easily customizable through the system and are conveniently available (admissions officer, NACTE, 16 August 2013).

In analysing the CAS portal to triangulate such information, it was further revealed that most of the information related to admission reports is readily available in the CAS. Soon after processing the admissions, one would easily access various admissions reports direct in the system. Prosper (system administrator, TCU, 05 July 2013) explained that these reports are accessible to the CAS-participating institutions through the CAS control panel, whereby each institution may access only the selection reports belonging to its institution. On the other hand, the public may access such reports by requesting them from TCU based on their needs. As reported by Hyera:

The CAS database can generate various reports that are customizable, but they are not directly accessible to everyone. Anybody who needs such reports has to request by writing the letter showing the type and purpose of the report that is requested ... Normally, these reports are based on the client's needs. Such clients include the Ministry of Education and Vocational Training, researchers, the National Bureau of Statistics, banks, etc. This is purposely done for the sake of securing the system (admissions officer, IAA, 30 May 2013).

Heeks and Bailur (2007) contend that ICT-based e-Governance systems help the public to have open access to information necessary for various purposes, including research and the government planning. This reflects the benefits of the CAS because stakeholders in higher

education are now able to access admissions information from a single point. This aligns with the e-Governance initiatives' goal to provide efficient access to information and services for the citizens. Therefore, strong commitments from higher education regulatory agencies to revisit the old manual admission systems are important for this area of computerization in institutions. The CAS should not be mistaken for income generation but should instead be viewed as a tool to promote quality not only in undergraduate admissions but also in terms of the quality of the higher education admissions information. In fact, the implementation of the CAS has facilitated the availability of consistent admissions statistics from a single source (database), thereby removing the bureaucracy of getting such information as it was experienced in the past. Porter and Cunningham (2005, p. 90) argue that one of the benefits of new technology in the public sector is that it is 'certainly convenient and provides advantages in consistency of information'.

The timely processing of admissions consequently helps the timely allocation of students' loans. As seen above, the task of processing admissions and the availability of admission data have been essential to the appropriate consideration and allocation of students' loans by the HESLB. This board offers loans to selected applicants based on its set measures and standards. However, any applicant is only eligible for a loan if she or he has secured admission from one of the HEIs. Thus, all loan beneficiaries are students who have been admitted after the selection has been processed through the CAS (where all qualified applicants are selected and their names are later sent to HESLB for a loan consideration). Basically, loan allocation was cumbersome in the past, but with the introduction of the CAS, most of the loan allocation problems have been sorted out. As Brown stated:

The system has helped us to make our decisions regarding timely loan consideration and allocation. You know, delays of loans cause a lot of problems in HEIs, such as students' strikes and boycotts. Today, such cases are very few since CAS has propelled the timely selection of students and hence timely allocation of loans (government officer, MoEVT, 16 August 2013).

Mwanjonda (government officer, HESLB, 22 May 2013) added that institutions' manual selection caused many problems for the HESLB, especially a delay in submitting the lists of selected applicants for loan consideration and allocation. As previously explained, that the details of manually selected applicants were associated with several typing errors, such as the

incorrect spelling of applicants' names, and the fact that academic credentials that are essential for applicants to be considered for loan were inaccurately entered. Indeed, one of the main purposes of the CAS was to reduce the admission irregularities that caused some applicants to receive loans from different institutions due to multiple admissions. Brown's (government officer, MoEVT, 16 August 2013) argument was further explained by Sharifa (admissions officer, RUCO, 30 July 2013), who insisted that: 'applicants received more than one loan due to multiple selections'.

From above explanations, it can be argued that due to multiple selections, one student was able to receive loans from the different institutions to which he or she had been admitted. The implication was that other loan applicants could not benefit from the scheme. Nevertheless, such occurrences suggest that they were also attributed to the manual processing of loans by the responsible agency. This study noted that currently the processing of loans has been automated as well, and applicants now lodge their loan applications through the Online Loan Application System (OLAS). In light of the discussion above, the advantages of the CAS are summarised in the list below:

1. enhanced quality assurance in admissions;
2. convenience and improved access to admission services;
3. cost and time saving;
4. acquisition of basic ICT skills;
5. control of corruption and nepotism in admissions;
6. elimination of multiple admissions and increased admission trend;
7. timely admissions and improved access to admission information; and
8. timely allocation of students' loans.

6.3 DISADVANTAGES OF THE CAS

While the purpose and focus of CAS remains promising, the overall objective of improving the coordination of admissions and the effort to improve higher education admissions service delivery through this system is also accompanied by various disadvantages as reported by the respondents of this study. Indeed, the applicants who are main users of the system, particularly those from rural areas have been disadvantaged in terms of accessing the services delivered by

the system. This has been attributed for example by income differences (i.e. poverty), remote social environment with poor social services particularly absence and or unreliable electricity and internet services. This darker side of the CAS is rarely reported in favour of the system. Instead, applicants staying in towns who are already privileged in terms of income and ICT infrastructure have tended to benefit from accessing and using the CAS.

Invariable loss of skills by workers at the workplace is another disadvantage of the CAS implementation in HEIs. In fact, the admissions officers were employed based on the skills that were found essential in assisting the processing of admissions in HEIs. However, these skills are slowly diminishing after automating undergraduate admissions. As Josiah (admission officer, MNMA, 7 January 2014) states that the introduction of CAS in HEIs has also implications for deskilling of the admissions officers' jobs, a subject which was discussed in chapter 4.

Further exploration has indicated that while most applicants from private secondary where ICT basic skills are taught enjoyed applying through the CAS; most of applicants from public secondary schools had to hire people particularly internet café attendants or their colleagues to apply for them. In fact, most public secondary schools are not yet equipped with the ICT facilities, thus the students from these schools graduate without basic ICT skills when compared to their colleagues from private secondary school. This can be attributed by the government's failure to invest more in ICTs in secondary schools country-wide, with a few exceptions (Alphonse, CAS applicant, 9 July 2013). Such failure implies the widening gap between applicants from poor families and those from families with a good income who are digitally advantaged (they learn ICTs at school and access ICT facilities at home). The impact of the CAS on reskilling admissions officers was also examined and the findings have shown that the admissions officers experienced the re-skilling effect in the course of using the system and supporting applicants during the application period (see section 5.3 for more discussion). This is an indication that applicants who are digitally advantaged (especially those from families with a earning a good income) and those who are digitally disadvantaged (who lack ICT skills) whose knowledge base of ICT will continue to differ greatly after completing their advanced secondary education. Therefore, it is a good indicator for the government to make investment on ICT facilities particularly in public schools where majority of the students from poor families are studying.

Disadvantages were also reported upon the applicants from upcountry who incurred additional costs during the application sessions. Such additional costs were explained in two contexts: first, applicants from upcountry had to travel to urban centres to access the internet. Some of these applicants had to pay for accommodation and meals as they were not able to return to their homes (Joel, system developer, UCC, 5 July 2013). On the other hand, the applicants who used mobile phones (see section 6.2) also incurred additional costs; in fact, twice as much as compared to those who applied using the internet. For example, those who used mobile phone SMS to apply through the CAS had to pay TZS 150 (about US\$ 0.1) for every SMS sent to the CAS database. This cost was higher for some applicants, especially when one faced difficulties in completing the registration and application process. Consequently, such applicants decided to send several messages which were also charged. Sharifa (admission officer, RUCO) explained that:

Applicants were not used to mobile phones. They made several mistakes in registration and normal phones are not user friendly for application exercise which takes a long time to complete. We had some cases where some applicants even used the same mobile phone for application and that made it difficult to understand the exact owner of a particular application as the phone number was the important identification for SMS applicants (30 July 2013).

Because of mistakes committed by applicants who used mobile phone SMS, they had to repeat the exercise several times without success. In so doing they had to pay more money. This comes from very simple analysis, that if one SMS was charged TZS 150, it means every 10 SMS sent to the CAS database, one had to pay TZS 1500 (which is equivalent to the costs of internet per one hour). This suggests that many opted to use the internet rather than the mobile phone SMS. Moreover, it is an indication that the issue of costs and usability for SMS applicants was not given attention by the CAS developers and implementers, rather than advocating the 'convenience' as the main advantage of using mobile phone in application. It was further reported that most applicants who failed to complete their application through mobile phone SMS visited the TCU offices for further assistance. According to Josiah (admission officer, MNMA, 7 January, 2014) reports that some applicants requested to switch from the SMS application (which was testified to be difficult) as the internet alternative. Hence, the SMS application method has been temporarily stopped since the 2011/2012 admissions cycle due to the above experiences. The implication of this is that applicants residing in rural areas where

the internet access is a problem still have to travel at least to district headquarters to get internet services. In fact, the above verdict offers an indication that there was inadequate and possibly a hasty preparation by the CAS implementers to decide on the use of the SMS (mobile phones) application, which was thought to be a solution for those who have limited access to the internet.

While it has been strongly established that the CAS is capable to reduce undergraduate admissions malpractices, the system is claimed to depreciate the income generation in HEIs because application fees was one of the major sources of income in HEIs. Establishing the CAS has made some institutions which do not get subsidies from the central government (e.g. private universities) to suffer in some ways. The implication of this is putting more charges on applicants by establishing new contributions in HEIs. Some private universities have even attempted to increase their tuition fees so as to fill that gap.

To admissions officers, while the system has reduced the workload, it has caused the ending of the extra pay that was part of motivation or reward after completing the manual selection and admissions. The CAS has also detrimentally affected workplace socialization within HEIs as well as the workplace relations between HEIs, TCU and NACTE.

6.3 CONCLUSION

Generally, the advantages and disadvantages of the CAS as one of the e-Governance projects in higher education in Tanzania are almost the same as those of other centralised admissions systems in developing and developed countries. The differences could only result from the fact that such a system faces more serious challenges in developing countries than in developed countries as a consequence of their disadvantaged technological and social circumstances in the deployment and limited use of e-Governance services. Most commentators view the CAS as having many advantages (e.g. enhanced quality assurance in admissions, convenience and improved access to admission services, cost and time saving, acquisition of ICT skills, control of corruption and nepotism in admissions, elimination of multiple admissions and increased admission trend, timely admissions and improved access to admission information, and timely allocation of students' loans).

This study has established that the system is responsible for depreciating the income generation activities in HEIs because application fees are no longer paid to these HEIs. Such effect has been also reported by admissions officers who were earned extra income during manual admissions. Also cost saving seems to play a double role whereby; while some applicants do save the costs, there are other applicants who bear additional costs. Remote accessibility is one of the mission of implementing e-Governance projects; essentially, with the purpose of removing boundaries to accessing public services instead of the citizens traveling physically to the institutions for enquiring/acquiring and delivering various public service transactions manually. While it is argued that the CAS helps applicants from upcountry to register and apply at home remotely without physical visits to HEIs as used to be during manual application, such advantage has been possible particularly for those who have efficient access to the internet and other related ICT facilities.

CHAPTER 7

CONCLUSION AND RECOMMENDATIONS

7.1 INTRODUCTION

This chapter provides concluding comments on the implementation practices of CAS in Tanzania's higher education system. The study sought to understand the influence of the CAS on work organization, the CAS implementation challenges, the advantages and disadvantages of the system and the role played by the system in admissions quality assurance and improvement of the overall admissions service delivery in the country. Chapter offered an overview of how the study was conducted. The key aspects of research design and methodology were briefly discussed. The willingness of applicants, admissions officers, and other key stakeholders of the CAS (e.g. system developers, government officials) to participate in the study was ensured. The findings that led to the conclusions of this study were gathered from personal interviews and documentary analysis. The interviews data were managed and analysed using Nvivo QSR. Significantly both the positive and negative sides of the CAS implementation were established.

On the basis of the study results discussed in Chapters 4, 5 and 6, the following is a summary of the key conclusions drawn from this study. Chapter one provided the theoretical framework of the present study which was discussed in line with different literature that informs the study. Sociotechnical theoretical conceptualizations were deployed to explain the literature on e-Governance implementation in the public sector. Several examples of e-Governance and e-Government studies were highlighted with a discussion of the impacts, costs, advantages, disadvantages, and challenges. A brief discussion on the implementation of e-Governance from Africa and other regions was incorporated and presented.

7.2 SUMMARY OF THE FINDINGS

Chapters 4 dealt with the presentation and discussion of the findings that are related to objective one. The findings related to objective two related to objective three. For the purpose of

reference, the said research objectives are hereby revisited - objective (1) examines whether and how the implementation of the CAS influences work organisation and workplace relations in HEIs; objective (2) explores the sociotechnical challenges of implementing the CAS in Tanzania's higher education system; and objective (3) explores the advantages and disadvantages of the CAS in its efforts to improve admissions service delivery and quality assurance in HEIs.

7.2.1 Objective 1: CAS Influence on Work Organisation and Workplace Relations in HEIs

This study reveals an array of admissions officers' perceptions on the influence of the CAS on admissions work organization and workplace relations in HEIs. The interviews with these admissions officers confirmed that CAS has been responsible for replacing the admissions officers' tasks and jobs which are part of their previous job descriptions in HEIs. Workplace relations as well as relation between HEIs and the TCU and NACTE has taken a new shape with the decrease in physical meetings and other face-to-face sessions which were reported to be very common during manual processing of admissions.

