THE DIFFUSION OF SOCIAL INFORMATICS IN THE CIVIL SERVICE WORK ENVIRONMENT IN KWAZULU-NATAL

BY

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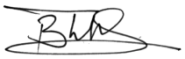
DECLARATION

I, Blessing Thuthuka Mbatha, do hereby declare that this study, "The Diffusion of Social Informatics in the civil service work environment in KwaZulu-Natal" is my own work, both in conception and execution. All the information that was used has been duly acknowledged in the text and references.



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DEDICATION

This thesis is first and foremost dedicated to the Almighty God, *"Thank you Lord that you have shown me favour. The appointed time has come" (*Psalm 102:13).

It is also dedicated to my exquisite wife Mbali Pearl Mbatha and my beloved and handsome sons Mvelo and Melisizwe Mbatha, who have been by my side throughout this period, and who without knowing it, have always inspired me and given me the strength to carry on.

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ABSTRACT

ICT is a compound term that is used to refer to the convergence of a wide array of new technologies presently being developed and used in the creation, processing and transmission of information. Broadly speaking, these technologies encompass all aspects of data / information recording, handling and transmission, and include computers, telecommunications, satellites, fibre optics, video-based multimedia applications, automated speech outputs, and electronic broadcast technologies. The public services referred to in this study are government departments, and they are responsible for servicing society, devising policies, and ensuring that they are implemented. The civil servants referred to in this study are government employees.

The focus of this study was to examine the use, types, interaction, and availability of ICTs in four government departments in KwaZulu-Natal, South Africa, in the context of work productivity and creativity. In order to achieve the stated aim, the following research had to be answered: What types of ICTs are available in government departments? What problems are experienced by the civil servants in their utilization of ICTs? How can the education and training needs of the civil servants be addressed? To what extent are ICTs used by the civil servants in their work activities? What strategies and solutions can address the problems faced by the civil servants?

This study adopted mixed methods where aspects of both quantitative and qualitative approaches were employed. The quantitative method was used to solicit information from the civil servants, while the qualitative approach was used in the review of different social informatics studies. The literature review was undertaken across a broad spectrum of sources

including conference papers, journals, government policy documents and several Internet sources.

The study used multistage probability sampling to select the elements for the survey and to achieve the desired representation from the population. Probability samples helped the researcher acquire a demonstrable degree of reliability and validity. The sampling techniques used were simple random, systematic, and stratified sampling. Simple random sampling was first used to identify government departments in the province that have considerable reach and are service intensive, namely the Departments of Arts and Culture, Home Affairs, Education, and Health. Secondly, systematic sampling was used to select suitable district municipalities. This sampling technique was used in order to increase the chances of obtaining a representative sample and to prevent bias in the selection process. The initial starting municipality in this technique was selected randomly and every second district municipality from a list was selected thereafter. The departments were selected from the following district municipalities: uMgungundlovu, uMzinyathi, Zululand, uThungulu and Sisonke.

The first stage of stratified sampling consisted of the division of the service area into rural and urban based areas. In the second stage, stratification of personnel in the selected departments into top, medium and lower level management was done. This was to ensure that all the levels of management were represented in the study. In the last stage, a simple random sample was used to select the sample elements from the different levels of management. Government departments in South Africa have a well defined organogram such that the number of managers is almost equal across all departments. A sample size of 20 % of the population elements was used and this resulted in 65 personnel being selected from each ministry and a target sample of 260 managers. A questionnaire was used to collect

quantitative data. The data collected was analyzed using thematic categorization and tabulation, and the findings were presented descriptively.

The findings show that a variety of ICTs have been adopted in the sector. All the civil servants surveyed indicated that they used ICTs to communicate with fellow colleagues, for spreadsheet purposes, word processing, printing, and to disseminate departmental information. The respondents' level of interaction with some of the ICTs, such as e-mail, personal computers, Internet, printers and telephones, was very high, while the use of ICTs such as video conferencing, television and radio was very poor. The most common obstacles to the effective use of ICTs in government departments were found to be lack of skills / competence, the lack of a comprehensive ICT policy, and the lack of proper planning for the adoption and diffusion of ICTs in the sector. The civil servants particularly voiced the need for training on database searching and information retrieval. The contextual conditions that need to be adapted in order to improve the use of ICTs in government departments include the need for adequate and well structured planning; an introductory a comprehensive ICT policy that would provide sufficient frameworks for ICT development and/or use in the public sector; provision of proper and sufficient ICT infrastructure; funding for the purchase of all necessary facilities and resources for ICTs; and the training of staff on how to use ICTs.

The issue of planning revealed here is very important as embarking on any new innovation requires adequate planning. Other recommendations include training sessions for civil servants so that they can use the acquired ICT knowledge and skills in their daily work and activities. Where necessary, the government should continually review the ICT training it offers to civil servants, especially considering the rate of developments in the ICT industry.

A good policy would also provide sufficient frameworks for ICT development and/or use in government departments, for instance in areas of strategizing implementation, staff

development and communication. Policies to foster the uptake of ICTs are insufficient. Moreover, policies specific to ICT diffusion and use will not, on their own, lead to stronger performance; they should be part of a comprehensive set of actions to create the right conditions for growth and innovation. The diffusion and adoption of ICTs in government departments require expertise at various levels. The South African government is still working on putting together a comprehensive national ICT policy that would guide ICT use in the country.

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ACRONYMS AND ABBREVIATIONS

3G	Third Generations
ABC	African Broadcasting Company
ADSL	Aerospace Systems Design Laboratory
AIDS	Acquired Immune Deficiency Syndrome
ANC	African National Congress
ASGISA	Accelerated and Shared Growth Initiative of South Africa
BBC	British Broadcasting Corporation
BEE	Black Economic Group
CD-ROM	Compact Disk Read Only Memory
CIA	Central Intelligence Agency
CMC	Computer-Mediate Communication
CNN	Cable News Network
COMESA	Common Market for Eastern and Southern Africa
CSIR	Council for Scientific and Industrial Research
CSN	Community Services Network
DBSA	Development Bank of Southern Africa
DCN	Digital Cellular Network
DoC	Department of Communications
DRC	Democratic Republic of Congo
DSTV	Digital Satellite Television

DTV	Digital Television
DVD	Digital Video Discs
E-gov	Electronic government
EIU	Economist Intelligence Unit
E-mail	Electronic mail
EU	European Union
GDP	Gross Domestic Product
HDTV	High Definition Television
HIV	Human Immune Virus
HSDPA	High-Speed Downlink Packet Access
HSGIC	Heads of State and Government Implementing Committee
ICASA	Independent Communications Authority of South Africa
ICT	Information and Communication Technology
IDRC	International Development Research Center
IS	Information Society
ISP	Internet Service Providers
ISSC	International Steering Committee
IT	Information Technology
ITU	International Telecommunications Union
JINX	Johannesburg Internet Exchange
KZN	KwaZulu-Natal
LAN	Local Area Network
MACIS	Mamelodi Community Information Services

MCA	Multi Choice Africa
M-Net	Electronic Media Network
MNP	Mobile Number Portability
NGO	Non-governmental Organization
NGN	Next Generation Network
OECD	Organization for Economic Corporation and Development
PC	Personal Computer
PCEHR	Personally controlled electronic health records
PSTN	Public Switch Telecommunications Network
PTNS	Public Telecommunications Networks
RDP	Reconstruction and Development
RSG	Radio Sonder Grense
SABC	South African Broadcasting Corporation
SADC	Southern African Developing Community
SAFE	South African-Far East
SANDF	South African National Defense Force
SATA	Southern African Telecommunications Association
SATCC	Southern African Transport and Telecommunications Commission
SAUSA	South African Universal Service Agency
SDTV	Standard-Definition Television
SKA	Square Kilometer Array
SI	Social Informatics

SIM	School of Information and Media
SMB	Small Medium Business
SNO	Second National Operator
SRII	Sub-Regional information infrastructure
SUNSAT	Stellenbosch University Satellite
TELI	Technology Enhanced Learning Institute
TRASA	Telecommunications Regulatory Authority of Southern Africa
UEFA	Union of European Football Association
UK	United Kingdom
UNDP	United Nations Development Programme
USA	Universal Service Agency
USAID	United States Agency for International Development
VANS	Value Added Networks
VoIP	Voice over Internet Protocol
VSAT	Very Small Aperture Terminals
WAN	Wide Area Network
WAP	Wireless Application Protocol
WASC	Western Africa Submarine Cable
W-CDMA	Wideband Code Division Multiple Access
WSIS	World Summit on the Information Society

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CHAPTER ONE

INTRODUCTION AND BACKGROUND TO THE STUDY

1.1 CONCEPTUAL SETTING

The ramifications of technology are endless (Callon 1991, 132). Information and Communication Technologies (ICTs) are credited with their transformative capacity in national economies, organisations and the global economy (Sayed and Westrup 2003; Singh and Raja 2010, 3). For nations, ICTs are assumed to offer significant potential benefits for socioeconomic development and thus represent a promising way to lead developing nations to a path of more rapid development (UNDP 2001, section 2.1.1). According to Montealegre (1999, 199), ICTs have been portrayed "as a kind of panacea for a multitude of the world's problems" and as "an important catalyst that will strengthen developing countries" position in the information society. For organisations, ICTs provide the competitive advantage necessary to face the challenges of the new emerging global economy (Montealegre 1999, 199; Kling, Rosenbaum and Sawyer 2005, 23). At global level, ICTs are intimately involved in creating one global space due to their ability to overcome temporal and spatial limits by setting up new modes of work and facilitating speedy communication and organisation across time and space (Castells 2000, 54; Walsham 2001, 21; Law, Pelgrum and Plomp 2008, 1; Plomp 2009, 275).

It is generally acknowledged that the information and knowledge age is here, and has in-fact been with humankind since the last decades of the second millennium (Thioune 2003, 06; Comninos, Esselaar, Gillwald, Moyo and Naidoo 2010, 02). The notion that ICTs are pre-eminent for faster development especially in the underdeveloped countries is pervasive and momentum is gathering on a global scale to support the development, diffusion, use and appropriation of ICTs in knowledge-poor countries and regions in Africa and Asia in particular (Thioune 2003, 06; Comninos, Esselaar, Gillwald, Moyo and Naidoo 2010, 02). The founder of social informatics (SI), Kling (1999), supported by Millbery and Stuart (2010, 2); Singh and Raja (2010, 5); Unwin (2009, 7) describe SI as the systematic, interdisciplinary study of the design, uses, impact and consequences of ICTs that takes into account their interaction with institutional and cultural contexts. According to the document that was published at the Indiana University

(2000), supported by Berleur, Nurminen, and Impagliazzo (2006, 4) and Kling *et al*. (2005, 9) where SI was first established, describe SI as the study of the social aspects of computers, telecommunications and related technologies, examining, among other variables, the ways that ICTs shape organizational and social relations, or the ways in which social forces influence the use and design of ICTs. In further describing SI, D-Lib Magazine (1999) defines SI as the body of research and study that examines social aspects of computerization, including the roles of ICTs in social and organizational change and how the social organization of ICTs is influenced by social forces and social practices. According to D-Lib Magazine (1999), supported by Le Roux (2009), SI includes studies and other analyses that are labeled as the social impacts of computing, social analysis of computing, studies of computer-mediated communication (CMC), information policy, computers and society, organizational informatics, and interpretive informatics, to list a few.

Kling (2000, 227) narrates that in the late 1960s and early 1970s, some social scientists began empirical observational studies on the consequences of computerization inside organizations. He is of the view that during the 1970s and 1980s, this body of research expanded to cover topics such as the relationship between computerization and changes in the ways in which work was organized, organizations were structured, and distributions of power were altered. Moreover, he notes that most of the empirical social research was conducted within organizations because they housed computers and the people who used them intensively. By the 1980s, research covering the social aspects of ICTs was conducted by academics in a number of different fields, including information systems, information science, computer science, sociology, political science, and communications (Kling and Iacono 1989, 13; Kling 2000, 228). According to Kling (2000, 229), in 1996 some participants in this research community agreed that the scattering of related research in a wide array of journals and the use of different nomenclatures was impeding both the research and the abilities of "research consumers" to find important work. They therefore decided that a common name for the field would be helpful, and after significant deliberations, they selected "social informatics."

Kling recalls that some members of this group held a workshop at Indiana University in 1997, and agreed upon a working definition for SI as follows:

> Social informatics refers to the interdisciplinary study of the design, uses and consequences of ICTs that takes into account their interaction with institutional and cultural contexts (Kling 2000, 230).