Admissions officers believed that the introduction of CAS in HEIs has been the source for decrease of their physical interaction with applicants and their parents and guardians who used to visit HEIs to secure admissions and academic guidance on matters related to higher education studies. Currently, due to the automation of the admission work processes such people rarely visit these institutions and when that happens, it is particularly for those who are living near the institutions. Moreover, some institutions used to conduct oral interviews with selected applicants to verify if they real need to pursue studies in medical related programmes. However, it was reported that this is no longer done because once an applicant is selected through the CAS cannot be given re-examined as to whether he/she fits in such programme.

7.2.2 Objective 2: Sociotechnical Challenges of Implementing the CAS in Tanzania's HEIs

The present study shows that the CAS implementation faces myriad challenges: access issues (digital divide), resistance to change, poor ICT facilities, unreliable electricity, unstable internet connectivity, costs of the internet, lack of basic ICT skills among applicants, and lack of enough IT experts. Applicants who are the major users of the CAS have been facing these challenges in the course of accessing the CAS services. Digital divide/inequality remains to be among the main challenges facing the applicants of the CAS. It was reported in this study that some applicants had to hire the attendants of the internet café to apply for them. Even if some interviewees reported the 'cost saving' as advantage of CAS, some of them testified this as a big challenge particularly among applicants from poor families who had to incur the cost of application (TZS 50 000, the cost which some viewed it as high for one to afford) and the cost of accessing the internet, and sometimes the costs for accommodation and meal for applicants from upcountry.

Poor connectivity of the internet and unreliable electricity was said to impose additional costs among CAS users particularly applicants. It was informed that, slowness of the internet made the application exercise not to be completed within subscribed time (in terms of an hour), thus in some cases one had to pay more money for accessing the internet. Also the electrical cut-off was mentioned to be a contributing factor as some could not complete the application process due to the electricity problems. Moreover, lack of awareness to the CAS users was also raised as the challenge to the implementation of the system. Currently the on-going awareness was said to be insufficient and not properly targeted to prospective applicants who mostly are easily available in advanced level secondary schools. Payment challenges were also reported as facing the CAS implementation. For example, Diploma applicants tended to confuse mode of payment, instead of paying through M-Pesa they purchased the TCU scratch cards (cards that entail the numbers used by applicants to register into the CAS). Furthermore, some of applicants who paid the money using M-Pesa did so by sending it to wrong institution (e.g. instead of paying to NACTE, they forwarded the payments to NECTA).

This study also witnessed most of the unanswered queries of voluminous emails that were sent by applicants mostly from regions outside Dar es Salaam city. Applicants requested several clarifications and assistance on matters related to admissions but their email queries were not attended.

7.2.3. Objective 3: Advantages and Disadvantages of the CAS in its efforts to Improve Admissions Service Delivery and Quality Assurance in HEIs

The establishment and implementation of the CAS has been advantages to some and disadvantages to others. The present study has established both the advantages and disadvantages of the system to applicants, HEIs and regulators. Among the advantages of the system in its efforts to improve admissions service delivery and quality assurance in HEIs include: enhanced quality assurance in admissions, convenience and improved access to admission services, cost and time saving, acquisition of ICT skills, control of corruption and nepotism in admissions, elimination of multiple admissions and increased admission trend, timely selection and admissions, improved access to admission information, reduced workload among admissions officers, and timely allocation of students' loans.

On the other hand, disadvantages were also reported by respondents most of which were: resistance to the CAS (change), invariable loss of prior admission skills among admissions officers, limited access to the CAS services among the applicants from remote areas, loss of income generated by application fees in HEIs and the cost burden to some applicants from poor families (costs for application TZS 50 000 and accompanied costs when one had to travel from rural areas to the district level where at least there are services (banking services, internet and electricity).

7.3 RECOMMENDATIONS

There are measures that can be put in place to improve the implementation of the CAS in Tanzania's HEIs.

- The admissions officers in HEIs have already expressed their need for training for training so as they can be able to interact with the system more effectively. The CAS being the admission tool for HEIs, it raises the needs to offer training to its key holders who are supposed to understand the system and offer support to applicants. For example, key stakeholders are supposed to understand how selection is done, the concern which is of many CAS users.
- Most of the CAS prospective applicants are available in advanced secondary schools, thus these are ideal places for conducting awareness on how to use the system.
- There is a need to empower the prospective users of the CAS by teaching them the basic ICT skills when they are in secondary schools. It is a call for government to acknowledge that automation of the admissions needs prospective applicants to have at least basic ICT skills, thus the need for installing networked computers in high schools is important.
- The CAS implementers also need to explore the option of addressing applicants' queries instantly online as enquiries through emails has proved to be inefficient due to the availability of many applicants' queries that were channelled through emails (i.e unanswered emails). Additionally, information related to the CAS needs to be made available for easy access. Brochures, video clips, posters, FAQs – are all necessary for providing various illustrations to applicants on how to register and apply through the system. These are essential based on the raised sociotechnical challenges.
- The CAS implementers should use the sociotechnical approach whenever they make upgrade of the system. This is essential because system developers (who normally upgrade the system) are not users of the system), thus users' involvement or making them aware of the upgrade and changes done into the system is important.
- It is also suitable for TCU and NACTE to develop a capacity building roadmap that will ensure the successful implementation of the CAS.

Reflecting on the study contribution, therefore we can argue that:

- Sociotechnical analysis is an ideal approach for studying the services that involve the social system as an 'ensemble view' of understanding technological innovation and the society.
- This study has widened the theorization and examination of the e-Governance implementation in the context of regulated services by explaining the complex nature of such services as exemplified by the CAS.

- The study has tried to explain the way ICT can efficiently be deployed and used in the area of higher education quality assurance, thus contributing to the knowledge on the how ICT can be used in controlling admissions malpractices and improving admissions service delivery.
- Apart from the benefits or advantages that are continuously advocated as the results of ICT deployment in public service delivery, this study has portrayed all the other sides of the technological innovations including the challenges, disadvantages and the costs.

7.4 FUTURE RESEARCH DIRECTIONS

This research aimed to understand the implementation practice of the CAS in undergraduate admissions to Tanzania's HEIs using qualitative methods. This study identifies some areas for future research since not all aspects that deserve scholarly examination were covered because of the limited nature of the case study.

Future research therefore needs to include quantitative methods that involve a large sample of applicants so as to understand the critical sociotechnical challenges in the course of accessing the system. A longitudinal study needs to be conducted to track the challenges of the ICT skills required as the system becomes familiar to the prospective applicants in the country.

The influence of the CAS on the organization of admissions to HEIs has only been explored as a theme in this study. Thus, a dedicated study needs to be conducted to investigate the theme – in particular, of the labour process in the context of transition from decentralized manual admissions to centralized automated admissions. Future research on this issue would provide insights into how diverse people in different areas adopt ICTs. Future research on the CAS stakeholders' analysis (institutional perspectives) is also required in order to assess what does and what does not work in the exercise of operationalizing and implementing the CAS. Conclusively, further research is required for deeper understanding of the nature of the digital divide and its influence in allowing applicants to access online admissions services.

7.5 CONCLUSION

Despite the available challenges as reported in this study, the CAS has been an important ICT tool in improving admissions service delivery and quality assurance in Tanzania. The researcher is of the opinion that, with the decision to invest more on ICT in schools, there is a possibility of reducing several challenges facing applicants particularly those related to digital inequality between those who are ICT advantaged and those who are ICT disadvantaged (applicants from remote and poor families). Training for admissions officers has to be taken seriously as these are the focal people who can provide a reliable and convenient support to applicants due to their position in HEIs. It was interesting to find that majority of the admissions officers are in favour of the CAS despite the fact that the system has taken most of their admissions tasks. They view the system as playing an assistive role in reducing their workload and paper based manual processing of admissions in HEIs. As the system has no serious influence on their profession (particularly loss of job and or on their wage), admissions officers insisted only on the aspect of training for them to cope with the on-going system upgrade. Nevertheless, automation of admissions on the other side of the coin is viewed as disadvantage to HEIs, particularly in terms of income loss, since this was one of the guaranteed income generation activities in HEIs. The researcher is of the opinion that this could be one of the reasons for some HEIs to resist joining the CAS. The fact that most of the HEIs are admitting their students through the CAS provides a good starting point for regulatory agencies to continue revising the best way of attracting the remaining non-CAS HEIs to join the system. The researcher considers the admission through the CAS be done together with the effort to increase awareness and encourage the prospective applicants for higher education to learn the basic ICT skills prior to completion of their secondary education. This would be a big pace for such prospective applicants to cope with the continuous revolution of the public sectors that is taking place in the name of 'e-Governance' or 'e-Government'. Thus it would also be helpful for them not only during application for admissions, but also when they join HEIs where ICT-assisted services are becoming part of the institutional growth.

BIBLIOGRAPHY

Abdel-Hamid, T. K., and Madnick, S.E. 1990. "The Elusive Silver Lining: How We Fail to Learn from Software Development Failures". *Sloan Management Review*. Vol. 32 pp. 39–48.

Abel, W.S. 2010. Higher Education and Development: A Critical Nexus. Key Paper Presented to SARUA Workshop on Investment in Higher Education for Development: New Directions held in August 2010, University of Dar Es Salaam, Tanzania.

Abu-Shanab, E.A., and Bataineh, L.Q. 2014. "Challenges Facing E-government Projects: How to Avoid Failure?" *International Journal of Emerging Sciences*. Vol. 4(4) pp. 207-217.

Adler, P.S. 1997. Work Organization: From Taylorism to Teamwork. IRRA's 50th Anniversary Magazine of Jan 21, 1997.

Adler, P.A., and Adler, P. 1994. "Observational Techniques". In: Denzig, N.K., and Lincoln, Y.S (Eds.). *Handbook of Qualitative Research*. Thousand Oaks, New Delhi: Sage Publications.

Akrich, M. 1992. "The De-Description of Technical Objects". In: Bijker, Wiebe E. and Law, J. (eds.). *Shaping Technology/Building Society. Studies in Sociotechnical Change*. Cambridge: The MIT Press.

Alawadhi S., and Morris A. 2008. "The Use of the UTAUT Model in the Adoption of E-government Services in Kuwait". *Proceedings of the 41st Hawaii International Conference on System Sciences*, pp. 1-11.

Al Bakr, W.R.E. 2009. "Towards an e-Government: the case of the Emirate of Dubai". PhD Thesis. London: University of Westminster.

Alberts, D.S. 1996. *Unintended Consequences of Information Age Technologies: Avoiding the Pitfalls, Seizing the Initiative*. Washington: NDU Press Book.

Ali, D., Jayousi, R., Villalba, L.J.G., and Abbas, C.J.B. 2011. "The Jordanian eGovernment Initiatives within the Context of the Socio-technical Model". ICIT 2011 The 5th International Conference on Information Technology. Alzaytoonah: Alzaytoonah University.

Al-Jaghoub, S., Al-Yaseen, H., and Al-Hourani, M. 2010 "Evaluation of Awareness and Acceptability of Using e- Government Services in Developing Countries: The Case of Jordan". *The Electronic Journal Information Systems Evaluation*. Vol. 13(1) pp. 1 - 8.

Alshehri, M. Drew, S., and Alfraaj, O. 2012. "A Comprehensive Analysis of e-Government Services Adaption in Saudi Arabia: Obstacles and Challenge." *International Journal of Advance Computer Science and Applications*. Vol. 3(2) pp. 1-6.

AlShihi, H. 2006. "Critical Factors in the Adoption and Diffusion of E-government Initiatives in Oman". PhD Thesis. Victoria University.

Amit, R., and Zott, C. 2001. "Value Creation in e-Business". *Strategic Management Journal*. Vol. 22 pp. 493-520.

Andersen, K., and Henriksen, H. 2006. "E-government maturity models: Extension of the Layne and Lee model". *Government Information Quarterly*. Vol. 23, pp. 236-248.

Al Nag, E. 2009. "Computerization and e-Government Implementation in Jordan: Challenges, Obstacles and Successes". *Government Information Quarterly*. Vol. 26(4) pp. 577–583.

Amoretti, F. 2009. *Electronic Constitution: Social, Cultural, and Political Implications*. Hershey: Information Science Reference.

Atkinson, P. 1995. *Medical Talk and Medical Work*. London: SAGE

Attewell, P., and Rule, J. 1984. "Computing and Organizations: What We Know and What We Don't know". *Communications of the ACM*. Vol. 27 pp. 1184-1192.

Baark, E., and Heeks, R.B. 1999. "Donor-funded Information Technology Transfer Projects". *Information Technology for Development*. Vol. 8(4) pp. 185-197.

Babbie, E. 2007. *The Practice of Social research; (11th Ed.)*. Belmont: Wadsworth Thomson Learning.

Babbie, E. 2001. *The Practice of Social Research; (9th Ed.)*. Belmont: Wadsworth Thomson Learning.

Backus, M. 2001. *E-governance and Developing Countries: Introduction and Examples*. The Hague: The International Institute for Communication and Development.

Bakari, J.K. 2013. First Pan-African Conference on the Continent's Transformation and Emergence: Towards Efficient use of ICT (e-governance) as a Tool of Transformation and Emergence Process. Conference Proceeding. Kinshasa - Democratic Republic of Congo 18 - 20 November 2013.

Baker, P. M. A., and Bellordre, C. 2003. "Factors Influencing Adoption of Wireless Technologies Key Policy Issues, Barriers, and Opportunities for Persons with Disabilities". *Information Technology and Disabilities*. Vol. 27(2). Retrieved on April 17, 2015, from <http://www.rit.edu/~easi/itd/itdv09n2/baker.htm>

Barrantes, P. 2007. "Analysis of ICT Demand: What Is Digital Poverty and How to Measure It?" In: Galperin, H., and Mariscal, J (Eds). *Digital Poverty: Latin American and Caribbean Perspectives*. Ottawa: International Technologies Publications Ltd.

Barrett, M., Sahay, S., and Walsham, G. 2001. "Information Technology and Social Transformation: GIS for Forestry Management in India". *The Information Society*. Vol. 17 pp. 5–20.

Baum, C., and Di Maio, A. 2000. Gartner's Four Phases of e-Government Model. Gartner Group.

Bauer, M. (Ed.). 1997. *Resistance to New Technology: Nuclear Power, Information Technology and Biotechnology*. Cambridge University Press.

Beer, M., Eisenstat, R. A., and Spector, B. 1990. "Why Change Programs Don't Produce Change". *Harvard Business Review*. Vol. 68(6) pp. 158-166.

Beirne, M., and Ramsay, H. 1992. "Manna or Monstrous Regiment? Technology Control and Democracy in the Workplace". In: Beirne, M., and Ramsay, H. *Information Technology and Workplace Democracy*. London: Routledge.

Beniwal, V.S., and Sikka, K. 2013. "E-Governance in India: Prospects and Challenges". *International Journal of Computer and Communication Technology*. Vol. 4(3) pp.1-5.

Benjamin, R.I., and Blunt, J. 1992. "Critical IT issues: The Next Ten Years". *Sloan Management Review*. Vol. 33(4) pp. 7-19.

Berg, B.L. 2001. *Qualitative Research Methods for the Social Sciences (4th Ed.)*. Needham Heights, MA: A Pearson Education Company.

Berg, M. 1998. "The Politics of Technology: On Bringing Social Theory into Technological Design". *Science, Technology, and Human Values*. Vol. 23 pp. 456-490.

Berg M., Langenberg, C., Berg, I.V.D., and Kwakkernaat, J. 1998. "Considerations for Sociotechnical Design: Experiences with an Electronic Patient Record in a Clinical Context". *International Journal of Medical Informatics*. Vol. 52 pp. 243-251.

Beyer, H., and Holtzblatt, K., 1999. "Contextual Design". *Interactions*. Vol. 6 (1) pp. 32-42.

Bhatnagar, S. 2004. *E-Government: From Vision to Implementation - A Practical Guide With Case Studies*. New Delhi: Sage Publications India Pvt Ltd.

Bhuiyan, S.H. 2011. "Modernizing Bangladesh Public Administration through e-Governance: Benefits and Challenges". *Government Information Quarterly*. Vol. 28(1) pp. 54-65.

Bijker, W. E. 2001. "Social Construction of Technology". In: Smelser, N. J., and Baltes, P. B (Eds.). *International Encyclopedia of the Social and Behavioural Sciences*. Vol. 23, pp. 15522-15527. Oxford: Elsevier Science Ltd.

Bijker, W. E. 1997. *Of Bicycles, Bakelites, and Bulbs: Toward a Theory of Sociotechnical change*. MIT press.

Bijker, W.E. 1995a. Sociohistorical Technology Studies. In Jasanoff, S., Markle, G.E., Peterson, J.C. and Pinch, T. (Eds.). *Handbook of Science and Technology Studies*. Thousand Oaks, Calif: SAGE.

Bingham, W.V.D., and Moore, B. V. 1959. *How to Interview (4th Ed.)* New York: HarperCollins.

Black K. 1986. "The Information Poor". RQ. Vol. 25(4) pp. 517–518.

Boeije, H.R. 2010. *Analysis in Qualitative Research*. London: SAGE Publications Ltd.

Boreham, P., Parker, R., Thomson, P., and Hall, R. 2008. *New Technology @ Work*. New York: Routledge.

Bostrom, R.P., and Heinen, J. S. 1977. "MIS Problems and Failures: A Sociotechnical Perspective Part II: The Application of Sociotechnical Theory". *MIS Quarterly*. Vol. 1(4) pp. 11–28.

Bowker, G., Star L., Turner, W., and Gasser, L. 1997. *Social Science, Technical Systems, and Cooperative Work*. Erlbaum: Mahwah, NJ.

Braverman, H. 1974. *Labour and Monopoly Capital: The Degradation of Work in the Twentieth Century*. New York : Monthly Review Press.

Bresnahan, Timothy F., Erik Brynjolfsson, and Lorin M. Hitt, 2002. "Information Technology, Workplace Organization and the Demand for Skilled Labour: Firm-Level Evidence". *Quarterly Journal of Economics*. Vol. CXVII pp. 339-376.

Brown, J. S., and Duguid, P. 2002. *The Social Life of Information*. Harvard: Harvard Business Press.

Bryman, A. 2012. *Social Research Methods (4th Edition)*. Oxford: Oxford University Press.

Bryman, A. 2004. *Social Research Methods (2nd Edition)*. Oxford: Oxford University Press.

Buchanan, D. 1993. "Recruitment Mode Affecting Informant Response". *Journal of Management Studies*. Vol. 30(2) pp. 297–313.

Buckley, R., and Caple, J. 2009. *The Theory and Practice of Training (6th Edition)*. Haryana: Replika Press.

Bwalya, K.J. 2009. "Factors Affecting Adoption of e-Government in Zambia". *Electronic Journal of Information Systems in Developing Countries*. Vol. 38(4) pp.1-13.

Callon, M. 2012. "Society in the Making: The Study of Technology as a Tool for Sociological Analysis". In: Bijker, W. E., Hughes, T. P., Pinch, T., and Douglas, D. G. *The social construction of Technological Systems: New Directions in the Sociology and History of Technology*. Massachusetts: MIT press.

Cascio, W.F. 2000. "Managing a Virtual Workplace". *The Academy of Management Executive*. Vol. 14(3) p. 81-90.

Cascio, W., and Zammuto, R. 1987. *Societal Trends and Staffing Policies*. Denver: University of Colorado Press.

Carter, L., and Belanger, F. 2004. "Citizen Adoption of Electronic Government Initiatives". In Proceeding of the 37 Hawaii International Conference on System Sciences.

Charles, T. 1989. *New Technology and Work in the Future*. New Delhi: Gian Publishing House.

Chatman, J. A., and Jehn, K. A. 1994. "Assessing the Relationship between Industry Characteristics and Organizational Culture: How Different Can You Be?". *Academy of Management Journal*. Vol. 37(3) pp. 522-553.

Chen, Y., and Chu, P. 2012. *Electronic Governance and Cross-Boundary Collaboration: Innovations and Advancing Tools*. Hershey: Information Science Reference.

Chen, Y., Chen, H.M., Ching, R.K.H., and Huang, W.W. 2009. "Electronic Government Implementation: A Comparison between Developed and Developing Countries". In: Khosrow-Pour, M. *E-Government Diffusion, Policy, and Impact: Advanced Issues and Practices*. Hershey: IGI Global.

Cherns, A. 1987. "Principles of Sociotechnical Design Revisited". *Human Relations*. Vol. 40(3) p. 153.

Cherns, A. 1976. The Principles of Sociotechnical Design. *Human Relations*. Vol. 29(8) pp. 783-792.

Chidambaram, L. (Ed.). 2000. *Our Virtual World: The Transformation of Work, Play and Life via Technology: The Transformation of Work, Play and Life via Technology*. Hershey PA: IGI Global.

Ciborra, C. and Navarra, D. 2005. "Good Governance, Development Theory, and Aid Policy: Risks and Challenges of E-government in Jordan". *Information Technology for Development*. Vol. 11(2) pp.141–159.

Clegg, C.W. 2000. "Sociotechnical Principles for System Design". *Journal of Applied Ergonomics*. Vol. 31 pp. 463-477.

Cloete, N., Bailey, T., and Pillay, P. 2011. *Universities and Economic Development in Africa*. Wynberg: Centre for Higher Education and Transformation.

Coakes, E., Willis, D., and Clarke, S (Eds). 2002. *Knowledge Management in the Sociotechnical World*. London: Springer-Verlag London Ltd.

Cohen, S., and William, W. 2002. *The Future of E-government: A Projection of Potential Trends and Issues*. Columbia University, 2002.

Compain, B.M. (Ed.). 2001. *The Digital Divide: Facing a Crisis or Creating a Myth?* Cambridge MA: MIT Press.

Compeau, D.R., and Higgins, C.A. 1995. "Computer Self-Efficacy: Development of a Measure and Initial Test". *MIS Quarterly*. Vol. 19(2) pp. 198-211.

Coombs, R., Knights, D., and Willmott, H. C. 1992. "Culture, control and competition; Towards a Conceptual Framework for the Study of Information Technology in Organizations". *Organization Studies*. Vol. 13(1) pp. 051-72.

Cooper, C. L., Dewe, P. J., and O'Driscoll, M. P. 2001. *Organizational Stress*. Thousand Oaks, CA: Sage Publications.

Cornfield, D.B. 1987. 1987. *Workers, Managers, and Technological Change. Emerging Patterns of Labour Relations*. New York: Plenum Press.

Crompton, R., and Lyonette, C. 2006). "Work-life 'Balance' in Europe". *Acta Sociologica*. Vol. 49(4), pp. 379-393.

Creswell, J.W. 1994. *Research Design: Qualitative and Quantitative Approaches*. London: SAGE Publications.

Dada, D. 2006. "The Failure of E-Government in Developing Countries: A Literature Review". *The Electronic Journal of Information Systems in Developing (EJISDC)*. Vol. 26(7) pp. 1-10.

Damodaran, L., Nicholls, J., Henney, A., Land, F., and Farbey, B. 2005. "The Contribution of Sociotechnical Systems Thinking to the Effective Adoption of e-Government and the Enhancement of Democracy". *The Electronic Journal of e-Government*. Vol. 3(1) pp. 1-12.

Danemark, B., Ekstrom, M., and Jacobsen, L. 2002. *Explaining Society. Critical Realism in the Social Sciences*. London: Routledge.

Dash, A. 2014. "What is Public?" Medium, July 24, 2014. Available at: <https://medium.com/message/f33b16d780f9> accessed on 20/3/2015.

Davey, R. 2013. *The Professional Identity of Teacher Educators: Career on the Cusp?* New York: Routledge.

Davidson, E. and Lamb, R. 2000. "Examining Sociotechnical Networks in Scientific Academia/Industry Collaborations". AMCIS 2000 Proceedings. pp. 1625-1631.

Dawes, S.S. 2009. "Governance in the Digital Age: A Research and Action Framework for an Uncertain Future". *Government Information Quarterly*. Vol. 26 pp. 257-264.

de Jager, A., and Van Reijswoud, V. 2006. "E-Governance in the Developing World in Action: The case of DistrictNet in Uganda". *IICD Research Brief*.

Dempsey, A. D., and Dempsey, P. A. 2000. *Using Nursing Research: Process, Critical Evaluation, and Utilization*. Baltimore, MD: Lippincott.

Dent, E., and Goldberg, S. 1999. "Challenging 'Resistance to Change'". *Journal of Applied Behavioural Science*. Vol. 1 (35) pp.25-41.

Denzin, N. K. 1989. *Interactive Interactionism*. Newbury Park, CA: Sage

Derya, Y., and Gökhan, K. 2013. Resistance to Change and Ways of Reducing Resistance in Educational Organizations. *European Journal of Research on Education*. Vol. 1(1) pp. 14-21.

Di Gropello, E., Kruse, A., and Tandon, P. 2011. *Skills for the Labour Market in Indonesia: Trends in Demand, Gaps, and Supply*. Washington DC: World Bank Publications.

Dillon, A. and Morris, M. 1996. "User Acceptance of New Information Technology - Theories and Models". In Williams, M. (Ed.). *Annual Review of Information Science and Technology*. Vol. 31 pp. 3-32. Medford NJ: Information Today.

Doctor, R. 1991. Information Technologies and Social Equity - Confronting the Revolution. *Journal of the American Society for Information Science*. Vol. 42(3) pp. 216-228.

Dodgson, M., Gann, D. and Salter, A. 2005. *Think, Play, Do: Technology, Innovation, and Organization*. New York: Oxford University Press.

Dos Santos, E. M., and Reinhard, N. 2011. "Electronic Government Interoperability: Identifying the Barriers for Frameworks Adoption". *Social Science Computer Review*, 0894439310392196.

Ebrahim, Z., and Irani, Z. 2005. E-Government Adoption: Architecture and Barriers. *Emerald Business Process Management Journal*. Vo. 11(5) pp. 589-611.