Kling observes that in Europe, the term 'informatics' is widely used to refer to the disciplines that study ICTs, especially those of computer science, information systems and information science.

1.2 COMMUNICATION AND INFORMATION TECHNOLOGY DEFINED

ICTs are perceived to be key catalysts in current and future social and organizational changes. ICT is a compound term that is used to refer to the convergence of a wide array of new technologies presently being developed and used in the creation, processing and transmission of information. Broadly, these technologies encompass all aspects of data/ information recording, handling and transmission, and include computers, telecommunications, satellites, fibre optics, video-based multimedia applications, automated speech outputs, and electronic broadcast technologies, to name a few.

The term 'information and communication technologies', according to Kling (2001), Ngenge (2003, 1-2), usually refers to a wide variety of applications, such as electronic mail (e-mail), word processors, video-editing programs and web browsers, as well as technologies that support many different applications, such as fiber-optic networks. These authors also observe that for most individuals, usage is restricted to a set of specific ICT applications, such as a database and/or the Internet. De Sutter (2003) concurs with the above authors by describing ICTs as a combination of all these elements as indicated above, capped by a vision on how technology can help an organization reach its goals. Ngenge (2003, 2) advances the preceding views by explicating that ICTs encompass all those technologies that enable the handling of information and facilitate different forms of communication between human actors, between

human beings and electronic systems, and across electronic systems. Ngenge further describes ICTs as technologies that facilitate communication and the processing of information by electronic means. He argues that this definition embraces the full range of ICTs and includes capturing technologies that collect and convert information into digital format, e.g. keyboards, mice, voice recognition systems, bar code readers, and image scanners, to name a few. He opines that following closely are storage technologies such as magnetic tapes, floppy disks, hard disks, optical disks (such as Compact Disk-Read Only Memories – CD-ROMs) and smart cards (such as those used for financial transactions).

In his study, Adeya (2001, 3) describes ICTs as a combination of equipment, services and activities, including Internet services provision, telecommunications equipment and services, information technology equipment and services, media and broadcasting, libraries and documentation centres, commercial information providers, network-based information services, and other information related activities. Adeya adds that ICTs are embedded in networks and services that affect local and global flow and the accumulation of knowledge. The combination of any two or more of these multifaceted technologies results in a conglomeration that offers fast and attractive information handling capabilities. For instance, the Internet with its World Wide Web (WWW/Web) platform, facilities and tools for information exchange, networked with electronic publishing and knowledge management services such as intelligent gateways, epitomizes the power of ICTs. As a result, ICTs are characterized by high-speed communication and capabilities for handling vast amounts of information and traffic at the same time.

Some ICT experts, such as Kling (2001); Johnston (2001) and Plomp (2009, 275), have observed how ICTs are shrinking the traditional barriers of time and space while simultaneously increasing the rate of growth of vast reserves of knowledge. These authors note that the increasing range of human knowledge can be transmitted faster, in bigger bulk, and more easily than before, making human endeavour in all spheres appear limitless. In organizations, ICTs have become an important ingredient in organizational competitiveness; ICT resources increasingly get linked to the overall organizational strategies, such as ICT-related decision-making in corporations. In the current information-driven economy, ICTs are considered to be power tools for the information/ knowledge industry because they are more efficient economic

substitutes for labour or older technologies. Thus, the United Nations Development Programme refers to ICTs as a "powerful enabler of development" (UNDP 2001, section 2.1.1) because of their significant impact on the economic, scientific, academic, social, political, cultural and other aspects of life. Ngenge (2003, 2) notes that next in line, are processing technologies that create systems and application software. Communication media, such as fiber optics, cellular phones and fax machines, and communication technologies which produce devices and networks to transmit information, such as Digital Cellular Networks (DCNs), Local Area Networks (LANs), Wide Area Networks (WANs), for example the Internet, are just as important (Ngenge 2003, 2). Ngenge further asserts that display technologies are the last group of ICTs that create a variety of output devices for the display of digitized information, such as display screens for computers, digital TV sets, digital video discs (DVD), printers, voice synthesizers and virtual reality helmets. Today, according to Ngenge (2003, 2), the common feature of these ICTs is 'digitization'. In this process, information (whether relayed through sound, text, voice or image) is converted into the digital, binary language that computers use (Ngenge 2003, 3). As computers cannot understand information in the form of pictures or words, data is broken down into binary digits or bits: "on" or "off ", "zero" or "one". The conversion of information into this form makes it possible to transmit information from different sources through one channel and to reduce the risks of distortion (Ngenge 2003, 3). Ngenge notes that this process of digitization facilitates the convergence of computers, telecommunications, office technologies and assorted audio-visual consumer electronics. Their integration in turn allows information to be handled at higher speeds with more flexibility, improved reliability, and at lower cost (Ngenge 2003, 3).

1.3 A BRIEF HISTORY OF SOCIAL INFORMATICS

It is often assumed that social informatics started with the Internet. However, Kling (1999) clarifies that it actually began with studies of computerization in workplaces and organizations that date back to the early 1970s, although the specific label of social informatics was not yet being used. Kling (2000, 223) observes that since the deployment of the first commercial computers in the 1950s, their potential power to extend human and organizational capabilities

excited the imaginations of many people. In the 1950s and 1960s computers were relatively expensive (often costing hundreds of thousands of dollars) and relatively few were in use (Kling 2000, 223).

Kling observes that consequently, it was difficult to observe their effects, and the writing about computerization was primarily speculative. For example, Kling notes that the concerns about computerized systems becoming efficient substitutes for human labor led to speculation about mass unemployment, radically reduced work weeks, and the "problem" of how millions of people would be able to manage extensive amounts of leisure time. It is interesting to view these speculations from today's perspective, when computer systems have become ubiquitous and professional workweeks seem to have expanded (Kling 2000, 230). In the 1980s, the range of topics studied in this area (computerization) expanded to include other types of issues (Kling 1999). Examples include studies on the extent to which people would communicate more or less effectively with organizational electronic mail systems, and the extent to which "expert systems" could improve the quality of decision making and services in organizations, such in medical professions (Kling 1999). According to Kling (1999), through the 1980s, computerization was primarily taking place within organizations, and there were significant pressures for information systems professionals to design and develop systems that would be useful and useable by a variety of people. He recognizes that the research on SI was used in the education of information systems professionals through textbooks, workshops and some professional articles in magazines and journals.

In the 1990s, according to Kling (1999) other significant themes emerged. For example, as the use of the Internet grew widespread, the question of the extent to which Internet use would decrease or enrich the quality of local civic life in communities became important. An examples of other types of issues that arose include political participation, e.g. grassroots groups' use of the Internet to organize more effectively, online mobilization for groups that cannot get access to mainstream press, the ability of voters to get more complete information through online sources, and the ability of campaigns or candidates to raise funds using the Internet.

1.4 QUESTIONING ICTs AND DEVELOPMENT IN AFRICA

For several years, many researchers have been showing a particular interest in ICTs. Mansell and When (1998) predicted that ICTs would become crucially important for sustainable development in African countries. A few years later, Thioune (2003, 2) observed that in their last two decades, most developed countries had witnessed significant changes that could be tied to ICTs. This author cited these multidimensional changes as technical, financial and economic, cultural, social and geo-political. He noted that these changes could be observed in almost all aspects of life, from economics to education, communications, leisure and travel, to name a few.

In Thioune's (2003, 4) study on "Addressing ICTs in Africa", the author established that ICTs made it possible to quickly find and distribute information while introducing new ways of doing business in real time at a cheaper cost. However, he found that there was a considerable gap between developing countries, notably African countries, and developed countries in terms of the contribution of ICTs to the creation of wealth. This author observed that the gap tended to widen between developed countries, the technology suppliers, and the receiving developing countries. He cautioned that at the same time, the gap between the elites and the grassroots communities within these developing countries was also expanding in terms of their access to ICTs. One of the conclusions of his study was that if measures were not taken to make ICTs both affordable and easy to use, access to them would be insignificant in developing countries.

Thioune highlighted many initiatives at international level to support Africa's efforts to develop communication infrastructure and services that would connect the continent to the world's information highways. These efforts have all been designed to enable African countries to find faster ways to achieve durable and sustainable development. However, when looking at the findings of Thioune's study, it is clear that although most of the actors intuitively agree on the positive role that ICTs can play in the development process, the links between development and the use of ICTs are yet to be clearly established and rigorously supported by empirical results from Africa. There is no doubt that ICTs play an important role in developed countries. In developed countries, the evolution of ICTs has been linked closely to the power and economic boom of these countries, and there has been a strong positive correlation between development

levels and the adoption of increasingly sophisticated and complex technologies. However, Thioune's (2003, 6) suggestion was that although the new (digital) technologies may be impressive, they cannot determine the changes expected from their uses. His argument was that ICTs are no more than catalysts that facilitate these changes. Like any other technology, it is the social context in which they have been introduced and implemented that determines their uses and impacts. Thus the digital revolution is relevant for Africa only if it takes into consideration the daily realities and aspirations of individuals. On the other hand, the United Nations Development Programme [UNDP] (2001 section 2.1.1) supported by Millbery and Stuart (2010, 97) argued that ICTs have, to a large extent, been developed in the context of, and for the cultural and social standards of, a few rich countries (Western Europe, North America, East and Southeast Asia, and Australia). According to UNDP (2001, section 2.1.1), these innovations can help meet market pressures but not the needs of the poor, who have very weak purchasing power. The International Telecommunications Union [ITU] (1997) proposes that factors that strongly influence the introduction and spread of the Internet are wealth, telecommunications infrastructure (quality and number), the number of microcomputers, the relatively low cost of communications (telephone and the Internet), language, education, and training.

It is interesting to note that Africa is known for being a continent with one of the world lowest growth rates in all types of infrastructure. UNDP's (2001, section 2.1.1) argument is that even if sustainable economic growth facilitates the creation and diffusion of useful innovations, technology is not only the result of growth, but can also be used to support growth and development. Thioune (2003, 8), in support of this argument, wrote that ICTs are credited with the ability to transform, and deep and significant changes are expected from their widespread use in Africa. From this standpoint, African countries can take maximum advantage of the new technologies even if major challenges remain. These challenges include adapting ICTs to local conditions and uses in developing countries, and allowing each country to understand these innovations and adjust them to their own development needs. It should be pointed out that development in Africa depends on the continent's capacity to create wealth first and significantly reduce poverty and then to raise its capacity to create wealth to unprecedented and sustainable levels. Thioune (2003, 11) pointed to the most optimistic observers estimates that with the era of new technologies and networks, African countries have an unprecedented opportunity to gain

access to, to take advantage of, and most importantly, to contribute fully to this new world constructed on knowledge. This view is shared by UNDP (2001, section 2.1.1), i.e. that accurate and reliable information is a key element for sustainable development.

Mansell and When (1998) observed that in June 1996, the United Nations Commission on Science and Technology for Development (UNCSTD), in collaboration with International Development Research Centre (IDRC) proposed five development indicators that focused on the improvement of the quality of life: education, health, income, governance and technology. If one considers that these five indicators are key indicators of development for African countries, ICTs can be socially beneficial only if they contribute to: poverty eradication (higher income), improved health and education, better use and more equitable sharing of resources, and raising participation in decision-making processes (and in this respect, access to information is crucial).

1.5 CONTEXTUAL SETTING

KwaZulu-Natal is South Africa's domestic tourism leader (South Africa Year Book 2009/10, 10). Aptly called South Africa's "Garden Province", KwaZulu-Natal is one of the country's most popular holiday destinations. This verdant region includes South Africa's lush subtropical east coast (SA Year Book 2009/10, 10). Washed by the warm Indian Ocean, it stretches from Port Edward in the south and northwards to the Mozambique boundary. The document adds that in addition to the magnificent coastline, the province also boasts sweeping savanna in the east, and the majestic Drakensberg mountain range in the west. The KwaZulu-Natal province has more than 10 million people living on 92 100 km2 of land. The principal language spoken is isiZulu, followed by English and Afrikaans. Remnants of British colonialism, together with Zulu, Indian and Afrikaans traditions, make for an interesting cultural mix in the province (SA Year Book 2009/10, 11). In essence, with a total area of 94 361 square kilometers, KwaZulu-Natal is roughly the size of Portugal (South Africa Info 2010; KwaZulu-Natal 2010). The KwaZulu-Natal province has the following 26 government departments: the Departments of Agriculture and Land Affairs; Arts, Culture, Science and Technology; Communications; Correctional Services; Education; Environment Affairs and Tourism; Finance; Foreign Affairs; Health; Home Affairs;

Housing; Intelligence; Justice and Constitutional; Development; Labor; Mineral and Energy Affairs; Provincial and Local Government; Public Enterprises; Public Service and Administration; Public Works; Safety and Security; Social Development (Previously Welfare and Population Development; Sport and Recreation; Trade and Industry; Transport; Water Affairs and Forestry; and the South African National Defense Force or SANDF (Government Ministries Website in South Africa 2004).