Edwards, P. 1998. "Y2K: Millennial Reflections on Computers as Infrastructure". *History and Technology*. Vol. 15 pp. 7-29.

Emery, F.E. 1959. *Characteristics of Sociotechnical Systems*. London: Tavistock Institute.

Esselaar, S., and Adam, L. 2013. *Understanding what is happening in ICT in Tanzania: A Supply- and Demand- side Analysis of the ICT sector*. Evidence for ICT Policy Action - Policy Paper 11, 2013. Ottawa: International Development Research Centre (IDRC).

Fang, Z.P. 2002. "E-Government in Digital Era: Concept, Practice, and Development. International Journal of the Computer". *The Internet and Management*. Vol. 10(2) pp. 1-22.

Fischer, F., and Sirianni, C. (Eds.). 1994. *Critical Studies in Organization and Bureaucracy*. Philadelphia: Temple University Press.

Flick, U. 2009. *An Introduction to Qualitative Research (4th)*. London: SAGE Publications Ltd.

Flyvberg, B. 2006. "Five Misunderstandings About Case-Study Research". *Qualitative Inquiry*. Vol. 12 pp. 219-245.

Fook J. 2002. *Social Work: Critical Theory and Practice*. London: Sage Publication Ltd.

- Fountain, J.E. 2001. *Building the Virtual State: Information Technology and Institutional Change*. Washington, DC: Brookings Institution.
- Frankfort-Nachmias, C., and Nachmias, D. 2000. *Research Methods in the Social Sciences, (6th Ed.)*. New York: Wadsworth.
- Franz, C.R., Robey, D., and Koebnitz, R.R. 1986. User Response to an Online Information System: A Field Experiment. *MIS Quarterly*. Vol. 10 pp. 29-42.
- Fripp, C. 2012. "Country Focus: Tanzania's state of ICT. June 7, 2012. IT News Africa. Consumer Tech editor". Accessed on 20.04.2014 from: <http://www.itnewsafrika.com/2012/06/country-focus-tanzanias-state-of-ict/>.
- Gallie, D. 1991. "Patterns of Skill Change: Upskilling, Deskilling or the Polarization of Skills?" *Work, Employment and Society*. Vol. 5(3) pp. 319-351.
- Galliers, R (Ed.). 1992. *Information Systems Research: Issues, Methods, and Practical Guidelines*. Oxford: Blackwell Scientific.
- Gallivan, M.J. 1997. Value in Triangulation. A Comparison of Two Approaches for Combining Qualitative Methods. In: Lee, A.S., Liebenau, J., and DeGross, J.I (Eds.). *Information Systems and Qualitative Research* (pp. 417-443). London: Chapman and Hall.
- Garrety, K., and Badham, R. 2004. "User-Centred Design and the Normative Politics of Technology". *Science, Technology and Human Values*. Vol. 29(2) pp. 191-212.
- Garson, G.D. 2006. *Public Information Technology and E-governance: Managing the Virtual State*. London: Jones and Bartlett Publishers, Inc.
- Geels, F.W. 2005. *Technological Transitions and System Innovations: A Co-evolutionary and System Innovations: A Co-Evolutionary and Sociotechnical Analysis*. Cheltenham: Edward Elgar Publishing Limited.

Geels, F.W. 2002. "Technological Transitions as Evolutionary Reconfiguration Processes: A Multi-Level Perspective and a Case-Study". *In Research Policy*. Vol. 31 pp. 1257-1274.

Giacomello, G. 2005. *National Governments and Control of the Internet: A Digital Challenge*. New York: Routledge.

Gigliani G.B., and Bedeian A.G. 1974. "A Conspectus of Management Control Theory: 1900–1972". *Academy of Management Journal*. Vol. 17(2) pp. 292–305.

Gil-Garcia, J. R. 2012. *Enacting Electronic Government Success: An Integrative Study of Government-wide Websites, Organizational Capabilities, and Institutions (Vol. 31)*. New York: Springer Science and Business Media.

Gil-Garcia J. R., Chengalur-Smith, I. and Duchessi, P. 2007. "Collaborative E-Government: Impediments and Benefits of Information Sharing Projects in the Public Sector". *European Journal of Information Systems*. Vol. 16(2): p. 121-133.

Gilham, B. 2000. *Case Study Research Methods*. New York: Continuum.

Gillwald, A. 2012. *Understanding Broadband Demand in Africa: Internet Going Mobile*. Lusaka: Research ICT Africa.

Giorgi, A. 1994. "A Phenomenological Perspective on Certain Qualitative Research Methods". *Journal of Phenomenological Psychology*. Vol. 25, pp. 191-220.

Goldstein, J.1994. *The Unshackled Organization*. Portland, OR: Productivity Press, Inc.

Granter, E (Ed). 2009. *Critical Social Theory and the End of Work*. Burlington: Ashgate Publishing Limited.

Green, F. 2011. What is Skill? An Inter-Disciplinary Synthesis Published by the Centre for Learning and Life Chances in Knowledge Economies and Societies at: <http://www.llakes.org>. Research Paper 20.

Greenbaum, J., and Kyng, M. (Eds.), 1991. *Design at Work: Cooperative Design of Computer Systems*. Hillsdale, NJ: Taylor and Francis.

Greenhalgh, T., Stones, R., and Swinglehurst, D. 2014. Choose and Book: A Sociological Analysis of 'Resistance' to an Expert System. *Social Science and Medicine*. Vol. 104 pp. 210-219.

Grint, K. 2005. *The Sociology of Work: Introduction*. Cambridge: Polity Press.

Hamelink C. 1999. "The Digital Advance: Will ICT make a difference to the people who have never made a phone call?" Newsletter of IFIP WG 9.4 and Commonwealth Network for IT, version 9, Number 2.

Hansen, H. 1995. "A Case Study of a Mass Information System". *Information and Management*. Vol. 28, pp. 215–225.

Hanseth, O., and Ciborra, C. 2007. *Risk, Complexities and ICT*. Massachusetts: Edward Elgar Publishing.

Hanseth, O. 2002. From Systems and Tools to Networks and Infrastructures from Design to Cultivation. Towards a Theory of ICT Solutions and Its Design Methodology Implications. Working Paper. Institutt for Informatikk. University of Oslo.

Harrison, M. I., Koppel, R., and Bar-Lev, S. 2007. "Unintended Consequences of Information Technologies in Health Care: An Interactive Sociotechnical Analysis". *Journal of the American Medical Informatics Association*. Vol. 14 pp. 542-549.

Hasan, S. 2003. "Introducing E-government in Bangladesh: Problems and Prospects". *International Social Science Review*. Vol. 79 (1) pp. 111-126.

Hassan, R. 2012. "E-Governance and E-Government in Bangladesh: Performance, Challenges and Remedies". *Asian Journal of Applied Science and Engineering*. Vol. 2(2) pp. 111-117.

Heeks, R. 2006. "Health Information Systems: Failure, Success and Improvisation". *International Journal of Medical Informatics*. Vol. 75 pp. 125-137.

Heeks, R. 2008. "Benchmarking e-Government: Improving the National and International Measurement, Evaluation and Comparison of e-Government". In: Irani, Z., and Love, P. (Eds.). *Evaluating Information Systems: Public and Private Sector*. Amsterdam: ELSEVIER.

Heeks, R., and Bailur, S. 2007. "Analysing E-Government Research: Perspectives, Philosophies, Theories, Methods, and Practice". *Government Information Quarterly*. Vol. 26(3) pp. 243–265.

Heeks, R. 2005. Foundations of ICTs in Development: The Onion-Ring Model. Available at: <http://www.sed.manchester.ac.uk/idpm/research/publications/wp/di/short/DIGBriefing4Onion.pdf> (Accessed: 10 March, 2015).

Heeks, R. 2003. "Most eGovernment-for-Development Projects Fail: How Can Risks be Reduced?" Paper No. 14. University of Manchester: Institute for Development Policy and Management. Accessed on 15 April 2015, available at: http://www.sed.manchester.ac.uk/idpm/research/publications/wp/igovernment/documents/igov_wp14.pdf.

Heeks, R. 2002. "Information Systems and Developing Countries: Failure, Success and Local Improvisations". *The Information Society*. Vol. 18(2) pp. 101-12.

Heeks, R. 1999. *Reinventing Government in the Information Age: International Practice in IT-enabled Public Sector Reform*. New York : Routledge.

Heeks R. 1998. Information Systems and Public Sector Accountability. *Working Paper No.1, IDPM*. University of Manchester, UK.

Heller, F. 1997. "Sociotechnology and the Environment". *Human Relations*. Vol. 50(5) pp. 605-624.

Henman, P. 2010. *Governing Electronically E-Government and the Reconfiguration of Public Administration, Policy and Power*. Houndmills: Palgrave Macmillan.

Herold, D.M., Farmer, S.M, Mobley, M. 1999. “Pre-implementation Attitudes Toward the Introduction of Robots in a Unionized Environment”. *Journal of Engineering Technology Management*. Vol. 12 pp. 155-173.

Hess, J., Offenbergh, S., and Pipek, V. 2008. Community Driven Development as Participation? Involving User Communities in a Software Design Process. Proceedings Participatory Design Conference. Trustees of Indiana University.

Hesse-Biber, S.N., and Leavy, P (Eds.). 2008. *Handbook of Emergent Methods*. New York: Guilford Press.

Henning, E. 2004. *Finding Your Way in Qualitative Research*. Pretoria: Van Schaik.

Hirschheim, R. and Newman, M. 1988. “Information Systems and User Resistance: Theory and Practice”. *The Computer Journal*. Vol. 31(5) pp. 398-408.

HOD. 2009. St. Meld. nr. 47 (2008–2009) - Samhandlingsreformen Rett behandling – på rett sted – tilrett tid. Det Kongelige Helse og Omsorgsdepartementet, Trykk: 07 Gruppen AS – 06/2009.

Hodson, R., and Sullivan, T.A. 2012. *The Social Organization of Work (5th Edition)*. Wadsworth: Cengage Learning.

Hodson, R., and Sullivan, T. 2008. *The Social Organization of Work (4th Edition)*. Belmont: Thomson Wadsworth.

Hoogeveen, J. and Ruhinduka, R. 2009. Poverty Reduction in Tanzania since 2001: Good Intentions, Few Results. Paper commissioned by the Research and Analysis Working Group (unpublished). Dar es Salaam: Research on Poverty Alleviation (REPOA).

Horrigan, P.G. 2007. *Epistemology: An Introduction to the Philosophy of Knowledge*. Lincoln: iUniverse.

Howard, M. 2001. "E-government Across the Globe: How will "e" Change Government?" *Government Finance Review*. Vol. 17(4) pp. 6-9.

Howland J. 1998. "The 'Digital Divide': Are we Becoming a World of Technological 'Haves' and 'Have-Nots'?" *Electronic Library*. Vol. 16(5) pp. 287–289.

Huberman, M. A., and Miles, M. B. 1994. "Data management and Analysis Methods". In: Denzin, N., and Lincoln, Y. S. (Eds.): *Handbook of Qualitative Research*. Thousand Oaks, CA: SAGE Publications.

Hussey, J., and Hussey, R. 1997. *Business Research*. Basingstoke: Macmillan Press Ltd.

Inequality Watch. (n.d). Number of Poor by Region: Poverty Threshold by 2008. (Source: World Bank). Available at: <http://inequalitywatch.eu/spip.php?article105#nb1>. Accessed on 12 April, 2015.

Jagun, A. 2007. "Micro-enterprise and the Mobile Divide". Id21 Insights. Issue 69, September 2007. www.id21.org/insights

Janssen, M., Scholl, H.J., Wimmer, M.A., and Tan, Y. (Eds.). 2011. "Electronic Government 10th IFIP WG 8.5 International Conference, EGOV 2011 Delft, the Netherlands, August 28 - September 2, 2011, Proceedings". Springer: IFIP International Federation for Information Processing.

Jalon, A. 1985. *Synthesizers: Sour Sound to Musicians*. Los Angeles Times, December 6, 1985.

Jaruwachirathanakul, B. and Fink, D. 2005. "Internet Banking Adoption Strategies for a Developing Country: the Case of Thailand". *Internet Research*. Vol. 15(3) pp. 295-311.

Jayanthi, S. 1998. "Modelling the Innovation Implementation Process in the Context of High-Technology Manufacturing: An Innovation Diffusion Perspective". Working Paper No. 112. ESRC. Centre for Business Research: University of Cambridge.

Johnson, D.G., and Wetmore, J.M. 2009. *Technology and Society: Building Our Sociotechnical Future*. Cambridge: The MIT Press.

Kanter, R.M. 1991. "Improving the Development, Acceptance, and Use of New Technology: Organizational and Interorganizational Challenges". In: National Academies. *People and Technology in the Workplace*. Washington DC: National Academy Press.

Kaplan, B., and Harris-Salamone, K. D. 2009. "Health IT Success and Failure: Recommendations from Literature and an AMIA Workshop". *Journal of the American Medical Informatics Association*. Vol. 16(3) pp. 291–299.