1.6 STATEMENT OF THE PROBLEM AND MOTIVATION OF THE STUDY

A research problem should go beyond activity to present conceptual thinking, inquiry and insight. Simply collecting data and making comparisons may not be activities representative of true research problems. This study on social informatics is important, particularly in Africa where the utilization of ICTs is either low or underdeveloped (Kling 2000; Kling 1999; Kling 2000, 232; UNDP 2000; William, McIver, Traxon, 2002; Berleur, Nurminen and Impagliazzo 2006, 08; Ngulube 2007; Mutula 2008; Mutula and Mostert 2008; Mbatha 2009; Ntetha 2010). In terms of human needs, the use of ICTs has been echoed by numerous researchers as both fundamental and healthy, especially in public offices where the impact and consequences of ICTs take into account the interaction between institutions and society, particularly in government departments (Kling 1999; Carol 1998 and RHO 2004; Ntetha 2010). These authors reaffirm that the social aspects of computers, telecommunications and related technologies are crucial in shaping organizational and social relations and in enhancing the ways in which social settings influence the use and design of ICTs.

In Africa, and particularly in the KwaZulu-Natal province, office transactions remain dated, with little or no acknowledgement of the social and technological benefits of computerization in workplaces and organizations (Mbatha 2009; Ntetha 2010). This is despite the notions and labels accredited to the role of social informatics in integrating and building on bodies of research, such as "computers and society," "social impacts of computing," "social issues of computing," "social analysis of computing," and "behavioral information systems". Very little has been done to integrate this knowledge through research. It is believed that a study

on social informatics in the KwaZulu-Natal Province focusing on civil servants would enable them to extend their abilities with respect to accessing data and communication. It is common for many technology-centered accounts of new ICTs to emphasize the ways in which they enable new kinds of actions that were previously more costly, difficult or impossible; For example, ICTs would enable the civil servants to drastically reduce some of the communicational restrictions of space and time. In short, the use of ICTs by civil servants in government departments would completely restructure the public sector.

It is important to note that in some government departments such as Social Development and Education the use of ICTs by some civil servants is generally low in terms of both frequency and variety. For example, Williams, Wilson, Richardson, Tuson and Coles (1998) and the School of Information and Media (2000) supported by a current study done by Ntetha (2010), observe that the use of ICTs by some civil servants is generally restricted to word processing and the use of specific applications. While Williams *et al.* (1998) and the School of Information and Media (2000) note that civil servants make more use of a range of generic computer applications such as spreadsheets and PowerPoint, word processing still dominates their use of ICTs. Williams *et al.* (1998) and The School of Information and Media note that other types of ICTs, such as the Internet and Web, databases and video conferencing, are used relatively less. Ntetha (2010) in his study on social informatics in selected government departments in KwaZulu-Natal established that an ICT tool such as video conferencing was not available in the targeted departments.

Likewise, Williams *et al*. (1998) and the School of Information and Media (2000) note that in some government departments such as Social Development and Education other types of ICTs, such as the Internet and Web, databases and video conferencing, are used relatively less. In Ntetha's study civil servants identify a range of issues that they regard as inhibitors to their effective use of ICTs, particularly lack of access or availability of hardware and software, and lack of ICT education, skills and knowledge. The researcher's multidisciplinary background, which includes a first degree in Information, Communication and Technology and a Masters degree in Sociology, were easily accommodated by SI, which attracts studies in diverse fields, including information systems, anthropology, computer science, communications, sociology,

library and information science, political science, and science and technology studies. It is often difficult for scholars within these various disciplines to locate others who share common interests in the social aspects of information technologies. SI is a relatively new term that can serve as a banner to group together those who are interested in contributing to these interests. SI can therefore serve as a pointer, helping lead others to appropriate theories, key ideas, studies, findings, books, articles, and courses of study (Kling 1999; William, McIver and Traxon 2002). It is important to note that since one of the objectives of the study is to examine the ICT infrastructure in South Africa, this study therefore intends to suggest and recommends suitable mechanism whereby ICT policies could be used to improve the civil servants' interaction with ICTs.

1.7 PURPOSE OF THE STUDY

An aim functions as an ideal indication of the direction of the research in question. According to Kwake (2007, 14), with the assistance of an aim, a study is able to translate and process a set of objectives. Broadly speaking, this study set out to examine the types, uses, and contextualization of ICTs through social informatics within the civil service work environment in the KwaZulu-Natal province.

1.8 OBJECTIVES OF THE STUDY

Objectives are specific steps taken in order to find a solution to a given problem. They are derived from the aim or purpose of a study, and are by nature specific, measurable, achievable, realistic and timely (Kwake 2007, 15). Kwake notes that objectives present the expected outcomes of the research study in question. The main role of objectives is therefore to guide action. Often objectives are presented as precise statements of intended activities that are used by the researcher to achieve the aims of the study, and must be fulfilled within a specified time frame.

In order to achieve the stated aims, the study set out to:

a) Establish the types of ICTs and products (systems/ software) currently in use in government departments (e.g. the Internet, intranets, databases, etc.)

b) Explore the civil servants' level of interaction with ICTs in their respective departments

c) Determine how ICTs can add value to the public sector

d) Establish the training needs of civil servants in order for them to use ICTs more often and effectively in their respective departments

e) Explore the impact of ICTs in selected government departments

f) Describe the uses and values of ICTs in selected government departments

g) Explore and examine the general strategy for ICT development and degree of ICT awareness in government departments

h) Examine the infrastructure required to ensure the effective implementation of ICTs in government departments

1.9 RESEARCH QUESTIONS

A research question has three criteria, as indicated below:

- It expresses a relation between two concepts or constructs
- It is stated clearly and unambiguously in question form
- It implies possibilities of empirical testing

Thus in order to realize the objectives of the study, the following research questions were posed:

a) What types of ICTs are available in government departments?
b) What is the civil servants' level of interaction with ICTs?
c) What is the value of ICTs in the public sector?
d) What are the levels of computer skills amongst the civil servants?
e) How can civil servants' education and training needs be addressed?
f) What impact do ICTs have in the civil servants' work environment?
g) What is the purpose of using ICTs in government departments?
h) What strategies and solutions can address the challenges faced by civil servants as far as ICT utilization is concerned?

1.10 ASSUMPTIONS OF THE STUDY

An assumption is defined as an educated guess that is based on intuition, experience, or what one has read in literature (Mugenda and Mugenda 1999, 28). Mugenda and Mugenda add that assumptions are often expectations or suppositions that a researcher makes as a preamble to a study. Kwake (2007, 17) supports this statement, arguing that assumptions are not merely the values and/or beliefs held by a researcher. According to Ikoja-Odongo (2002b, 18), assumptions are useful during data analysis and when making conclusions. Thus this study was based on the following analysis:

- Some government departments remain underdeveloped with poor infrastructure because of the lack of an integrated ICT policy that could help create an enabling environment for improved social and economic welfare
- Civil servants who have and use ICTs provide better service delivery and offer higher economic standards than those who do not have and/or use ICTs
- The effective utilization of ICTs improves work productivity and creativity

1.11 SCOPE AND LIMITATIONS OF THE STUDY

The scope of a study includes the area, extent or latitude a study can cover, while the limitation of a study takes into account the restrictions that are imposed on the research (Mugenda and Mugenda 1999, 41). These restrictions may either be internal (i.e. related to the person conducting the study) or external (i.e. imposed by the environment in which the study is being conducted). Restrictions can also arise from the type of study being conducted (Kwake 2007, 20).

The section below presents the conceptual scope, focus, research environment, time factor, and methodological frames of the study.

1.11.1 Conceptual scope

Most of this study is descriptive and therefore quantitative in its approach.

1.11.2 Focus

This study focused on the use of ICTs by civil servants in selected government departments in KZN. The interest lay in understanding the role, use, and types of ICTs within the government departments in KZN.

1.11.3 Research environment

Because of the diversity and enormous size of government departments in South Africa, the researcher limited the study to the KZN province, covering only selected government departments. In order to increase the chances of obtaining a representative sample, systematic sampling was applied. In this technique, suitable district municipalities in KZN were selected, where every second district in the list was chosen. The sampled district municipalities were: uMgungundlovu District Municipality, Zululand District Municipality, uThungulu District Municipality, Umzinyathi District Municipality, and Sisonke District Municipality.

1.11.4 The time factor

The study only focused on government departments in KZN. Although it would have been interesting to cover all the provinces in the country, this would have required more time, resources and expertise, which the researcher simply did not have. As outlined above, this study used the established frameworks of government departments in the country, namely the Departments of Health, Education, Arts and Culture, and Home Affairs. The study focused on the various levels of civil servants, specifically the strategic, tactical and operational levels of staff. A sample size of 260 was deemed suitable given that the study population in all the departments in KZN was beyond 5000 (Gay 1996, 125). The researcher had to take into account the extensive distances between the respondents in the province and their availability.

1.11.5 Methodological scope

The survey research method was used to collect quantitative data from the civil servants.

1.12 SIGNIFICANCE OF THE STUDY

The importance of a study is judged by the contribution it makes towards furthering research and knowledge (Kwake 2007, 18). As it stands, this study could potentially benefit analysts who are in the process of researching and framing policies about ways in which people might or should use ICTs. Scholars who are not involved in such policy analyses may also find this study of interest, particularly because it uses several contemporary examples of ICT policy debates to illustrate the value of socially and organizationally informed research. The outcome of this study is also intended to benefit the civil service in South Africa, particularly in the KwaZulu-Natal province. Students, academics, researchers, institutions, the donor community and the government are all expected to gain from this study in some way. The study forms a significant reference for research, especially because of its scope and breadth.

1.13 SOURCE MATERIAL

Literature was reviewed/ sourced from journals, conference papers, research publications, official government publications and books. However because not much has been written on social informatics in Africa, it proved difficult to locate enough useful sources of information from traditional libraries. Most information was therefore from the Internet, with significant efforts made to use the latest publications.

1.14 DISSEMINATION OF THE RESEARCH RESULTS

Ocholla (1999, 141) has stated on a few occasions that possessing information without disseminating it is useless - research is not complete until it is disseminated. The results of this study will be disseminated via the library of the University of Zululand with copies in its theses collection. To reach a wider audience, the results will also be disseminated through seminars, conferences, and internal workshops. Findings from the study have already been disseminated through the following conferences and peer-reviewed journals:

- Mbatha, B.T., D.N. Ocholla, and C.J.B. Le Roux. 2011. Some implications of Information and Communication Technologies on public service work environments in South Africa. *In proceedings of ProLiSSA 2011*. Held in Pretoria, South Africa.
- Mbatha, B.T. 2010. Prevalence of Internet Addiction Disorder in Government Departments in KwaZulu-Natal in South Africa. *In proceedings of the Spring 8th International Conference on Computing, Communications and Control Technologies*, Orlando, Florida, USA. (6-9 April, 2010).
- Mbatha, B.T. 2009. Web-based technologies as key catalysts in improving work productivity and creativity: the case of Zululand District Municipality. *Journal for Communication Sciences in Southern Africa,* Vol. 28(2) pp.82-95.
- Mbatha, B.T. 2009. Web-based technologies as a double-edged sword in improving work productivity and creativity in government departments in South Africa: The case of

KwaZulu-Natal. *In proceedings of the CIE39 International conference on Computers & Engineering*. University of Technology of Troyes, France. (6-8 July, 2009).

- Mbatha, B.T. 2009. Researching the impact of Internet Addiction Disorder (IAD) in government departments in KwaZulu-Natal. *In proceedings of the 11th Annual conference on ZAWWW applications.* Held at the Nelson Mandela Metropolitan University, Port Elizabeth. (2-4 September, 2009).

- Mbatha, B.T., M.O. Adigun, and M.P. Kubeka. 2008. Mapping and auditing the impact of the Web based Technologies in civil services in KZN: the case of Pietermaritzburg. *In Proceedings, 10th Annual Conference on World Wide Web Applications (ZAWWW2008)*, (5-7 September, 2008).

- Mbatha, B.T. 2004. Conceptualising and contextualizing social informatics, Literature review. *In Proceedings, LIASA Conference* (LIASA, 2004).