Kaplan, B., and Maxwell, J.A. 1994. "Qualitative Research Methods for Evaluating Computer Information Systems". In: Anderson, J.G., Aydin, C.E., and Jay, S.J. (Eds.). *Evaluating Health Care Information Systems: Methods and Applications*. Thousand Oaks, CA: Sage, pp. 45-68.

Keen, P. G. W. 1981. "Information Systems and Organizational Change". *Communications of the ACM*. Vol. 24(1) pp. 24-33.

Kettani, D., and Moulin, B. 2014. *E-Government for Good Governance in Developing Countries: Empirical Evidence from the eFoz Project*. London: Anthem Press.

Khosrowpour, M (Ed.). 2005. *Encyclopedia of Information Science and Technology*, Volumes 1-5. Hershey PA: Idea Group Reference.

Kim, T., Adeli, H., Slezak, D., Sandnes, F.E., Song, X., Chung, K., and Arnett, K.P (Eds.). 2011. "Future Generation Information Technology: Third International Conference". FGIT 2011 in Conjunction with GDC 2011, Jeju Island, Korea, December 2011 Proceedings. London: Springer.

Kim, H. W., and Kankanhalli, A. 2009. "Investigating User Resistance to Information Systems Implementation: A Status Quo Bias Perspective". *MIS Quarterly*. Vol. 33(3) pp. 567-582.

Klein, L., 1994. "Sociotechnical/Organizational Design". In: Karwowski, W., Salvendy, G. (Eds.). *Organization and Management of Advanced Manufacturing*. New York: Wiley.

Klein, L., and Eason K. D. 1991. *Putting Social Science to Work*. Cambridge: Cambridge University Press.

Klein, H.K., and Myers, M.D. 1999. "A Set of Principles for Conducting and Evaluating Interpretive Field Studies in Information Systems". *MIS Quarterly*. Vol. 23(1) pp. 67-93.

Kling R 2000. "Learning about Information Technologies and Social Change: The Contribution of Social Informatics". *The Information Society*. Vol. 16(3) pp. 217–232.

Kling, R., McKim, G., Fortuna, J., and King, A. 2000. Scientific Collaboratories as Sociotechnical Interaction Networks: A Theoretical Approach. arXiv preprint cs/0005007.

Kling, R., and Lamb, R. 2000. *IT and Organizational Change in Digital Economies: A Socio-Technical Approach. Understanding the Digital Economy - Data, Tools and Research*. Cambridge, MA: MIT Press.

Kling, R., and Lamb, R. 1999. "IT and Organizational Change in Digital Economies: A Sociotechnical Approach". *Computer and Society*. Vol. 29(3) pp. 17-25.

Kohoutek, J. (Ed.). 2009. *Studies on Higher Education: Implementation of the Standards and Guidelines for Quality Assurance in Higher Education in the Central and East-European Countries – Agenda Ahead*. Prague: UNESCO-CEPES.

Kolsaker, A., and Lee-Kelley, L. 2008. Citizens' Attitudes towards E-Government and E-Governance: A UK study". *International Journal of Public Sector Management*. Vol. 21(7) pp. 723-738.

Kotter, J. P. 1995. "Leading Change: Why Transformation Efforts Fail (Cover Story)" *Harvard Business Review*. Vo. 73(2) pp. 59-67.

Kraemer, K. L., King, J.L., Dunkle, D.E., and Lane, J.P . 1989. *Managing Information Systems. Change and Control in Organizational Computing*. San Francisco: Jossey-Bass.

Kvale, S. 1996. *Interviews: An Introduction to Qualitative Research Interviewing*. London: SAGE Publications.

Lamb, R., and Davidson, E. 2005. "Information and Communication Technology Challenges to Scientific Professional Identity". *Information Society*. Vol. 21(1) pp. 1-24.

Lapointe, L., and Rivard, S. 2005. "A Multilevel Model of Resistance to Information Technology Implementation". *MIS Quarterly*. Vol. 29(3) pp. 461 -491.

Layne, K., and Lee, J. 2001. Developing Fully Functional E-government: A Four Stage Model. *Government Information Quarterly*. Vol. 18(2) pp. 122-136.

Leavitt, H. J. 1965. "Applied Organizational Change in Industry: Structural, Technological and Humanistic Approaches". In March J. G. (Ed.) *Handbook of Organizations*. Chicago, McNally.

Lee, A.S. 1989. "A Scientific Methodology for MIS Case Studies". *MIS Quarterly*. Vol. 13(1) pp. 33-52.

Leonard, D., and Rayport, J.F., 1997. "Spark Innovation through Empathic Design". *Harvard Business Review*. Vol. 75 (6) pp. 102–113.

Lewis, G.A., and Wrage, L. 2005. *A Process for Context-Based Technology Evaluation. Integration of Software-Intensive Systems (ISIS) Initiative*. Pittsburgh: Carnegie Mellon University.

Lincoln, Y.S., and Guba, E.G. 1985. *Naturalistic Inquiry*. Beverly Hills, CA: Sage Publications.

London, M., and Bassman, E. 1989. "Retraining Midcareer Workers for the Future Workplace". In: Goldstein, I (Ed.). *Training and Development in Work organizations. Frontiers of Industrial and Organizational Psychology*. San Francisco, CA: Jossey Bass.

Longe, O., Ngwa, O., Wada, F., Mbarika, V., and Kvasny, L. 2009. "Criminal Uses of Information and Communication Technologies in Sub-Saharan Africa: Trends, Concerns and Perspectives". *Journal of Information Technology Impact*. Vol. 9(3) pp. 155-172.

Lubbe, S (Ed.).2003.*The Economic and Social Impacts of E-commerce*. Hershey: Idea Group Publishing.

Mahmood, M.A (Ed.). 2003. *Advanced Topics in End User Computing Volume 2*. Hershey, PA: Idea Group Inc.

Malhotra, Y. 2001. *Enabling Next Generation e-Business Architectures: Balancing Integration and Flexibility for Managing Business Transformation*. Portland, OR: Intel Corporation.

Management Association, Information Resources (MAIR) (Ed.). 2012. *Digital Literacy: Concepts, Methodologies, Tools, and Applications: Concepts, Methodologies, Tools, and Applications*. Hershey, PA: IGI Global.

Mancuso, R., and Stahl, B.1996. Implementing a Combined Computing Services and Library Help Desk. Paper Presented at the 1996 CAUSE Annual Conference. Charlotte, NC: The University of North Carolina.

Margetts, H., and Hood, C. 2010. *Paradoxes of Modernization: Unintended Consequences of Public Policy Reform*. Oxford: Oxford University Press.

Marjoribanks, T. 2000. *News Corporation, Technology and the Workplace: Global Strategies, Local Change*. Cambridge: Press Syndicate of the University of Cambridge.

Markus, M. L. 1983. "Power, Politics, and MIS Implementation". *Communications of the ACM*. 26(6): 430-444.

Marlow, C., and Boone, S. 2010. *Research Methods for Generalist Social Work (5th Ed.)*. Belmont: Brooks/Cole.

Mason, J. 2002. *Qualitative Researching (2nd Ed.)*. London: Sage Publications.

Materu, P. 2007. *Higher Education Quality Assurance in Sub-Saharan Africa: Status, Challenges, Opportunities, and Promising Practices. World Bank Working Paper Number 124*. Washington, D.C: World Bank.

Maumbe, B.M., Owei, V., and Alexander, H. 2008. "Questioning the Pace and Pathway of e-Government Development in Africa: A Case Study of South Africa's Cape Gateway Project". *Government Information Quarterly*. Vol. 25(4) pp. 757–777.

Maxwell, J.A. 2013. *Qualitative Research Design: An Interactive Approach (3rd Ed.)*. Los Angeles: SAGE.

McCulloch, G. 2004. *Documentary Research in Education, History and the Social Sciences*. London: Routledge Falmer.

Mchome, S. 2013. "The World Bank Mission to Tanzania Commission for Universities". Paper Presented to the World Bank Team by the Tanzania Commission for Universities on 2nd May 2013. Dar es Salaam: TCU (Unpublished).

McLaughlin, J., Rosen, P., Skinner, D., and Webste, A. 1999. *Valuing Technology: Organisations, Culture and Change*. London: Routledge.

McLoughlin, I., Preece, D., and Dawson, P (Eds.). 2000. *Technology, Organizations and Innovation: Theories, concepts and paradigms*. London: Routledge.

Merriam, S.B. 2009. *Qualitative Research: A Guide to Design and Implementation*. San Francisco: Jossey-Bass.

Merriam, S. B. 1988. *Case study Research in Education: A Qualitative Approach* . San Francisco : Jossey-Bass .

Mesthene, E.G. 1970. *Technological Change: Its Impact on Man and Society*. Cambridge, MA: Harvard University Press.

Meuter, M., Ostrom, A., Roundtree, R., and Bitner, M. 2000. "Self-service Technologies: Understanding Customer Satisfaction with Technology-based Service Encounters". *Journal of Marketing*. Vol. 64(3) pp. 50–64.

Michael, M. 2000. *Reconnecting Culture, Technology and Nature*. New York: Routledge.

Milkman, R., and Pullman, C. 1991. "Technological Change in an Automobile Assembly Plant: The Impact on Workers' Tasks and Skills". *Work and Occupations*. Vol. 18(2) pp. 123–47.

Miller P., and O'Leary, T. 1987. "Accounting and the Construction of the Governable Person". *Accounting, Organizations and Society*. Vol. 12(3) pp. 235–265.

Mingers, J., and Willcocks, L. (Eds.). 2004. *Social Theory and Philosophy for Information systems*. West Sussex: John Wiley and Sons Ltd.

Mittal, P., and Kaur, A. 2013. "E-Governance - A challenge for India". *International Journal of Advanced Research in Computer Engineering & Technology (IJARCET)*. Vol. 2(3) p. 1196-1199.

Mkono, N., and Kapinga, K.W. 2014. *Telecoms, Media and Internet 2014*. International Comparative Legal Guide. Tanzania Chapter. (Accessed from www.iclg.co.uk/ on 2/5/2014).

Mkude, D., Cooksey, B., and Levey, L. 2003. *Higher Education in Tanzania: A Case Study*. Dar es Salaam: Mkuki na Nyota.

Moyle, K. 2010. *Building Innovation: Learning with Technologies*. Camberwell: Australian Council for Educational Research Press.

Mullen, H., and Horner, D.S. 2004. "Ethical Problems for e-Government: An Evaluative Framework". *Electronic Journal of E-government*. Vol. 2(3) pp.187-196.

Muller, M.J., Wildman, D.M., and White, E.A., 1993. "Taxonomy of PD Practices: A Brief Practitioner's Guide". *Communications of the ACM*. Vol. 36 (4) pp. 26–27.

Mullins, L. J. (2005). *Management and Organizational Behaviour*. 7th Edition. Prentice Hall.

Mumford, E. 2006. "The story of Sociotechnical Design: Reflections on its Successes, Failures and Potential". *Info Systems Journal*. Vol. 16 pp. 317-342.

Munyoka, W., and Manzira, F.M. 2013. "Assessing the Impact of E-government Projects: The Case of Limpopo Province in South Africa. In: Proceedings of The International Conference on Cloud Computing and E-governance (ICCCEG 13)". Urapakkam: Association of Scientists, Developers and Faculties.

Mwakaje, A.G. 2010. "Information and Communication Technology for Rural Farmers Market Access in Tanzania". *Journal of Information Technology Impact*. Vol. 10(2) pp. 111-128.

Mwollo-Ntallima, A.M. 2011. "Higher Education and Democracy: A Study Of Students' and Student Leaders' Attitudes towards Democracy in Tanzania". Master Thesis. University of the Western Cape. South Africa.

Myers, M.D. 2013. *Qualitative Research in Business and Management (2nd Edition)*. London: SAGE Publications Ltd.

Myers, M. D., and Young, L. W. 1997. "Hidden Agendas, Power, and Managerial Assumptions in Information Systems Development: An Ethnographic Study". *Information Technology and People*. Vol. 10(3) pp. 224-240.

National Office for Information Economy (NOIE). 2003. *E-government Benefits Study*. Canberra: Commonwealth of Australia.

Nayak, G.K. 2005. "E-Governance in Project Implementation". *Journal of the Eighth National Conference on e-Governance*, pp.16-20.

Ndou, V. 2004. "E-government for Developing Countries: Opportunities and Challenges". *The Electronic Journal of Information Systems in Developing Countries*. Vol. 18(1) pp. 1-24.

Ng'ethe, N., Subotzky, G., and Afeti, G. 2008. *Differentiation and Articulation in Tertiary Education Systems: A Study of Twelve Countries*. World Bank Working Paper No. 145. Washington: The World Bank.

Ngulube, P. 2007. "The nature and accessibility of e-government in Sub Saharan Africa". *International Review of Information Ethics*. Vol. 7(9) pp. 1-13.

Nkunya, M.H. 2009. "Tanzania". In: Bjarnason, S., Patrinos, H.A (Eds.). *The Evolving Regulatory Context for Private Education in Emerging Economies*. World Bank Working Paper No. 154. Washington: The World Bank.

Nkwe, N. 2012. "E-Government: Challenges and Opportunities in Botswana". *International Journal of Humanities and Social Science*. Vol. 2(17) pp. 39-48.

Odat, A., and Khazaaleh, M. 2012. E-Government Challenges and Opportunities: A Case Study of Jordan. *IJCSI International Journal of Computer Science Issues*. Vol. 9 Issue 5 (2) pp. 361-367.

OECD. 2003. *The e-Government Imperative*. France: OECD Publications.

Oreg, S. 2003. "Resistance to Change: Developing an Individual Differences Measure". *Journal of Applied Psychology*. Vo. 88 680 – 693.

Orlikowski, W.J. 2008. "Using Technology and Constituting Structures: A Practice Lens for Studying Technology in organizations". In: Ackerman, M.S., Halverson, C.A., Erickson, T., Kellogg, W.A. (Eds.) *Resources, Co-evolution and Artifacts: Theory in CSCW*. Springer, London, pp 255–305.

Orlikowski, W.J., and Robey, D. 1996. "Information Technology and the Restructuring of Organizations". *Information Systems Research*. Vol. 2 pp. 143-166.

- Orlikowski, W.J. 1992. "The Duality of Technology: Rethinking the Concept of Technology in Organizations". *Organization Science*. Vol. 3(3) pp. 398–427.
- Ortiz, J.A 2008. "The Perceived Impact of Municipal Wireless Broadband Networks on the Digital Divide: A Tale of Five Cities". PhD Dissertation. The Pennsylvania State University, USA.
- Papadopoulos, T., and Kanellis, P. 2012. *Public Sector Reform Using Information Technologies: Transforming Policy into Practice*. Hershey: Information Science Reference.
- Paré, G., and Elam, J.J. 1997. "Using Case Study Research to Build Theories of IT Implementation". In: Lee, A.S., Liebenau, J., and DeGross J.I (Eds.). *Information Systems and Qualitative Research* (pp. 542-568). London: Chapman and Hall.
- Pasmore, W. A. 1988. *Designing Effective Organizations: The Sociotechnical Systems Perspective*. New York: John Wiley & Sons Inc.
- Patton, Q.M., 1990. *Qualitative Evaluation and Research Methods (2nd Edition)*. Newsbury Park: Sage Publications Inc.
- Pazi, S., and Chatwin, C. 2014. The Impact of NICTBB in Facilitating the eServices and mServices in Tanzania. (Available at: <http://waset.org/publications/9997991/the-impact-of-nictbb-in-facilitating-the-eservices-and-m-services-in-tanzania> (accessed 26 January 2015).
- Peacey, B. 2002. "Socio-Economic Impacts of ICT. E-government@ the Local Level – A Discussion Paper". Working Paper 1. ICT and Community Series. Canterbury: University of Canterbury.
- Pillay, P.N (Ed.). 2010. *Higher Education Financing in East and Southern Africa*. Somerset West: African Minds.
- Podder, P. 2013. "Evaluating Local e-Government in New Zealand: A Sociotechnical Approach". PhD Thesis. Auckland: Auckland University of Technology.

Porter, A.L., and Cunningham, S.W. 2005. *Tech Mining Exploiting New Technologies for Competitive Advantage*. New Jersey: John Willey & Sons, Inc.

Prior, L. 2003. *Using Documents in Social Research: Introducing Qualitative Methods*. London: SAGE Publications Ltd.

Püschel, J.O., and Eifert, M. 2004. *National Electronic Government: Comparing Governance Structures in Multi-layer Administrations*. London: Routledge.

QSR International. 2014. *NVivo for Windows: Getting Started*. Burlington: QSR International.

Rabiaiah, A., and Vandijck, E. 2011. "A Strategic Framework of E-government: Generic and Best Practice". In: Worrall (Ed.). *Leading Issues in e-Government Research*. Reading: Academic Publishing Internationals.

Rahman, H. 2013. *Cases on Progressions and Challenges in ICT Utilization for Citizen-Centric Governance*. Hershey: Information Sciences References.

Rahman, H. 2010. "Framework of E-governance at the Local Government Level". In: Reddick, C.G (Ed.). *Comparative E-Government*. New York: Springer.

Rapley, T. 2007. *Doing Conversation, Discourse and Document Analysis*. London: SAGE Publications.

Reddick, 2010. *Comparative E-Government*. New York: Springer.

Remenyi, D. 2009. *Proceedings of the 9th European Conference on e-Government*. Reading: Academic Publishing Limited.

Rip, A., and R. Kemp 1998. "Technological Change". In: Rayner, S., and Malone, E.L. (Eds), *Human Choice and Climate Change*. Columbus, Ohio: Battelle Press. Vol. 2 pp. 327-399.

Rintala, N. 2008. "The Impact of ICT Implementation on Social Interaction in Work Communities". In: Loos, E., Haddon, L., and Mante-Meijer, E (Eds.). *The Social Dynamics of Information and Communication Technology*. Hampshire: Ashgate Publishing Limited.

Robey, D. 1997. The Paradoxes of Transformation. In Sauer, C., and Yetton, P.W. (Eds.). *Steps to the Future: Fresh Thinking on the Management of IT-based Organizational Transformation*. San Francisco: Jossey-Bass Publishers.

Ritchie, J., Lewis, J., Nicholls, C. M., and Ormston, R. (Eds.). 2013. *Qualitative research practice: A guide for social science students and researchers*. London: SAGE.

Roberts, M. 1982. "Technology and Labour". In: Appelbaum, E. Papers Prepared as Background Materials for the OTA Labour Markets and Industrial Relations Workshop. July 27, 1982. Temple University: Department of Economics.

Ropohl, G. 1999. "Philosophy of Socio-technical Systems". *Philosophy and Technology*. Vol.4 (3) pp.59-71.

Rose, A.H. 1994. *Human Stress and the Environment*. Yverdon: Gordon and Breach Science Publishers.

Rossmann, G. B., and Rallis, S. F. 2003. *Learning in the Field: An Introduction to Qualitative Research (2nd Ed.)*. Thousand Oaks, CA: SAGE Publications.

Roy, R.N. 2005. *A Modern Approach to Operations Management*. New Delhi: New Age International Publishers.

Royse, D. 2008. *Research Methods in Social Work (5th Ed.)*. Belmont, CA: Thomson Higher Education.

Rubin, B., and Wang, H. 2004. Embedding e-finance in E-government: A New E-government Framework. *Electronic Government*, vol. 1(4) pp. 362-373.

Russell, S., and Williams, R. 2002. "Social Shaping of Technology: Frameworks, Findings and

Implications for Policy, with Glossary of Social Shaping Concepts”. In: Sorensen K.H., and Williams, R.(Eds). *Shaping Technology, Guiding Policy. Concepts, Spaces and Tools*. Cheltenham, UK and Northampton, MA, USA: Edward Elgar.

Saleh, N. 2010. *Third World Citizens and the Information Technology Revolution*. New York: Palgrave Macmillan.

Satyanarayana, J. 2004. *E Government: The Science of the Possible*. New Delhi: Prentice-Hall of India Private Limited.

Schelin, S.H., and Garson, G.D. 2004. *Humanizing Information Technology: Advice from Experts*. Hershey: Idea Group Publishing.

Scholl, H.J (Ed.). 2010. *E-Government: Information, Technology, and Transformation*. New York: M.E Sharpe, Inc.

Schwartz, S. 2004. *Fair Admissions to Higher Education: Recommendations for Good Practice*. Brunel: Brunel University.

Schwester, R.W. 2009. “Examining the Barriers to e-Government Adoption.” *Electronic Journal of e-Government*. Vol. 7(1), pp. 113-122.

Sebastian, M.P., and Supriya, K.K. 2013. “E-governance Readiness: Challenges for India”. *IIM Kozhikode Society and Management Review*. Vol. 2 (1) pp.31–42.

Sedoyeka, E., and Hunaiti, Z. 2008. “WiMAX: A Breakthrough for Underserved Area. Tanzania Chapter”. *Info*. Vol. 10 (2) pp. 34-36.

Seidman, I. 2006. *Interviewing as Qualitative Research: A Guide for Researchers in Education and the Social Sciences (Third Edition)*. New York: Teachers College Press, Columbia University.

Sewell, G., and Barker, J.R. 2001. “Neither Good, nor Bad, but Dangerous: Surveillance as an Ethical Paradox”. *Ethics and Information Technology*. Vol. 3(1) pp. 83-196.

Shah, M. 2007. "E-governance in India: Dream or Reality?" *Indian Journal of Education and Development Using Information Communication Technology*. Vol.3(2) pp 125-137.

Shih, E., Kraemer, K. L., and Dedrick, J. 2008. "IT Diffusion in Developing Countries". *Communications of the ACM*. Vol. 51(2), pp.43-48.

Smith, A., and Stirling, A. 2008. *Social-ecological Resilience and Sociotechnical Transitions: Critical Issues for Sustainability Governance*. Sussex: STEPS Centre Publications.

Song, H.J. 2004. *Building E-Governance through Reform*. Seoul: Ewha Womans University Press.

Sørensen, K.H. 2004. "Cultural Politics of Technology: Combining Critical and Constructive Interventions". *Science, Technology and Human Values*. Vol. 29(2) pp. 184–190.

Sorrentino, M., and Virili, F. 2003. "Socio-technical perspectives on eGovernment Initiatives". In: Traunmueller, R. (Ed.). *Electronic Government, Second International Conference EGOV 2003*. Prague: Springer-Verlag.

Spenner, K. 1990. "Skill: Meanings, Methods and Measures". *Work and Occupations*. Vol. 17(4) pp. 399-421.

Spreitzer, G. M. and R. E. Quinn. 1996. "Empowering Middle Managers to Be Transformational Leaders". *Journal of Applied Behavioural Science*. Vol. 32(3) pp. 237-261.

Srivastava, S. and Teo, T. 2005. "Citizen Trust Development for E-government Adoption: Case of Singapore". Proceedings of the 9th Asia Pacific Conference on Information Systems, Bangkok, Thailand.

Ståhle, P., and Grönroos M. 1999. *Knowledge Management–Tietopääoma Yrityksen Kilpailuetuna*. Helsinki: WSOY.

Stake, R. 1995. *The Art of Case Study Research*. Thousand Oaks, CA: Sage Publications.

Statistics Canada. 2008. *Information and communications technologies (ICTs)*. Accessed 17/10/2015 from <http://www.statcan.gc.ca/pub/81-004-x/def/4068723-eng.htm>.

Surry, D.W., Stefurak, J. R., and Gray, R.M (Eds.). 2011. *Technology Integration in Higher Education: Social and Organizational Aspects*. Hershey: Information Science Reference.

Szoka, B., and Marcus, A. 2011. *The Next Digital Decade: essays on the Future of the Internet*. Washington DC: TechFreedom.

Tanzania Commission for Universities (TCU). 2013. *Universities and University Colleges Facts and Figures (4th Edition)*. Dar es Salaam: Tanzania Commission for Universities.

Tanzania Commission for Universities (TCU). 2010a. *The Central Admission System Oman Report*. Dar es Salaam: TCU.

Tanzania Commission for Universities (TCU). 2010c. *Joint Admission Meeting Report: Briefing to the Management*. Dar es Salaam: Tanzania Commission for Universities.

Tanzania Commission for Universities (TCU). 2010. *Admissions Guidebook for Higher Education Institutions in Tanzania Academic Year 2010/2011*. Dar es Salaam: Tanzania Commission for Universities.

Tanzania Commission for Universities (TCU). 2010b. *CAS Application Monthly Report 2010/2011*. Dar es Salaam: Tanzania Commission for Universities.

Tanzania Commission for Universities (TCU). 2009. *Oman Report on the Centralized Admission System*. Dar es Salaam: Tanzania Commission for Universities.

Tanzania Commission for Universities (TCU). 2007. *Historical Perspective of the Development of Commission for Universities and Its Role in the Governance of the University System in Tanzania*. Dar es Salaam: TCU.

Taylor, B., Sinha, G., and Ghoshal, T. 2006. *Research Methodology: A Guide for Researchers in Management and Social Studies*. New Delhi: Prentice-Hall of India Private Limited.

Tanzania Communications Regulatory Authority (TCRA). 2013. "Quarterly Telecom Statistics". Available at: www.tcra.go.tz/images/documents/telecommunication/telecomStatsDec13.pdf (accessed 26 January, 2014).

Teicher, J., Holland, P., and Gough, R. (Eds.). 2013. *Australian Workplace Relations*. Cambridge: Cambridge University Press.

Templin, N. 1992. A Decisive Response to Crisis brought Ford Enhanced Productivity. *Wall Street Journal*, December 15, 1992.

Tenner, E. 1996. *Why Things Bite Back: Technology and the Revenge Effect*. London: Butterworth.

Thompson, S.K. 2012. *Sampling (3rd Ed.)*. New Jersey: John Wiley and Sons.

Tolsby, J. 2000. "Taylorism given a Helping Hand: How IT Systems Changed Employees' Flexibility and Personal Involvement in their Work". *Journal of Organizational Change Management*. Vol. 13(5) pp. 482–92.