- Mbatha, B.T. 2005. The role, uses, impact, and design of ICTs within the civil services in KwaZulu-Natal government. *In Proceedings, LIASA Conference* (LIASA, 2005).

- Mbatha, B.T., D.N. Ocholla, and M.O. Adigun. 2005. The impact of ICTs in public sector in KwaZulu-Natal province. *In proceedings, 7th Annual Conference on World Wide Web Applications (ZAWWW2004)*, (2-5 September, 2005).

- Mbatha, B.T. and P.N. Dlamini. 2005. A report on the 3rd ProLISSA/DISSAnet Conference, 28-29th October, 2004, Pretoria, South Africa. *South African Journal of Libraries & Information Science*, Vol. 71(2) p.201-203.

1.15 STRUCTURE OF THE THESIS

Preliminaries Title page, declaration, acknowledgements, dedication, abstract, table of contents, list of tables/ figures, abbreviations and acronyms, and list of appendices

Chapter 1 Introduction and Background

Conceptual setting, contextual setting, statement of the problem and motivation of the study, aim and objectives of the study, research questions, scope and limitations of the study, significance of the study, source material, dissemination of research findings, and structure of thesis

Chapter 2 Mapping and Auditing of ICT infrastructure in South Africa

Chapter two discusses the state of ICT infrastructure in South Africa

Chapter 3 Evolvement of ICT policy in South Africa

This chapter addresses the status, developments, challenges and opportunities of information and ICT policy in South Africa

Chapter 4 The uses of ICT in an organization

Integrated review of related literature on the positive consequences of ICT utilization in an organization

Chapter 5 Theoretical framework

The chapter discusses the Diffusion of Innovations Theory and how it applies to ICTs in government departments

Chapter 6 Methodology

Detailed description and explanation of research design and method, target population, research techniques and instruments, data collection procedures and problems, and ethical considerations

Chapter 7 Data Presentation and Analysis

Report of the data using tabulations, tables, figures and descriptions

Chapter 8 Results and Discussion

Discussion of salient issues arising from the results

Chapter 9 Summary of Results, Conclusion and Recommendations

1.16 SUMMARY

This chapter has defined and discussed social informatics and covered the introduction and conceptual setting, statement of the problem, motivation of the study, aims and objectives of the study. Also, the chapter has justified the necessity for the research. It has also introduced the significance of the study, assumptions, scope and limitations, research questions, source material and dissemination of results. Finally, the chapter presented an overview of the chapters that follow and laid the foundation for this thesis.

On this basis, the study now proceeds to Chapter 2 to provide an overview of ICT infrastructure in South Africa.

CHAPTER TWO

THE MAPPING AND AUDITING OF ICT INFRASTRUCTURE IN SOUTH AFRICA

2.0 INTRODUCTION

The previous chapter defined and discussed social informatics and provided the introduction and conceptual setting of the study. The aim of this chapter is to map and audit the ICT infrastructure in South Africa. The chapter is based on the following research objective:

- To establish the types of ICTs and products (systems/ software) currently in use (e.g. the Internet, intranets, databases, etc.)

In answer to the following research question:

- What kind of ICT tools, services and infrastructure are available in government departments?

2.1 ICT AUDITING

Auditing ICT infrastructure is a process that is used to discover, monitor and evaluate ICT infrastructure and flows in order to implement, maintain, or improve the government distribution of ICTs in the country. Other than its financial function, auditing is now used extensively as a yardstick for ensuring conformity to standards and to give reasonable assurance that concrete measures are being taken/ followed. ICT enthusiasts have written quite extensively on the mapping and auditing of ICTs within organizations (Ellis, Barker, Potter and Pridgeon 1993, 135; DeNucci 2002). According to these authors, auditing and mapping ICT infrastructure involves examining evidence that supports different phenomena and activity. An audit of ICTs therefore involves the systematic exploration, analysis and description of ICT strategies including the challenges encountered by organizations in harnessing these technologies. To 'audit' is to examine the quality and/or standard of something (Hornby 2000, 63).

DeNucci (2002) notes that one objective of a technology audit is to determine the infrastructural/ system's needs, adequacy, integrity, security and cost effectiveness, so as to obtain a clear understanding of the strength of an organization. This would help the organization picture its own strengths and weaknesses. Booth and Haines (1993, 225) are of the view that the term "information audit" is generally understood to refer to needs' analysis or assessment. However, Robertson (1994, 2) argues that the word 'audit' in the modern sense has become synonymous with processes of discovery, checking, verification, compliance, and control of a system. St. Clair (1995, 1) explains that an audit alludes to accountability and responsibility, focusing on determining the needs of a population and how well these needs are being addressed. In support of this view is Worlock (1987, 256) suggests that the final product of an audit should be a record of a decision-making chain that can be used in implementing change.

2.2 ICT MAPPING

'Mapping' means to discover or provide information about something with respect to how it is arranged or organized (Hornby 2000, 7). Mapping here is in the form of a survey undertaken to identify what and how much South Africa has done with respect to ICT infrastructure. Information mapping involves exploring information use and needs and the graphical representation of part(s) of an information system (Ellis, Barker, Potter and Pridgeon 1993, 149). This enables an organization to effectively manage its information resources (Ellies *et al*. 1993, 149). In this study, mapping ICTs in South Africa involves taking stock of telecommunications services such as telephone lines, teledensity distribution, cellular/ mobile telephony and "old" technologies/broadcasting (e.g. radio and TV); the use of and distribution of communications media, such as copper or fibre optic cables; wireless or cellular mobile links and satellite links; and communication technologies that produce devices and networks to transmit information, such as Digital Cellular Networks (DCNS), Local Area Networks (LANS), and Wide Area Networks (WANs) such as the Internet.

2.3 BACKGROUND INFORMATION

ICT infrastructure is the backbone of ICT applications. A study by the Association of African Universities (2000, section 2.6) notes that sufficient infrastructure should consist of equipment (telecommunications services and broadcasting equipment), carrier technology, functionality, operating systems, ICT policy and accessibility. Each of these have relevant variables, e.g.: equipment that may include stand alone and/or networked computer hardware, modems, local area networks (LANS), intranets or campus-wide backbone connecting LANs, and multi-organizational networks; and carrier technology such as satellite technology that includes Very Small Aperture Terminals (VSATs – a two-way satellite ground station or a stabilized maritime VSAT antenna with a dish antenna that is smaller than 3 meters) and wireless radio/ television, fibre-optic technology, and coaxial technology. Functionality would include electronic mail (e-mail), Internet access, conferencing tools and multimedia tools; and operating systems may be freeware or proprietary (Kling 1999 and Association of African Universities 2000, section 2.6). According to Kling (1999), sufficient bandwidth and routers' availability are important in ensuring that a wide variety of information products can be accessed efficiently.

2.4 GLOBAL ICT INFRASTRUCTURE

Heavy investments in ICT infrastructure in well developed countries have contributed to great advancements in the utilization of ICTs for business and service delivery purposes and for private use. For example, Pavlotsky (2008) observes in his study that Russia spent over 10 billion on ICT products in 2008. Russian small and medium businesses (SMBs) are well equipped with high technology computer systems (Pavlotsky 2008). Consequently, Russia has proved to be the highest spending ICT country in the northern Eurasia. Russia is one of the top mobile Internet users in the region, with the country ranked 4th in mobile Internet penetration. Much of this can be attributed to 11.2 % of Russian mobile users who access the web using their mobile phones. Pavlotsky (2008) further states that Russia has 17 million mobile users that access the Internet on a regular basis. It is predicted that mobile data transmission in Russia will

increase from 400 million to 8 billion by 2012, while the Russian mobile content market will grow from 800 million to 5.4 billion by 2012.

A study conducted by Mait (2008) on ICT infrastructure in Japan established that the ICT industry in that country has strengthened its focus far beyond the manufacturing of equipment to further maintenance and management services and creating audio, video, print and digital content. These new developments are going to boost the ICT market in Japan. Conversely, Japan is ranked 2nd in the world in terms of the ICT Industry Competitive Index with 72.7 %. Japan's ICT infrastructure has been developing very rapidly over the past few years. It has featured the fastest broadband connection speeds and highest Internet penetration rates globally. There has been infrastructural support for the quick spread of multi-function mobile telephones, which include cameras, barcode readers, music and video players, and wireless payment functions, with increasing numbers of people accessing the Internet (Mait 2008).

In his study, Mait further notes that Japan has over 100 million mobile phone subscribers, which is nearly 80 % of its population. Japan is in fact leading the way in third-generation (or 3G) mobile telephony. For example, Japan introduced Mobile Number Portability (MNP), which allows customers to keep their new number when switching to a new carrier. Japan is also leading the way in video conferencing and other means of visual communication. A lot of companies and organisations are opting for video conferencing to conduct their operations and improving internal communications (Mait 2008).

A survey conducted by Nielsen (2007) established that the United States is still the world's technology powerhouse. The United States is said to be the best country in the ICT industry because of the quality of the market environment for ICT. Nielsen further opines that the USA has improved a lot in terms of ICT infrastructure, ICT penetration and the use of e-government. According to the United Kingdom (UK) trade and investment services (2008), the UK is regarded as one of the leading countries with the strongest ICT infrastructure. In the UK, the privatisation of major ICT service providers led to greater competition and lower prices. The UK currently has the strongest ICT infrastructure when measured against countries like Germany, France, Italy and Spain. It has strengthened the ICT infrastructure required by companies to

operate, including e-business, availability of broadband, availability of Wi-Fi, and the provision of secure servers (UK trade and investment services 2008).

The e-readiness rankings placed the UK among the top 10 countries in the world based on the results provided by the Economist Intelligence Unit (EIU) (UK trade and investment services 2008). These rankings measure economic, technological, political, infrastructural and social factors that relate to the development of e-business. The latter document adds that the UK has a 24.9 % penetration rate of broadband technology, which is the highest compared to the European Union average of 20 %. Furthermore, broadband subscribers in the UK have the highest number of verified Wi-Fi hotspots in Europe, second highest globally behind the US. The UK also has the highest number of secure servers in Europe and is third globally behind the USA and Japan (UK trade and investment services 2008). Overall, the number of world Internet users is growing daily, as evident in the table below.

Table 2.1: World Internet usage and population statistics

WORLD INTERNET USAGE AND POPULATION STATISTICS						
World Regions	Population (2010 Est.)	Internet Users Dec. 31, 2000	Internet Users Latest Data	Penetration (% Population)	Growth 2000-2010	Users % of Table
Africa	1,013,779,050	4,514,400	110,931,700	10.9 %	2,357.3 %	5.6 %
Asia	3,834,792,852	114,304,000	825,094,396	21.5 %	621.8 %	42.0 %
Europe	813,319,511	105,096,093	475,069,448	58.4 %	352.0 %	24.2 %
Middle East	212,336,924	3,284,800	63,240,946	29.8 %	1,825.3 %	3.2 %
North America	344,124,450	108,096,800	266,224,500	77.4 %	146.3 %	13.5 %
Latin America/Caribbean	592,556,972	18,068,919	204,689,836	34.5 %	1,032.8 %	10.4 %
Oceania / Australia	34,700,201	7,620,480	21,263,990	61.3 %	179.0 %	1.1 %
WORLD TOTAL	**6,845,609,960**	**360,985,492**	**1,966,514,816**	**28.7 %**	**444.8 %**	**100.0 %**

Adapted from: Internet world stats (2010)

2.5 ICT INFRASTRUCTURE IN AFRICA

Africa is the second-largest continent, after Asia, in size and population; located south of Europe and bordered to the west by the Atlantic Ocean and to the east by the Indian Ocean (Internet World Stats 2010). A current study conducted by Lange (2010, 01) on African Internet and broadband statistics, established that large parts of Africa gained access to international fibre bandwidth for the first time via submarine cables in 2009 and 2010. In addition, the author notes that in other parts of the continent, additional fibre systems have brought competition to a previously monopolised market. This has led to massive investments into terrestrial fibre backbone infrastructure to take the new bandwidth to population centres in the interior and across borders into landlocked countries.

A similar study conducted by BuddeComm (2010), established that Africa's Internet and broadband sector is set to benefit the most from these developments. Also, this study found that wholesale prices for Internet bandwidth have come down by as much as 90% from previous levels based on satellite access, and the cost savings are slowly being passed on to the retail level as well. Furthermore, broadband is rapidly replacing dial-up as the preferred access method, and this process is already virtually completed in the continent's more developed markets. Interestingly, Lange's study (2010, 01) also found that most African countries now have commercial Digital Subscriber Line (DSL) services, but their growth is limited by the poor geographical reach of the fixed-line networks. Improvements in Internet access have therefore been mostly confined to the capital cities so far. However, the rapid spread of mobile data and third-generation (3G) broadband services is changing this, with the mobile networks bringing Internet access to many areas outside of the main cities for the first time (Lange 2010, 01).