Trauth, E.M (Ed.). 2001. *Qualitative Research in International Settings: Issues and Trends*. Hershey, PA: Idea Group Publishing.

Trist, E., and Murray, H. 1993. "The Social Engagement of Social Science". In Trist, E., and Murray, H (Eds.). *The Sociotechnical Perspective*. Pennsylvania: University of Pennsylvania Press.

Trist, E., and Bamforth, K.W. 1951. "Some Social and Psychological Consequences of the Longwall Methods of Coal Getting". *Human Relations*. Vol. 4(3) pp. 3–38.

Trost. C. 1985. The Price of Progress. *Wall Street Journal*, September 16, 1985.

UNESCO Institute for Statistics (UIS). 2008. *Global Education Digest 2008*. Montreal: UIS.

United Nations. 2014. *E-Government Survey 2014: E-Government for the Future We Want*. New York: United Nations.

United Nations. 2005. *Global E-government Readiness Report 2005: From E-government to E-inclusion*. New York: United Nations.

United Republic of Tanzania (URT). 2012. *National e-Government Strategy*. Dar es Salaam: President's Office – Public Service Management.

United Republic of Tanzania (URT). 2012a. *The Tanzania eGovernment Strategy*. Dar es Salaam: President's Office – Public Service Management (PO-PSM).

United Republic of Tanzania (URT). 2011. *The Economic Survey 2011*. President's Office, Planning Commission (POPC). Dar es Salaam: President's Office, Planning Commission.

United Republic of Tanzania (URT). 2009. *National Economic Survey 2009*. Dar es Salaam: The Ministry of Finance and Economic Affairs.

United Republic of Tanzania (URT). 2005. *The Universities Act, 2005*. Dar es Salaam: Tanzania Commission for Universities.

United Republic of Tanzania (URT). 2003. *National ICT Policy 2003*. Ministry Of Communications and Transport (MoCT). Dar es Salaam: MoCT.

United Republic of Tanzania (URT). 1999. *National Higher Education Policy*. Dar es Salaam: Ministry of Science, Technology and Higher Education.

United Republic of Tanzania (URT). 1995. *The Tanzania Development Vision 2025*. Dar es Salaam: Planning Commission.

US Department of Commerce. 1995. *Falling through the Net: A Survey of the "Have Nots" in Rural and Urban America*. Washington, DC: US Department of Commerce.

Vartanian, T.P. 2011. *Secondary Data Analysis: Pocket Guides to Social Work Research Methods*. Oxford: Oxford University Press.

Verkerk, M.J. 2004. *Trust and Power on the Shop Floor: An Ethnographical, Ethical and Philosophical Study on Responsible Behaviour in Industrial Organizations*. Delft: Eburon Academic Publishers.

Volti, R. 2012. *An Introduction to the Sociology of Work and Occupations*. London: SAGE Publications.

Volti R. 2008. *An Introduction to the Sociology of Work and Occupations*. California: Pine Forge Press.

Volti, R. 1988. *Society and Technological Change*. New York: St. Martin's Press.

Walsham, G. 2001. *Making a World of Difference: IT in a Global Context*. Chichester: John Wiley & Sons, Ltd.

Walsham, G. 1993. *Interpreting Information Systems in Organizations*. New York: John Wiley and Sons, Inc.

Warschauer, M. 2003. "Demystifying the Digital Divide". *Scientific American*. Vol. 289(2) pp. 42-48.

Wellman, B., Salaff, J., Dimitrova, D., Garton, L., Gulia, M., and Haythornthwaite, C. 1996. "Computer Networks as Social Networks: Collaborative Work, Telework, and Virtual Community". *Annual Review of Sociology*. Vol. 200 pp. 213-238.

Weckert, J. 2005. "Five: Trust in Cyberspace". In R. J. Cavalier, *The Impact of the Internet on our Moral Lives*. Albany, NY: State of University New York Press.

West, D.M. 2005. *Digital Government: Technology and Public Sector Performance*. New Jersey: Princeton University Press.

Wengraf, T. 2001. *Qualitative Research Interviewing: Biographic Narrative and Semi-structured Methods*. London: Sage.

Whyte, W.H. 1956. *The Organization Man*. New York: Doubleday Anchor.

Wilson A. 1987. "The Information Rich and the Information Poor". *The Association for Information Management*. Vol. 39(1) pp. 1- 6.

Wimmer, M., and Traunmüller, R. 2002. "Integration - The Next Challenge in e-Government". EurAsia-ICT 2002. Shiraz-Iran, 29-31 October, pp. 213-218. Institute of Applied Computer Science, University of Linz.

Woodman, R. 1989. "Organizational Change and Development: New Arenas for Inquiry and Action". *Journal of Management*. Vol. 15 pp. 205-228.

World Bank. 2012. "World DataBank: World Development Indicators". Available at: <http://databank.worldbank.org/data/views/variableselection/selectvariables.aspx?source=worlddevelopment-indicators#> (accessed 26 January 2015).

Yin, R.K. 2012. *Applications of Case Study Methods (3rd Ed)*. London: Sage Publications.

Yin, R. K. 2003. *Applications of Case Study Research: Applied Social Research Methods (4th Edition)*. Thousand Oaks: Sage Publications.

Yonazi, J. 2010. *Enhancing Citizen Adoption of e-Government Initiatives in Tanzania*. PhD Thesis. Groningen: University of Groningen.

Zaigham, M. 2011. "Barriers to Developing eGovernment Projects in Developing Countries, Proceedings of the 11 European Conference on E-Government (ECEG)". University of Ljubljana. Ljubljana, SLOVENIA, pp. 363-368.

Zheng, Y. 2007. Exploring the Value of the Capability Approach for e-Development. The 9th International Conference on Social Implications of Computers in Developing Countries. Brazil, São Paulo.

Zuboff, S., and Maxmin, J. 2003. *The Support Economy: Why Corporations are Failing Individuals and the Next Episode of Capitalism*. New York: Viking.

Zuboff, S. 1988. *In the Age of the Smart Machine*. New York: Basic Books.

Zuboff, S. 1985. Automate-Informate: The New Faces of Intelligent Technology. *Organizational Dynamics*. Vol. 14 pp. 5-18.

Zucker, L. G. 1988. Where do Institutional Patterns come from? Organizations as Actors in Social Systems. In: Zucker, L.G (Ed.). *Institutional Pattern and Organizations*. Cambridge, MA: Ballinger.

Websites

<http://www.worldbank.org/en/news/feature/2012/10/24/increasing-access-to-higher-education-for-the-poor-in-tanzania>

<http://inequalitywatch.eu/spip.php?article105#nb1>

<http://tcu.go.tz/index.php/about-us>

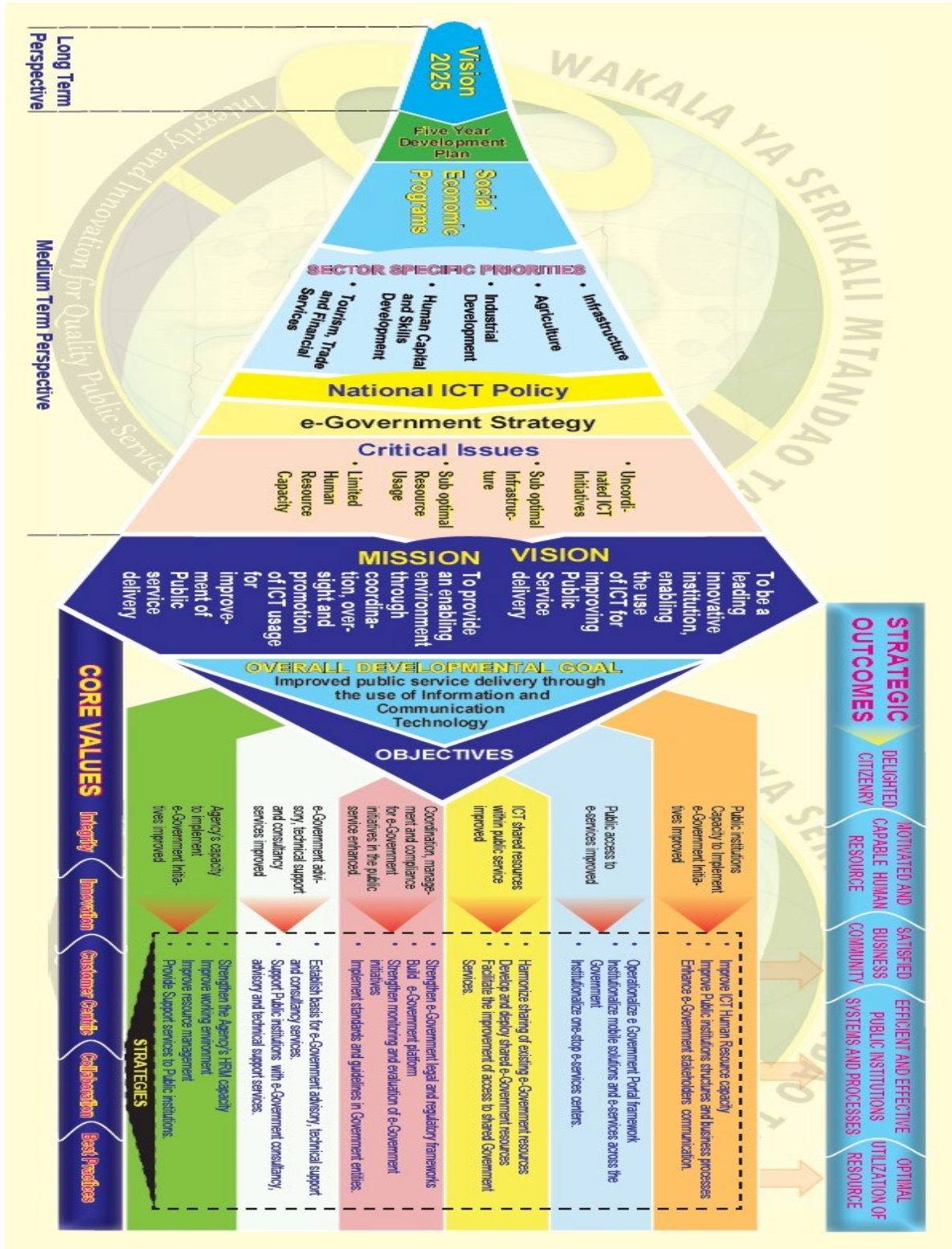
<http://tcu.go.tz/index.php/about-us>

<http://www.tcra.go.tz/index.php/about-tcra/tcra-profile>

<http://archive.unu.edu/unupress/unupbooks/uu19ie/uu19ie0i.htm>

APPENDICES

Appendix 1: National Development Vision 2025 and strategies to promote ICTs use in Tanzania



Appendix 2: Part of Undergraduate Admission Guidebook for CAS Operationalization

Mbeya University of Science and Technology (MUST) (Conventional Programmes)										
S/N	Programs	Code	Admission requirements: Form VI	Admission requirements: Diploma (Teacher Education or NTA Level 6)	Minimum Institutional Admission Points for form VI	Admission Capacity	Programme Duration (Yrs)	Tuition Fee	Possible Loan Amount TZS	Loan Priority
1	Bachelor of Business Administration	MB001	Any two principal passes including subsidiary pass in Mathematics at A level or pass in Mathematics at O level	Holders of Ordinary Diploma (NTA Level 6) in Business Management or Business Administration, or Education, Engineering, Law, Accountancy, Marketing with at least a GPA of 3.0 AND 5 passes at O' level	2.5	160	3	1,000,000	-	Non-priority
2	Bachelor of Civil Engineering	MB002	Two principal passes in Mathematics, Physics and Chemistry or Geography. One of the principal passes must be in Mathematics	Holders of Ordinary Diploma (NTA Level 6) in Civil or Transportation or Water Supply and Sanitation or Civil and Irrigation Engineering respectively, all with at least a GPA of 3.0 OR Full Technician Certificate (FTC) in Civil or Transportation or Water Supply and Sanitation or Civil and Irrigation Engineering respectively all with at least average of C grade AND 5 passes at O' level	2.0	100	3 years for Ordinary diploma 4 years for Form VI	1,000,000	900,000	Priority

Appendix 3: The CAS Portal Interface

Tanzania Commission for Universities

Central Admission System

Home
Register
Login
Contact

Important!

[Download: RPL Guidelines](#)

[Download: Undergraduate Admission Guidebook](#)

Read the RPL [instructions](#) or CAS [How to pay and apply instructions](#) for F6

Welcome to the Central Admission System

Please self register or login to continue with your application process.

New applicant? Do Self Registration	Registered Applicant? Login here
Form Six and Foreign Certs registration	Form Six and RPL Foreign Certs Login
RPL Applicants registration	Diploma, FTC and Equivalent Login
Diploma, FTC and Equivalent registration	search for 2015/16 Selection Results here Forgot Password? Reset with :Payment Voucher OR Secret Qn and Answer

Online Help

2015 Degree Programmes [click here](#)

Review programme choices for 2015/2016 admission with a simple interface.