It is clear that ICTs are powerful tools that can be used to boost economic growth and reduce poverty in Africa. ICTs increase efficiency, provide access to new markets or services, create new opportunities for income generation, improve governance, and give poor people a voice (Lisham 2008, 1).

Lisham notes that the current spread and use of ICTs in Africa is as a result of a number of factors, including:

- **Infrastructure** – its availability, operation and maintenance. This includes not only ICT infrastructure, but also transport and electricity.
- **Access** – characterised by public access facilities, the existence of relevant content, adequate capacity at different levels and promising experiences with respect to mobile telephony.
- **Supportive enabling environments -** including specific regulatory frameworks and an overall policy framework that promotes sound economic and political governance.

For governments to use ICTs for their own administrative functions, as well as for service delivery and information dissemination purposes, ICT enthusiasts believe that the following ICT tools and services need to be available to the government workers as well as to the citizenry in general: the WWW, intranets, databases, telephones, mobile phones, television, radio, video cameras, video recorders, sound/ tape recorders, overhead projectors, fax machines, digital cameras, printers, scanners, data projectors, diskettes, and copy machines, to name a few (Van Brakel and Chisenga 2003) [see different types of ICTs in Section 1.2 of Chapter one]. Africa already has many different types of modern ICT infrastructure available, such as satellite-based telephony, mobile cellular phone services, digital satellite television, computers, facsimile services, and satellite radio services (Van Brakel and Chisenga 2003). However according to the authors, Africa is still far behind when compared to the rest of the world as far as ICT infrastructure is concerned as discussed below.

2.5.1 Telecommunications context in Africa

It is important to note that many researchers have been showing particular interest in ICTs. It is clear that ICTs will become crucially important for sustainable development in developing countries (Credé and Mansell 1998, ix). Thioune (2003, 01) observes that for the past two decades, most developed countries have witnessed significant changes that can be traced to ICTs. The author clarifies that these multidimensional changes (technical, financial and economic, cultural, social, and geo-political) have been observed in almost all aspects of life: economics, education, communications, leisure, and travel.

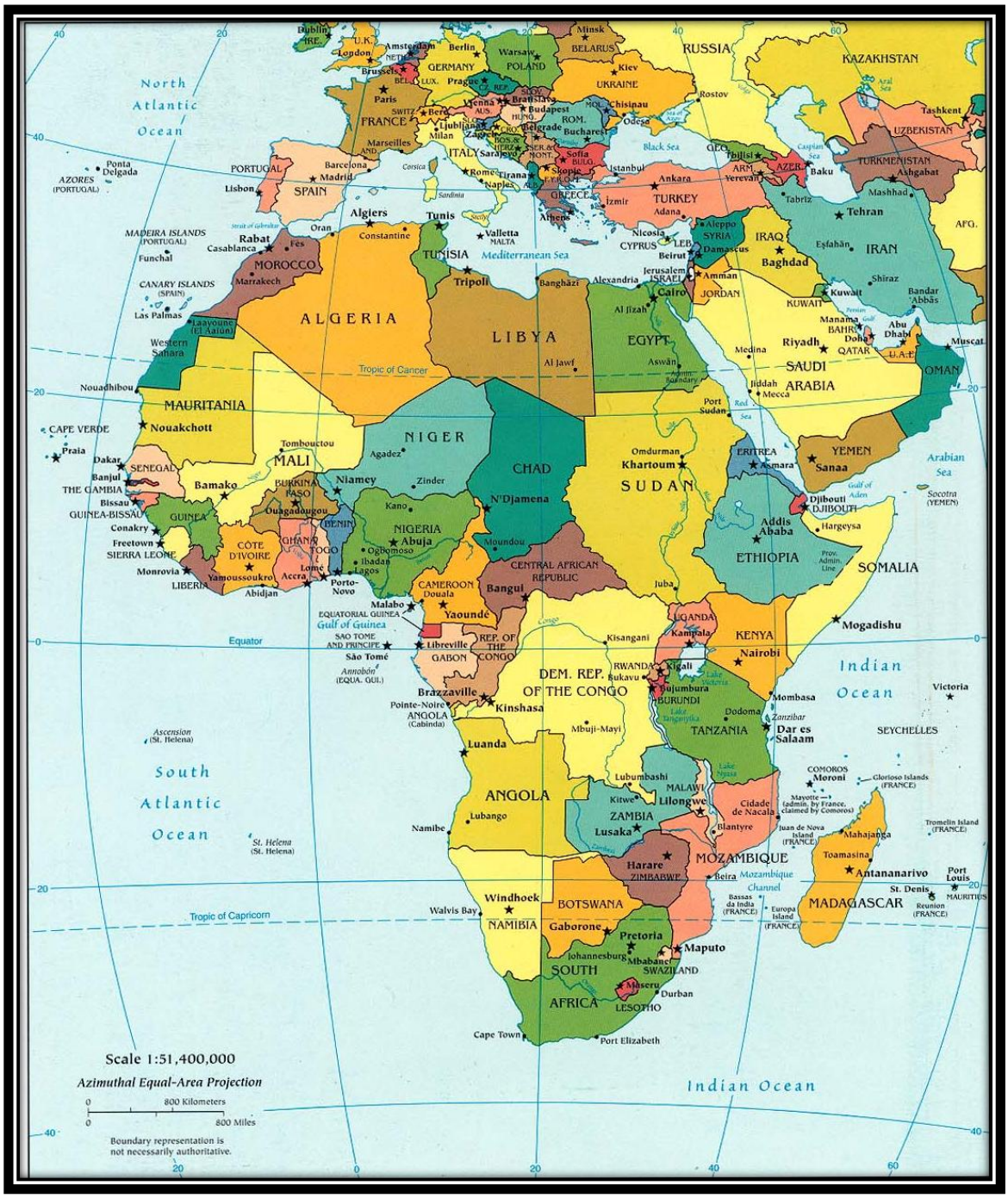
Thioune (2003, 11) in his study, established that South Africa had by far the largest number of fixed-line (estimated to be 4.9 million in 2002) and mobile connections in Africa, and the most advanced ICT sector on the continent, with nearly three million Internet accounts in 2001. However, he observed that access to ICTs in South Africa followed lines of existing inequalities, which are quite broad because of the legacy of apartheid. There have been significant changes in the telecommunications sector in Africa in the recent past. These changes have been on three broad fronts which Thioune outlines as policy changes, institutional innovations, and technical and operational changes, which have all been catalyzed by new liberalization and privatization regimes. Partly on account of these changes, a substantial increase in the rate of expansion and modernization of fixed-line (terrestrial) networks is taking place, accompanied by an explosion in mobile networks and satellite-based telecommunications services (Thioune 2003, 11).

While being the world's most rapidly growing market for mobile telephony, Africa is also home to some of the fastest growing fixed-line markets in the world (Comninos, Esselaar, Gillwald, Moyo, and Naidoo 2010, 02). However, BuddeComm (2010) argues that the continent still has some of the world's lowest penetration rates in both market sectors. Also, the document notes that the difficulties of rolling out fixed-line networks across its vast land mass have meant that by early-2010 mobile users constituted more than 90% of all African telephone subscribers. However, as lower income groups are being targeted, a price-sensitive market for lower-cost fixed or limited-mobility services is emerging. Furthermore, a surge in demand for Internet access and broadband capabilities is accelerating this fixed-line renaissance in some of Africa's

more advanced markets. Despite reasonable growth of the traditional fixed-line markets in some countries, subscriber access to both voice and data services is shifting more and more to fixed-wireless solutions as a substitute for inadequate fixed-line infrastructure (Comninos *et al*. 2010, 03; BuddeComm 2010). Moreover, BuddeComm (2010), states that the landing of several new international fibre optic submarine cables in Africa in 2009 and 2010 – in many countries for the first time ever – has led to massive investments into terrestrial fibre backbone infrastructure to take the new bandwidth to population centres in the interior and across borders into landlocked countries.

Prior to this, backbone network infrastructure across the continent was largely substituted by microwave radio relay and satellite links, with the associated limitations in capacity, quality of service and high cost. However, both technologies will continue to play a significant role in reaching Africa's extensive rural and remote areas (BuddeComm 2010). It is interesting to note that despite the global economic crisis, foreign investors' interests have remained high in Africa's telecoms sector as market liberalisation continues, national telcos are being privatised and new operating licenses issued (BuddeComm 2010).

Figure 2.1: Map of Africa



Adapted from: Internet World Stats (2010)

The NEPAD ICT infrastructure programme (2005) is of the view that there are factors that hinder the economic participation of Africa in the world, including:

- The high cost of access for end-users to foreign-owned satellite telecommunication providers for cross border, regional and international telecommunications traffic
- High Internet costs
- Low bandwidth
- Poor ICT infrastructure
- Unreliable communication facilities

NEPAD, through its Heads of State and Government Implementing Committee (HSGIC), introduced measures to try and improve the way certain information and communication technologies work. The NEPAD ICT infrastructure programme was introduced with the aim of completing an optic fibre ring around Africa, connecting all African countries and the world at large through submarine cable systems (NEPAD ICT infrastructure programme 2005). Key features of the NEPAD ICT infrastructure programmes include:

- The establishment of a submarine cable for East Africa (EASSy). This cable will complete the fibre-optic ring around the African coastline in conjunction with other fibre submarine cable systems.
- The rationalization and development of the ICT Broadband Network for East and Southern Africa, as well as for Central, West and Northern Africa, connecting these countries to their neighbors and ensuring that each land-locked country is connected to at least two cable landing stations (NEPAD ICT infrastructure programme 2005).

2.5.2 Desktop computers

Many people around the globe now have personal computers (PCs) in their homes and in their workplaces (Van Brakel and Chisenga 2003). However, the availability of desktop computers in Africa is the lowest compared to the rest of the world. Statistics provided by the International Telecommunications Union (ITU) indicate that in 2002, Africa had 1.23 desktop computers per 100 inhabitants (Van Brakel and Chisenga 2003). In the absence of the latest statistics in this regard, it is important to note that this is in sharp contrast to the 3.95 of Asia, 20.01 of Europe, 27.49 of the Americas, and 38.94 of Oceania. The low number of computers in Africa can partly be attributed to the high cost and low earnings of most of the people. The ability of African organizations to afford computers is also curbed by the high import rates and sales tax imposed on computers. Computer prices in the developed world have gone down while remaining high in African countries (Van Brakel and Chisenga 2003).

2.5.3 Telephone facilities

A study conducted by Africa-Pan-African Operators (2008) confirmed that Africa has poor fixed-line infrastructure. Consequently, the continent has experienced a high growth in mobile usage. Thus despite the bleak picture of Africa's telecoms, the future is predicted to be bright, with plenty of opportunities on offer for service providers, equipment vendors and investors. For example, in early 2007, Africa experienced a growth of 90 percent in telephone subscriptions, resulting in 35 million fixed-lines available for use by the end of that year. Despite this growth, wireless solutions are increasingly being used to serve as substitutes for inadequate fixed-line infrastructure (Paul Budde Communications 2007). According to ITU (2007), 93.3 % of telephone owners are mobile telephone consumers while 1.7 % are fixed-line telephone users. The ITU (2007) also found that communication at the workplace is now being performed through cellular phones. The use of mobile phone services has become more/ extremely attractive because of value added services like data transmission, short message sending (SMS), WAP-based Internet access, and even financial transactions, anywhere and anytime (Jensen 2002).

2.5.4 Telecentres in Africa

To reiterate, advances in microelectronics and telecommunications in conjunction with the convergence of these technologies with new ICTs in the final quarter of the last century have transformed the way the world works (Thioune 2003, 07). This author observes that this transformation has been unparalleled since the industrial revolution. This new revolution, the technology revolution, has the added quality of driving change at a much faster pace. It took almost five hundred years for the steam engine to spread across the world, whereas the Internet, developed in the 1970s, has already reached all the continents and is still spreading fast (Thioune 2003). For example in 1996, only five African countries had Internet capability, while today all are connected and Internet-enabled. This new age, variously labeled the computer, Internet, or information age, commodifies knowledge, ensuring that the information and knowledge rich are also rich in more conventional ways. This has translated into a divide whose lines appear to trace earlier demarcations of rich and poor societies, and of developed and developing countries (Thioune 2003).

Straddling the southern tip of the continent, South Africa occupies 1.2 million km^2. Since 1994, the official end of apartheid, a democratic government led by the ANC has attempted to share and spread the riches of the country to a wider majority of the people. Approximately 48 % of the country's 42 million people live in poverty (under ZAR 1000 or USD 83 a month) (Thioune 2003; South Africa.Info 2010). South Africa still remains a divided society, with the white community (11 % of the total population) generally living affluently, while most of the black African population (72 % of the total population) lives in poverty (South Africa.Info 2010). 58 percent of the households have electricity, 45 % have water taps inside their homes, and 34% of the households have or own a telephone (Thioune 2003).

2.5.5 Broadcasting in Africa

Television and radio broadcasting are widely available in Africa (Thioune 2003), although radio is by far the most dominant mass communication instrument or medium in Africa. Thioune (2003) found that ownership of radio sets was far higher than any other electronic device. In

1997, radio ownership in Africa was close to 170 million and growing at a rate of 4 % per annum (Thioune 2003). The estimate for 2002 was over 200 million radio sets. The corresponding figure for television sets was put at 62 million. It is estimated in 2003 that over 60 % of the population of the sub-continent is reached by existing radio networks, while national television coverage is largely confined to major towns. The number of commercial and community radio stations has been steadily increasing following the liberalization of the broadcasting sector in many countries (Thioune 2003).

2.5.6 Internet access in Africa

Since its creation in the 1970s, the Internet and the products it has spurned, e.g., e-mail have become very powerful tools for information and communication and a commonly used short-hand indicator of a country's level of ICT adoption and integration (Thioune 2003, 07). The author adds that in Africa, the pattern of Internet diffusion has been similar to that of mobile telephone networks. Although not as widespread, the Internet whose introduction preceded the mobile phone made an early foothold and impact at the top end of business, in wealthy families, primarily in the major urban areas (Thioune 2003, 07). Moreover, the author narrates that the non-profit sector; academic institutions and NGOs pioneered Internet use in the early 1990s, fuelled by their need for low cost international communications. Private Internet Service Providers (ISPs), and national telecom operators subsequently took it up and seem to be dominating the field currently (Thioune 2003, 07).

According to BuddeComm (2010), large parts of Africa gained access to international fibre bandwidth for the first time via submarine cables in 2009 and 2010. The document adds that in other parts of the continent, additional fibre systems have brought competition to a previously monopolised market. This has led to massive investments into terrestrial fibre backbone infrastructure to take the new bandwidth to population centres in the interior and across borders into landlocked countries. Also of note is that Africa's Internet and broadband sector is set to benefit the most from these developments. Wholesale prices for Internet bandwidth have come down by as much as 90 % from previous levels based on satellite access, and the cost savings are

slowly being passed on to the retail level as well (BuddeComm 2010). Also, broadband is rapidly replacing dial-up as the preferred access method, and this process is already virtually completed in the continent's more developed markets.

It is therefore interesting to note that most African countries now have commercial DSL services, but their growth is limited by the poor geographical reach of the fixed-line networks (BuddeComm 2010). The document notes that improvements in Internet access have therefore been mostly confined to the capital cities so far. However, the rapid spread of mobile data and third-generation (3G) broadband services is changing this, with the mobile networks bringing Internet access to many areas outside of the main cities for the first time (BuddeComm 2010). Table 2 below shows that Internet usage is rapidly growing in Africa.

Table 2.2: Internet usage statistics for Africa

INTERNET USAGE STATISTICS FOR AFRICA						
AFRICA	**Population (2010 Est.)**	**Internet Users Dec/2000**	**Internet Users Latest Data**	**Penetration (% Population)**	**User Growth (2000-2010)**	**% Users in Africa**
Algeria	34,586,184	50,000	4,700,000	13.6 %	9,300.0 %	4.3 %
Angola	13,068,161	30,000	607,400	4.6 %	1,924.7 %	0.5 %
Benin	9,056,010	15,000	200,000	2.2 %	1,233.3 %	0.2 %
Botswana	2,029,307	15,000	120,000	5.9 %	700.0 %	0.1 %
Burkina Faso	16,241,811	10,000	178,200	1.1 %	1,682.0 %	0.2 %
Burundi	9,863,117	3,000	65,000	0.7 %	2,066.7 %	0.1 %
Cameroon	19,294,149	20,000	750,000	3.9 %	3,650.0 %	0.7 %
Cape Verde	508,659	8,000	150,000	29.5 %	1,775.0 %	0.1 %
Central African Rep.	4,844,927	1,500	22,600	0.5 %	1,406.7 %	0.0 %
Chad	10,543,464	1,000	187,800	1.8 %	18,680.0 %	0.2 %
Comoros	773,407	1,500	24,300	3.1 %	1,520.0 %	0.0 %
Congo	4,125,916	500	245,200	5.9 %	48,940.0 %	0.2 %

Congo, Dem. Rep.	70,916,439	500	365,000	0.5 %	72,900.0 %	0.3 %
Cote d'Ivoire	21,058,798	40,000	968,000	4.6 %	2,320.0 %	0.9 %
Djibouti	740,528	1,400	25,900	3.5 %	1,750.0 %	0.0 %
Egypt	80,471,869	450,000	17,060,000	21.2 %	3,691.1 %	15.4 %
Equatorial Guinea	650,702	500	14,400	2.2 %	2,780.0 %	0.0 %
Eritrea	5,792,984	5,000	250,000	4.3 %	4,900.0 %	0.2 %
Ethiopia	88,013,491	10,000	445,400	0.5 %	4,354.0 %	0.4 %
Gabon	1,545,255	15,000	98,800	6.4 %	558.7 %	0.1 %
Gambia	1,824,158	4,000	130,100	7.1 %	3,152.5 %	0.1 %
Ghana	24,339,838	30,000	1,297,000	5.3 %	4,223.3 %	1.2 %
Guinea	10,324,025	8,000	95,000	0.9 %	1,087.5 %	0.1 %
Guinea-Bissau	1,565,126	1,500	37,100	2.4 %	2,373.3 %	0.0 %
Kenya	40,046,566	200,000	3,995,500	10.0 %	1,897.8 %	3.6 %
Lesotho	1,919,552	4,000	76,800	4.0 %	1,820.0 %	0.1 %
Liberia	3,685,076	500	20,000	0.5 %	3,900.0 %	0.0 %
Libya	6,461,454	10,000	353,900	5.5 %	3,439.0 %	0.3 %
Madagascar	21,281,844	30,000	320,000	1.5 %	966.7 %	0.3 %
Malawi	15,447,500	15,000	716,400	4.6 %	4,676.0 %	0.6 %
Mali	13,796,354	18,800	250,000	1.8 %	1,229.8 %	0.2 %
Mauritania	3,205,060	5,000	75,000	2.3 %	1,400.0 %	0.1 %
Mauritius	1,294,104	87,000	290,000	22.4 %	233.3 %	0.3 %
Mayotte (FR)	231,139	---	---	---	---	0.0 %
Morocco	31,627,428	100,000	10,442,500	33.0 %	10,342.5 %	9.4 %
Mozambique	22,061,451	30,000	612,500	2.8 %	1,941.7 %	0.6 %
Namibia	2,128,471	30,000	127,500	6.0 %	325.0 %	0.1 %
Niger	15,878,271	5,000	115,900	0.7 %	2,218.0 %	0.1 %
Nigeria	152,217,341	200,000	43,982,200	28.9 %	21,891.1 %	39.6 %
Reunion (FR)	822,986	130,000	300,000	36.5 %	130.8 %	0.3 %

Rwanda	11,055,976	5,000	450,000	4.1 %	8,900.0 %	0.4 %
Saint Helena (UK)	7,670	n/a	800	10.4 %	n/a	0.0 %
Sao Tome & Principe	175,808	6,500	26,700	15.2 %	310.8 %	0.0 %
Senegal	14,086,103	40,000	923,000	6.6 %	2,207.5 %	0.8 %
Seychelles	88,340	6,000	33,900	38.4 %	465.0 %	0.0 %
Sierra Leone	5,245,695	5,000	14,900	0.3 %	198.0 %	0.0 %
Somalia	10,112,453	200	106,000	1.0 %	52,900.0 %	0.1 %
South Africa	49,109,107	2,400,000	5,300,000	10.8 %	120.8 %	4.8 %
Sudan	41,980,182	30,000	4,200,000	10.0 %	13,900.0 %	3.8 %
Swaziland	1,354,051	10,000	90,000	6.6 %	800.0 %	0.1 %
Tanzania	41,892,895	115,000	676,000	1.6 %	487.8 %	0.6 %
Togo	6,199,841	100,000	356,300	5.7 %	256.3 %	0.3 %
Tunisia	10,589,025	100,000	3,600,000	34.0 %	3,500.0 %	3.2 %
Uganda	33,398,682	40,000	3,200,000	9.6 %	7,900.0 %	2.9 %
Western Sahara	491,519	---	---	---	---	0.0 %
Zambia	12,056,923	20,000	816,700	6.8 %	3,983.5 %	0.7 %
Zimbabwe	11,651,858	50,000	1,422,000	12.2 %	2,744.0 %	1.3 %
TOTAL AFRICA	**1,013,779,050**	**4,514,400**	**110,931,700**	**10.9 %**	**2,357.3 %**	**100.0 %**

Adapted from: Internet World Statistics (2010)

2.6 SADC REGIONAL OVERVIEW OF E-READINESS

A study conducted by the World Economic Forum (2002) established that there is no uniform level of e-readiness or economic and social development within the Southern African Developing Community (SADC). One of the recommendations of the World Economic Forum was that each SADC member state, and the region as a whole, should take its own path towards e-readiness, and any attempts to impose a single model would prove ineffective. The World Economic Forum's other suggestion was that laws need to be tailor-made to address the unique policy, infrastructure and ground-level realities reflected within each state and in the broader regional goals.

2.6.1 Regional initiatives overview

The World Economic Forum (2002) observes that although each country has a unique development path to follow, broader initiatives have also been initiated at regional level within the SADC. The organizations leading regional efforts in the SADC include Africa Connection, the coalition of Ministers of Communications in Africa, various NGOs, and international bodies such as USAID and the International Development Research Center (IDRC). In particular, a number of regional policy-making efforts are being launched and/or are underway or have been completed that aim to create a harmonized and coordinated approach to ICT policy reform (World Economic Forum 2002). However, there are low levels of implementation at national level to put regional agreements into effect. Moreover, some efforts are duplicative (World Economic Forum 2002). Regional agreements should be coordinated to ensure that they do not duplicate efforts and should be implemented at national level. Their effectiveness should also be evaluated and the best practice lessons recorded for application in other developing countries (World Economic Forum 2002). According to the World Economic Forum, examples of regional agreements include:

I. The SADC Human Resources Sector developed the *SADC Protocol on Education and Training*, signed in 1997. It promotes curriculum development and training, and coordinates policies, strategies and programmes promoting science and technology.

II. The Southern African Transport and Telecommunications Commission (SATCC) formulated the *Model Regulatory Framework for Telecommunications* in 1998. Of the 14 member states, 11 have established and have operating policies and autonomous regulatory authorities. Human resource development in this new field of regulation is a priority for the Telecommunications Regulatory Authority of Southern Africa (TRASA). In the remaining countries, progress in the application of the frameworks is at an advanced stage.

III. The Southern African Telecommunications Association (SATA) obtained agreement on the *GSM standard for SADC countries*. SATA handles issues such as technical standards, tariffs, sub-regional information infrastructure (SRII), cross-border investment (satellite technology) and public/ private partnerships.

IV. TRASA has developed the *Model Telecommunications Bill* as well as regional *Guidelines on interconnection, tariffs and the frequency band plan*. TRASA has also produced draft guidelines on universal access and services, licensing policy and implementation strategy in the SADC.

V. TRASA has commissioned a project with the SADC and the Development Bank of Southern Africa (DBSA) to establish a database within the region. Information and performance indicators collated on a national level will be fed through to the SADC level to promote informed decision making.

VI. Twelve SADC governments have signed the *SADC Protocol on Transport, Communication and Meteorology*, published in March 1998. It details the need for a regional telecommunications policy and provides guidelines on issues from universal service to technical standardization.

VII. The SADC drafted and adopted the Lusaka 1999 theme document: *The Challenges and opportunities of IT for SADC in the new millennium,* at the biannual ministers meeting.

VIII. The Common Market for Eastern and Southern Africa (COMESA) has drafted a *Model Telecommunications Bill*. Eight of the twenty-one COMESA member states hold dual membership in COMESA and SADC.

IX. SADC member countries have adopted at presidential level the policy guidelines on *Making ICT a priority in turning SADC into an information-based economy* produced by SATCC.