Online help is provided by pointing to any question mark

Helpdesk #: +255 22-2772657, +255 765 027990, +255 675 077673 and +255 683 921928

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Appendix 4: Interview Guide for TCU³, NACTE⁴, HEIs⁵, HESLB⁶, MoEVT⁷, NECTA⁸, UCC⁹, and DTBi¹⁰

Researcher: Fabian G. Mahundu

Supervisor: Prof. Gilton Klerck

Date.....

Time.....

Interviewee... ..

Organization.....

Section A

Introduction (for both the researcher and the interviewee)

Section B

THEME A: CHALLENGES OF NEW TECHNOLOGIES IMPLEMENTATION

A1.

Please tell me about yourself including your position in your organization, and your current responsibilities.

A2.

³ Tanzania Commission for Universities staff

⁴ National Council for Technical Education representative

⁵ Admission officers in HEIs, Vice Chancellors, Deputy Principals and Deputy Provosts in-charge of academic affairs

⁶ Higher Education Students Loan Board representative

⁷ Ministry of Education and Vocational Training (Directorate of Higher Education) representative

⁸ National Examination Council of Tanzania representative

⁹ University Computing Centre (UCC) representative

¹⁰ Dar Technohama Business Incubators representative

How can you describe CAS participating institutions?

Probe on:

- *The extent to which participating HEIs are supportive enough in implementation of CAS;*
- *Stakeholders' preparedness and acceptance of the new admission system*

A3.

Are there any policies or guidelines guiding the implementation/delivery of electronic Admission (e-Admission) services?

Probe on: which are they and adherence to such guidelines/policies?

A5.

Why some institutions are slow to adopt new technology in admission?

Probe on:

- *What are the main resistance factors, and what are the possible solutions?*
- *Union issues (concerns) between Mainland and Islands regarding the new admission system?*

A6.

What specific issues may be preventing CAS from delivering its services to stakeholders in smooth manner?

Probe on:

- *Social and technical issues*
- *Cultural issues;*
- *IT skills, access/geographical issues;*
- *Language;*
- *Adequacy of available information (in CAS portal, guidebook, brochures);*
- *Awareness of new technology; and*
- *Political interferences and external environmental factors.*

A7.

Can you tell me how you reach the applicants who are geographically at dispersed locations particularly at critical time when the system is down or out of use?

A8.

Can you tell me how the applicants know the location of the institution of which they are selected?

Probe: Does the system offer any integrated tool to assist applicants recognize the location of that institution?

THEME B: OPERATIONALIZATION OF NEW TECHNOLOGIES

B1.

How would you describe the general operationalization of CAS e-services?

Probe on:

- *Views on: CAS information, mode of payment; help desk system; feedback system;*

B2.

Before introduction of CAS, HEIs were getting income from admission fees of which they are no longer fully enjoying it.

Does this scenario influence your relationship with HEIs? If yes, how/explain; If no, why?

B3.

TCU has often been seen as a pathetic regulator in the context of implementation of CAS, lacking the ability to adequately outlaw the on-going back door admissions done by some institutions.

Probe on:

- *Why do you think this is the case?*
- *Is TCU upholding its own mandate in coordinating HEIs admissions?*
- *How does this impact the objectives and credibility the system?*

B4.

Some applicants have found themselves late in application for admission as they face difficulties in using the system due to several reasons.

- *To what extent is student' names mismatch still a problem?*
- *What is the source of the problem and how can this be mitigated?*
- *In your views, how this problem could be solved?*

B5.

Traditionally HEIS have their own ways of registering students. In your views, can CAS be used to provide unique registration numbers which might be useful in tracking students' academic progress, students' life cycle, and perhaps quality of graduates through employability follow-up?

Probe on:

- *If yes, how can this best be done?*
- *Does it have influence to the institutional autonomy?*
- B6. Can you tell me the intrinsic reasons for students transfer after selections?
- *Probe on: If there are students who were transferred in programmes which they were not previously selected.*

B7.

What are users' views as regarding CAS portal usability, accessibility, internet speed and timing of application?

B8.

Is there any possibility of allowing prospective applicants (form six students) to register into the system before completing their secondary education studies? If yes, how can this best be done and what are anticipated challenges?

B9.

How does the system handle issues related to;

- *Applicants with various disabilities;*
- *Applicants with foreign certificates (authenticity of grades/who oversee or validate the grades and how.*

B10.

What is the position of TCU and NACTE in handling faults caused by the system which bear consequences on applicants?

Probe on: examples of such cases and how they are handled.

B11.

Is there any kind of institutional relation conflict between TCU, NACTE, HEIs and other stakeholders?

Probe: explain the scenarios.

B12.

To what extent has CAS influenced internal working of HEIs?

Probe: Is there relational shift between management and admission workers after CAS enactment?

B13. To what extent does existence of multi-stakeholders complicate the implementation of CAS?

B14. For three years of admission cycles, data show that most applicants preferred using Internet instead of Mobile phones, can you explain why?

Probe: Application through mobile phone was considered to be panacea for applicants living in rural areas, but the trend is not like that.

B15. Can you comment on the available information related to central admission system?

Probe:

- *missing information which would be very essential in the application process;*
- *whether available information related to CAS is comprehensive*
- *whether TCU website is a good place for accessing CAS information or it would be placed within CAS Portal?*

B16. What would be the expected benefits of linking CAS to other systems (e.g. HESLB, NACTE, NECTA).

B17. To what extent has CAS changed the styles of interaction/relationship with stakeholders?

Probe on: new ways of communication on admission related matters (Example: How Joint Admission Meetings are conducted?)

B18. Are there some cases where applicants fail to report in the selected HEIs claiming that they were not aware?

Probe on: the way such applicants are assisted.

B19. If you were asked for recommendations to improve the system, what would you recommend?

THEME C: IMPACTS OF NEW TECHNOLOGIES ON WORK ORGANIZATION

C1.

How new admission system demands radically new understanding, competencies and skills in work?

Probe on: whether the new system helps in upgrading skills, increasing education and on-job training?

C2.

How does CAS influence your professional identity as admission officer?

C3.

To what extent the new system has changed the employment trend, job requirements and descriptions for admission officers?

Probe on: employees bargaining position in relation to the introduction of new admission system?

C4.

Please, tell me to what extent the new admission system promises improvement or growth of your knowledge in admission issues, work career, new skills and upgrading your general skill levels?

Probe on: modifications of work - working conditions, qualifications, wages, re-skilling/upskilling/de-skilling

C5.

Does new system promise for promotion?

Probe on: dissipating effect on work motivation

C6.

How does new admission system facilitate the “managerial control over work” and “work organization?”

C7.

Has the current system ever prevented you from completing the admission responsibilities?

Probe on: Do you feel any difference in comparative to the earlier manual admission system?

If yes, explain

C8.

Do you think the electronic system makes you more responsible for your daily routines and adapts to your work needs? *Probe on: which needs?*

C9.

Have you ever participated in any training on the new admission system?

Probe on: acquired new skills (up-skilling/multiskilling) and if are helpful in assisting applicants on admission issues?

C10.

Do you think that new admission system has replaced some of your job contents and responsibilities as admission officer?

Probe on: responsibilities replaced and coping strategies?

C11.

How do you consider your previous and current work design in relation to introduction of CAS?

Probe on: changes in professional identities due to new system

Probe on: the work diverse and rewarding possibilities

C12.

Are there new physical and/or cognitive constraints happening because of the new admission system?

C13.

Do you think new admission system has transformed relations between institutions, workers and management?

C14.

To what extent new admission system has brought a new diversity of tasks and new types of work competency?

Probe on: shift of competencies

THEME D: BENEFITS OF NEW TECHNOLOGIES

D1.

What is the contribution of CAS towards quality assurance in admission?

Probe on: how and in what ways does implementation of CAS guarantee efficiency and quality in admission service delivery in HEIs?

D2.

In your views, what are observable changes as a result of the new admission system?

D3.

Can you explain the benefits that encourage private HEIs to participate in CAS as it is voluntary to them?

D4.

What are the general advantages CAS has against the old, manual and tedious admission system?

D5.

Do you think CAS has eliminated “who-know-who” which is claimed to occur in manual admission system?

Probe on: issues related to nepotism and corruption

D6.

Do the available services through CAS adequate for quality assurance purposes in admission of undergraduate students in HEIs?

Probe: What other services do you think CAS could perform to control quality of admitted students in HEIs?

D7.

What other specific issues do you think that need to be improved so that CAS can attract non-participating institutions to join the system?

D9.

In your views, can you say something on whether CAS introduction increase computer literacy skills?

Probe on: who made application for you - for applicants and ICT literacy level for ADOs

Appendix 5: Convenient Interview Guide for Applicants

THEME A: CHALLENGES OF NEW TECHNOLOGIES IMPLEMENTATION

Researcher: Fabian G. Mahundu;

Supervisors: Prof. Gilton Klerck

Interviewee:

Date...Place:

Section A

Introduction (for both the researcher and the interviewee)

Section B

2A1.

Please, can you explain to me what brought you to this office (Hint: establishing the reason)

2A2.

Why didn't you make use of information available on the organization's website or seek assistance from Internet cafes to resolve your problem? (*Hint: probe on the reasons of not using available information on the website*)

2A3.

If this institution decides to provide its services through electronic means and be posted in all participating HEIs and other CAS stakeholders, would you be ready to use them? (*Hint: probe whether the respondent would or would not use*)

2A4.

What do you think are the issues constraining most applicants from using the system? (*Hint: probe on constraining issues*).

2A5.

What would you recommend to improve the utilization of the operationalization of the system?
(*Hint: Compare issues in No.4 above and the suggested commendations or required actions*).

2A6.

In your views, can you say something on whether CAS introduction increase computer literacy skills? *Probe on: who made application for you - for applicants*

Can you share with me anything you think I have not asked you and you would wish to describe concerning CAS?

General comments

.....

Thank you very much

Appendix 6: Documentary Analysis Tool

S/N	Place	Document	Observation	Remarks
1				
2				
3				
4				

Appendix 7: Permission Letter for Conducting Research



RHODES UNIVERSITY

Grahamstown • 6140 • South Africa

Department of Sociology

☎ 046 6038361

11 October 2012

TO WHOM IT MAY CONCERN

This letter serves to confirm that Mr Fabian Mahundu student number: 612M7042 is a PhD student in our Department. As part of the Industrial and Economic Sociology course, our students are required to conduct a research project. The research process is a vital component of our teaching programme and we would appreciate any assistance that you could give to enable him to meet his commitments in this regard.

Many thanks.

Yours sincerely

A handwritten signature in black ink, appearing to be 'G. Klerck', written over a horizontal line.

Professor G. Klerck
Research Coordinator

Appendix 8: Interviews coding and data management through Nvivo QSR

The screenshot displays the Nvivo QSR software interface. The top toolbar includes icons for Document, External, Memo, Video, Framework Matrix, Node, Relationship, Create As Node, Create As Case Nodes, Create As Static Model, Folder, Search Folder, Set, Source Classification, Node Classification, Attribute, Relationship Type, and Classify Nodes from Dataset. Below the toolbar, the 'Nodes' section is active, showing a tree view of nodes:

- Nodes
 - ThemeA Challenges of New Technologies Implementation
 - ThemeB Operationalization of New Technologies
 - ThemeC New Technology and Work Organization
 - C1 How does new admission system demand radically
 - C10 How do you consider your previous and current w
 - C11 Are there new physical and or cognitive constraint
 - C12 Do you think new admission system has transform
 - C13 To what extent new admission system has brought
 - C2 Do you think that CAS influences your professional
 - C3 To what extent the new system has changed the e
 - C4 What is the position of new admission system in the
 - C5 How does new admission system facilitate the man
 - C6 Do you think that the current system has prevented
 - C7 Do you think the electronic system makes you more
 - C8 Have you ever participated in any training on the ne
 - C9 Do you think that new admission system has replac
 - ThemeD Benefits of New Technologies
 - D1 What is the contribution of CAS towards quality ass
 - D10 If you were asked for recommendations to improve
 - D2 In your views, what are observable changes as a re
 - D3 Can you explain the benefits that encourage private
 - D4 What are the general advantages CAS has against

The right-hand pane displays the content of the selected node, 'Theme C: New Technology and Work Organization'. It shows three interview questions and their corresponding responses:

Interviewer
C1. How does new admission system demand radically new understanding, competencies and skills in work?

Interviewee
 Personally, I have been in this position for a long time and I am good in IT so it is not a problem indeed but it has simplified my work. I regard the system being user friendly and simple.

Interviewer
C2. Do you think that CAS influences your professional identity as admission officer?

Interviewee
 To me I don't see as a problem because professional wise nothing has change, I have still other admission related task to do like registering students when they report to the institution.

Interviewer
C3. To what extent the new system has changed the employment trend, job requirements and descriptions for admission officers?

Interviewee
 To a large extent, since the system has taken a lot of admission activities and tasks we used to do. Previously, you needed enough labour to handle manual application and that was very demanding

The bottom status bar shows: FMG 57 Items | Nodes: 16 | References: 16 | Editable | Line: 89 | Column: 11 | 100%