2.7 ICT INFRASTRUCTURE IN SOUTH AFRICA

South Africa is a nation of diversity, with over 49-million people and a wide variety of cultures, languages and religious beliefs (South Africa.Info 2010). Indigenous Africans are in the majority, making up 79.4 % of the population, while white people make up 9.2 %, the coloured population 8.8 %, and the Indian/Asian population 2.6 % (South Africa.Info 2010). According to the South Africa Yearbook (2009/10, 05), South Africa occupies the southernmost tip of Africa with a coastline of about 3 000 km. The document adds that the country stretches latitudinally from 22° to 35° S and longitudinally from 17° to 33° E. Its surface area is 1 219 090 km2. The country has common boundaries with Namibia, Botswana and Zimbabwe, while Mozambique and Swaziland lie to the north-east (South Africa Yearbook 2009/10, 05). Completely enclosed by South African territory in the south-east is the mountain kingdom of Lesotho. To the west, south and east, South Africa borders on the Atlantic and Indian oceans. Isolated, some 1 920 km south-east of Cape Town in the Atlantic, lie the Prince Edward and Marion islands, annexed by South Africa in 1947 (World Facts 2008; South Africa Yearbook 2009/10, 05).

Technologically, South Africa's history had been mostly confined to agriculture and mining until World War II, when the Council for Scientific and Industrial Research (CSIR) was formed. According to Basson (1996, 33), the CSIR is the largest research development and implementation organization in Africa, and became responsible in the ensuing years for creating research capacity and scientific and technological human resources on behalf of the nation. In the context of reconstruction and development (RDP), the CSIR is an important element of the nation's science and technology infrastructure and supports the GSA industrial development. The

CSIR also strengthens the South African industry's ability to compete internationally, provides technological support for small, medium and micro-enterprises, and supports technology decision-making. Below is the map of South Africa (Basson 1996, 33).

Figure 2.2: Map of the Republic of South Africa

Adapted from: Adventure Boot Camp CC (2010)

2.7.1 Information society in South Africa

South Africa is in a unique situation because it is both a developing country in Africa with massive basic needs that are largely unmet, and it is a country with a major industrialized sector with great technological potential (LINK Centre 2004). South Africa's re-entry into the global marketplace and the need to address major infrastructural and social backlogs requires great investment in creating knowledge and building the country's human potential, particularly in the field of information and communications strategy and management, essential components of success within the information economy (LINK Centre 2004). Human resources and skills are central to the ability of any country to develop in the globalised, competitive world of the new century. LINK Centre states that maximizing the benefits of the information society requires information literacy at all levels of society. The key mechanisms for growth in this knowledge and skills base include access, training and relevant content.

2.7.2 Bandwidth access and costs

Wider access to broadband, ADSL and 3G access has boosted Internet connectivity, with the number of South African Internet browsers increasing by 121 % in two years, from 1.8 million in May 2005 to 3.8 million in May 2007 (South Africa.Info 2008). South Africa.Info cautions, however, that bandwidth remains relatively limited and expensive in South Africa, hampering the rate of economic growth. Nevertheless, as a way of ameliorating the situation, the government has committed to increasing accessibility and bringing down costs. The cabinet approved laws early in 2008 to enable the formation of Infraco, a new state-owned company that will provide broadband capacity through fibre-optic cables to other telecoms operators in the country (South Africa.Info 2008). Infraco's role will complement that of state-owned signals' provider Sentech, which provides Internet connectivity focusing on the public sector through wireless systems rather than fibre-optic cables. Meanwhile, major cities such as Cape Town, Durban, Johannesburg and Pretoria have launched public-private initiatives to build their own broadband networks in order to provide residents with cheaper voice and data services (South Africa.Info 2008). As a way of harnessing technology in South Africa, mobile company MTN announced that it would partner with other operators to build a 5 000-kilometre fibre-optic network across the country's major

centres to meet the increasing demand for bandwidth from its customers (South Africa.Info 2008). Major projects are also under way to lay submarine fibre-optic cables along both the east and west coasts of Africa to boost the continent's connection to the rest of the world (South Africa.Info 2008).

2.7.3 Internet service provider association and the SA community

The Internet Service Providers' Association (ISPA) is a non-profit South African Internet industry organization. It was formed in June 1996, and currently represents over 150 Internet service providers with a diverse range of services and target markets. Members include non-profit providers and educational networks, as well as commercial service providers (ISPA 2009). ISPA is run by a management committee made up of representatives from ISPA member organizations (ISPA 2009). Since its launch, ISPA has played an important role in the development of South Africa's telecommunications and Internet policy (ISPA 2009). ISPA has participated in policy discussions and made various presentations to policy makers in a number of important legislative processes, including: VANS and PTNS licensing regimes, facilities' leasing and interconnection guidelines, Telkom rate review, Telecommunications Amendment Act, Electronic Communications and Transactions Act, Interception and Monitoring Bill, Films and Publications Amendment Act (ISPA 2009). ISPA produces regulatory advisories on issues of importance to the industry and makes these advisories publicly available via its website. ISPA has applied to the Department of Communications for recognition as an industry and has also made a submission to industry recognized body (IRB) guidelines (ISPA 2009).

- **ISPA's Internet exchange**

ISPA is an active industry body that facilitates communication between Internet service providers in South Africa (ISPA 2009). Collaboration levels have historically been very high, leading to the formation of the Johannesburg Internet Exchange (JINX) in 1996. This exchange point routes Internet traffic between different Internet access providers and serves as a means to keep South African Internet traffic within the country's borders (ISPA 2009). This reduces the costs of international Internet links and provides consumers with improved access to South African networks (ISPA 2009).

2.7.4 TELECOMMUNICATION SYSTEMS IN SOUTH AFRICA

A recent study conducted by Comninos, Esselaar, Gillwald, Moyo and Naidoo (2010, 05), established that the South African telecoms sector has been in flux over the last decade from a policy and regulatory perspective causing it to slip down the major global ICT indices. These authors add that this has produced suboptimal outcomes with regard to access to fixed lines and broadband; high prices for all services from fixed and mobile to leased lines and broadband. Furthermore, these authors note that this has escalated input costs to business, negatively impacting on South Africa's competitiveness in communication intensive services and businesses.

South Africa is a leader in ICT development in Africa and the 20th-largest consumer of information technology (IT) products and services in the world (SA Yearbook 2009/10, 108). The country has a network that is 99 % digital, and includes the latest in fixed-line, wireless and satellite communications. In short, it has the most developed telecommunications network on the continent. Consequently, several international corporations, recognized as leaders in the IT sector, operate subsidiaries from South Africa (SA Yearbook 2009/10, 108). It should not come as a surprise that the country that invented touchtone dialing offers world-class telecommunications. It is clear that telecommunications is one of the fastest growing sectors of South Africa's economy, reflecting the rapid growth of mobile telephony in the country. Thus, the communications sector, together with transport and storage, accounts for almost 10 % of the country's gross domestic product or GDP (South Africa.Info 2008). By the same token, with a network that is 99.9 % digital and that includes the latest in fixed-line, wireless and satellite communication, the country has the most developed telecoms network in Africa. The fixed-line monopoly of Telkom, a listed company in which the government is the largest shareholder, expired with the licensing of Neotel as South Africa's second national operator. Neotel is licensed to provide the entire range of telecoms services with the exception of full mobility (South Africa.Info 2008).

2.7.4.1 Telkom SA

A study conducted by Comninos *et al*. (2010, 09) indicate that Telkom's fixed-line results over the last five years reflect a service in decline. Comninos *et al.* note that fixed-line penetration is down by 1.5% and, at 9.5%, is now well below the pre-privatisation figure of 10% and its 2000 high of 12%. The number of voice subscribers continues to decline at just less than 1%, nearly 100 000 down on last year. Also, the number of residential users continues to decline due to mobile substitution. While post-paid only declined by 1.3%, pre-paid declined by 3.5% and public payphones by nearly 5% at 143,000 in 2008 compared to 715,000 only five years ago (Comninos *et al.* 2010, 09).

In 2007, Telkom SA strengthened its telecommunications infrastructure by focusing on providing new technology to include fixed voice and fixed-mobile data services and nomadic voice services, thus offering its customers choice at a highly competitive cost (Telkom SA 2007). W-CDMA is third generation (3G) mobile technology that offers services such as high-speed Internet access, video, and high quality voice transmission. Through the use of third generation technologies, Telkom is able to ensure sustained service without relying on copper cables, enabling the company to operate in areas where cables are repeatedly stolen or where the company lacks fixed-line infrastructure. Telkom has appointed Chinese telecom equipment manufacturer Huawei as a technology partner to deploy its fixed-wireless and mobile data network on a turnkey basis. The products and services that are lined up to be launched with this technology will certainly give Telkom customers a lasting positive experience.

2.7.4.2 Telephones/ telephone density

Telkom is Africa's largest integrated communications company, providing integrated communications solutions to a diverse range of customers (Telkom SA 2009). According to Wikipedia Foundations Inc. (2005), 4.844 million lines were in use in 2005. Accordingly, the telephone system provided by Telkom (which currently has a government monopoly on landlines) is the best-developed and most modern in Africa. Research ICT Africa (2005) reports that the telecommunications sector in South Africa is characterized by relatively high retail prices, super profits, job losses, licensing delays, and deadlocks with minimal new foreign

investments. In spite of these factors, the South African telecommunications market made an estimated total revenue of R 78 billion for the year ending 2004, thereby contributing to 5.1 % of the GDP in 2002.

Telkom South Africa was incorporated in 1991 following a transfer of the entire telecommunications enterprise of the Department of Post and Telecommunications of the government service administration (GSA). Up until 1996 (when the South African Telecommunications Act 103 of 1996 was enacted), Telkom remained the exclusive provider of public switch telecommunications services (PSTN), including international voice services. This was in keeping with the now repealed South African Postal Act 44 of 1958. Telkom (2005) reports that this (partly) changed in 1997 when the GSA sold equity interests to Southwestern Bell Corporation (SBC) Communications and Telekom Malaysia. Wikipedia Foundations Inc. (2005) explains that Telkom (under the management of US-based SBC communications from 1997 to 2004) had a monopoly on handling international connections to and from South Africa on the South Atlantic 3/West Africa Submarine Cable SAT3 & Southern Africa Far East (SAFE) backbone lines which is the underwater cable with fiber optic passing through Mauritius. This accounts for most international bandwidth in GSA and fixed line communications over public roads.

In his study, Hiles (2005, 1) narrates that South Africa's Second National Operator (SNO) licensed to operate a publicly switched telephone network in the second half of 2006. According to the author, this new operator, a coalition between black empowerment group Nexus Connexion (19 %), parastatals Transtel and Eskom (30 %), Indian group Tata (26 %), CommuniTel (12.5 %) and Two Consortium (12.5 %), opens up a new era of competition in South Africa's telecommunications industry. Additional licenses will be further issued to small business operators to provide telecommunications services in under-serviced areas with a teledensity of less than 5 %. Other determinations by the Minister of Communications include:

- Mobile cellular operators have been permitted to obtain fixed telecommunications links from parties other than Telkom;

- VANS operators and private network operators have been permitted to resell the telecommunications facilities that they obtain from Telkom;
- VANS operators have been permitted to allow their services to provide voice services;
- Telkom is no longer the sole provider of facilities to VANS operators; and
- Licensing for the provision of payphone services has been expanded.

2.7.4.3 South Africa Cellular mobile telephony

South Africa has a vibrant mobile market that has seen rapid uptake since competition was introduced to the sector in the 1990s (BuddeComm 2010). It is interesting to note that with market penetration around 100 % in 2010, the network operators – Vodacom, MTN, Cell C and Telkom SA – are increasingly forced to find innovative ways of distinguishing themselves from the competition in order to gain and retain customers (BuddeComm 2010). In addition, Virgin has entered the market as a Mobile Virtual Network Operator (MVNO). 3G/High Speed Packet Access (HSPA) mobile broadband services now rival available Digital Subscriber Line (DSL) fixed-line offerings in terms of both speed and price, and consequently subscriber numbers (BuddeComm 2010).

A study conducted by Comninos *et al*. (2010, 26) established that mobile penetration rates continue to be impressive. These authors further observe that South Africa has risen from the fourth-ranked country among the benchmarked nations in 2000 to first in March 2008. They note that even though it is now the top-ranked country in terms of mobile penetration rates, usage of mobile services is low. Interestingly, BuddeComm (2010) notes that 2010 also saw the first trials of the next generation of mobile technology, Long Term Evolution (LTE) - also referred to as 4G in South Africa. While emerging as the country's leading broadband providers, the major mobile operators are also branching out into fixed-lines, fibre backbone networks, international fibre connectivity, mobile banking and entertainment in a rapidly converging environment. Fixed-line incumbent Telkom SA has reacted by launching its own 3G mobile network (BuddeComm 2010). In their study, Comninos *et al*. (2010, 20) note that as the mobile market is reaching saturation, MTN and Vodacom have been looking into moving into new spaces that are not their traditional lines of business. These authors observe that collectively, MTN and Vodacom have

spent R7.3bn in mergers and acquisitions to expand their capability in the telecoms and IT services markets. They add that Vodacom acquired Gateway Communications in December 2008 for R5.7 billion, acquired a controlling interest of 51% in StorTech, a managed services company for R140.3 million and exercised its call option to acquire an additional 14.9% in WBS for R119.2 million. Also of note is that MTN acquired 69.4% of Verizon Business SA operations for R1.4 billion. These authors are of the view that the South African telecoms market is the largest on the continent. Voice services, both fixed and mobile, continue to generate the highest revenue unlike more mature markets. Despite the proliferation of licensed operators, they currently only occupy a small portion of the market. The South African telecoms market comprises only three key players. Particularly pertinent to this review is the continued and increased state involvement in the sector, from fixed-line to broadcasting (Comninos *et al*. 2010, 20).

It is irrefutable that South Africa is the fourth fastest growing mobile communications market in the world. Wireless Federation (2008) and Wanjiku (2008, 1) note that the cellular industry in South Africa has witnessed tremendous growth over the years, and currently there are four mobile operators, namely Vodacom, MTN, Cell C and Virgin Mobile. All the operators now provide telephony to over 39 million subscribers or nearly 80 % of the population. The introduction of number portability as well as the arrival of Virgin Mobile in 2006, a virtual network service provider that operates in partnership with Cell C, has helped enhance competition. South African mobile companies are making inroads into Africa and the Middle East, with MTN leading with over 20 operations in these emerging markets. At home, some of the world's leading telecommunication brands, including Siemens, Alcatel, SBC Communications, Telecom Malaysia and Vodafone, have made significant investments in the local industry (Wireless Federation 2008).

(a) Vodacom

Vodacom initially started commercial operations in 1994 with a modest subscriber base of 50,000. In 2008, Vodacom had 43.6 million subscribers (Wireless federation 2008; Wanjiku, 2008, 1). Vodacom's mobile network covers a total population of approximately 182 million

people in five countries: South Africa, Tanzania, the DRC, Lesotho and Mozambique (Vodacom South Africa 2010). Vodacom's presence in Africa was strengthened by the acquisition of Gateway, a leading provider of communications services to multi-national companies and telecommunications network operators (Vodacom SA 2010). The Vodacom Group provides a wide range of communications products and services, including voice, messaging, broadband and data connectivity, and converged services. Vodacom SA is the largest mobile network operator in South Africa with an estimated 53 % market share as at 31 March 2009 (Vodacom SA 2010). In addition, Vodacom SA had 27.6 million customers as at 31 March 2009, or 69.7% of the Group's customer base (Vodacom 2010). Vodacom SA contributed 86.0 % to group revenue and 94.7 % to group operating profit for the year ended 31 March 2009 (Vodacom SA 2010). It is interesting to note that Vodacom owns mobile network operations in Tanzania, the DRC, Mozambique and Lesotho, with a combined 12.0 million customers. The international operations cover a total population of approximately 134 million, which have a blended mobile penetration rate of less than 25 %. The international operations contributed 30.3 % to group customers as at 31 March 2009 (Vodacom SA 2010).

(b) MTN

MTN is a South African cellular network operator and is listed on the Johannesburg Stock Exchange under the umbrella of the M-Cell Group (MTN South Africa 2010). This South African Cellular Network was awarded a license in 1993 and started its operations in 1993 (MTN South Africa 2005). Reportedly, it was launched in 1994 and by 2005, had close to five million subscribers. MTN's GSM network is one of the largest in the world. The MTN Group is a multinational telecommunications group, operating in 21 countries in Africa and the Middle East. As at the end of December 2006, MTN recorded more than 40 million subscribers across its operations (MTN South Africa 2010). The MTN Group operates in the following countries: Botswana, Cameroon, Côte d'Ivoire, Nigeria, Republic of Congo (Congo-Brazzaville), Rwanda, South Africa, Swaziland, Uganda, Zambia, Iran, Afghanistan, Benin, Cyprus, Ghana, Guinea Bissau, Guinea Republic, Liberia, Sudan, Syria and Yemen (MTN South Africa 2010).

(c) Cell C

Cellular Statistics (2004) narrates that the Cell C consortium initiated its operations in 2001, with three million users in 2004. Cell C operates at GSM 900 and 1800 Mhz (Cellular Statistics 2004). Of the 1.9 million active users in 2004, some 84 percent or 1.6 million of its subscribers were prepaid users, while 16 percent were contract users. In 2008 Cell C had 5.4 million subscribers (Wireless federation 2008; Wanjiku 2008, 1). Cell C is South Africa's third cellular operator with just under seven million subscribers (Cell C South Africa 2010). In 2010 Cell C took the lead in the mobile communications race. It was the first to operate on a dual band network. Also it was the first to offer cost-effective call options like per second billing and it is working on even more firsts right now, like building the first HSPA+ 900 network in South Africa.

(d) Virgin Mobile

According to Mobile Africa (2007), this virtual network operator was launched in June 2006, and is therefore still in its infancy. Mobile Africa also reports that cellco (a wireless phone provider that owns and operates the largest mobile telecommunications network in the United States) uses Cell C network infrastructure to provide cellular communications services to subscribers in South Africa. Services of this network include voicemail, international roaming, short message service (SMS), multimedia messaging service (MMS), Internet caller ID, and flexible billing (Mobile Africa 2007). In 2008 Virgin Mobile had 300 000 subscribers (Wireless federation 2008). Virgin Mobile South Africa is a joint-venture between Sir Richard Branson's Virgin Group and Cell C (Wikipedia Foundation Inc 2010). Virgin Mobile has based its pricing on a drop-down rate system in which after the first 5 minutes the cost of the call will drop. SMS on the other hand has a flat rate of 60c (Wikipedia Foundation Inc 2010).

2.7.5 SOUTH AFRICAN BROADCASTING CORPORATION (SABC)

2.7.5.1 Public broadcasting services

The South African Broadcasting Corporation or SABC is South Africa's national public service broadcaster. As such, it is obliged to provide a comprehensive range of distinctive programmes and services. It must inform, educate, entertain, support and develop culture and education, and as far as possible, secure fair and equal treatment for the various groupings in the country while offering world-class programming on television and radio (SABC 2009). While wholly owned by the state, the corporation is financially independent of taxpayers' money, deriving its income from advertising and license fees in a ratio of four to one (South Africa.Info 2008).

In their study, Comninos *et al*. (2010, 07) observe that broadcasting law had undergone major reform since the first post-apartheid broadcasting legislation was introduced in 1993 by the Transitional Executive Council, which saw the introduction of the first broadcasting regulator, the Independent Broadcasting Authority (IBA). According to these authors, the IBA Act also mandated the Triple Inquiry into the viability of the public broadcaster, local content and cross-media ownership. But with the end of the Government of National Unity, and following a far less consultative process than had been enjoyed by the telecommunications sector, the Broadcasting Act was passed in 2000 in order to stamp the authority of the new government on policy in the sector, which until then had developed rather organically out of the civil society position that had resulted in the IBA and subsequently from the Triple Inquiry (Comninos *et al*. 2010, 07). According to the South Africa.Info (2008) the SABC's mandate is to provide both a commercial service and a public service, each administered separately, with commercial service stations subsidizing public service stations.

2.7.5.2 Radio

According to Erasmus (2004, 1), South Africa's broadcasting history can be traced back to the early twenties when the South African Railways made its first wireless broadcast in Johannesburg. This led to the first radio station, "JB Calling", transmitted by the Associated Scientific & Technical Club of Johannesburg, then the Durban Pietermaritzburg Calling radio service, transmitted by the Durban Corporation, and the Cape Town Calling radio service, transmitted by the Cape Peninsula Publicity Association. However, the untimely onset of financial constraints led to the dissolution of all three radio services and the formation of the African Broadcasting Company (ABC) in 1927 by the Schlesinger Organization. Following further investigation, the South Africa Parliament under Act 22 of 1936 formed the South African Broadcasting Corporation (SABC) [Erasmus 2004, 1; SouthAfrica.info 2007].

Mishkind (2006, 2) explains that the inception of an FM broadcast service in South Africa began in 1961 with transmissions from the Brixton Tower (now Sentech Tower) in English and Afrikaans. Although these services were for many years known as Radio South Africa and Radio Suid-Afrika respectively, they are now called SAFM and Radio Sonder Grense (RSG). The SABC's national radio network presently consists of 18 radio stations. Fifteen of these stations are dedicated specifically to public service broadcasting and include eleven (11) full spectrum stations, one in each of the official languages of South Africa, with a cultural service for the Indian community broadcasting in English, a regional community station broadcasting in isiXhosa and English, and a community station broadcasting in the !Xu and Khwe languages of the Khoisan people of the Northern Cape. By far the largest radio station in South Africa is Ukhozi FM, the SABC's isiZulu cultural service, with approximately 6.38 million listeners a week (South Africa.Info 2008; SA Year Book 2009/10, 116). The Independent Communications Authority of South Africa (ICASA) has granted licenses to the following private radio stations: Radio Algoa; Classic FM; Kaya FM; YFM; Highveld stereo; Radio 702; Radio Jacaranda; Radio Oranje; East Coast radio; P4; Cape Talk MW; and Radio KFM. Stations such as Radio Jacaranda, Highveld stereo, Radio Oranje, Radio Algoa and East Coast Radio were initially SABC stations, but were sold to private owners to diversify radio ownership in South Africa as part of the transformation of the public broadcasting sector (South Africa.Info 2008).

2.7.5.3 Television

According to SA Yearbook (2009/10, 116), South African television is broadcast in all 11 official languages and in sign language. Although the country was one of the last in Africa to have a television service, South Africans now have access to a wide spectrum of local and international drama, comedy, sports and news. The document narrates that a one-channel television service was introduced on 5 January 1976. Also, the document adds that between 50% and 60% of all programmes transmitted are produced in South Africa. Locally produced television programmes are augmented by programmes purchased abroad, and by co-productions undertaken with other television programming organisations.

The document further notes that the SABC's online news service, *SABCNews.com*, attracts about 600 000 visits a month. The SABC's terrestrial television channels devote between 18% and 20% of their airtime during prime time to news and news-related programmes. Test transmission for migration from analogue to digital terrestrial transmission of the SABC television signals were taking place by mid-2009, to comply with the requirements of switching off analogue in the southern African region by 2015, as prescribed by the Internet Telecommunication Union (SA Yearbook 2009/10, 116). The SABC's television network consists of four television channels; three are free-to-air, full spectrum channels, and the fourth is pay-TV. Combined, the free-to-air channels attract almost 20 million adult viewers daily, reaching 89 % of the total adult TV viewing population (SA Yearbook 2009/10, 116; SABC 2009).

According to the Wikipedia Foundation Inc. (2008, 1-3), South Africa was one of the last countries to introduce television broadcasting to its population, even though it is more economically advanced than most African countries. The apartheid regime viewed the TV as a threat to its control of the media and also to the Afrikaans language (South Africa.Info 2008). Nevertheless, the SABC finally launched a color-only service in 1971 and broadcast in Afrikaans and English, with an emphasis on religious programming on Sundays. Ten years later in 1981, a second channel was introduced that broadcast in African languages such as Zulu, Xhosa, Sotho, and Tswana (South Africa.Info 2008). Later in 1986, a subscription based service known as M-Net (Electronic Media Network) launched its digital satellite TV service (DStv). This service offered

viewers a greater choice of channels, including international services like Cable News Network (CNN), MTV, British Broadcasting Corporation (BBC World), BBC Prime, the Discovery Channel, Sky News, Zee TV (in Indian languages), RTP International (in Portuguese), Summit TV, Channel O and Kyk Net (for Afrikaans speakers). Currently, there is no cable TV service in South Africa. More than 60 % of the programmes transmitted via the SABC are produced in South Africa. Television news is provided by the SABC news teams, reporting from across the country using modern portable electronic cameras and line-feed equipment via more than 220 television transmitters. 18 % and 20 % of their airtime is donated by the SABC's terrestrial television channels during primetime to news and news-related programmes (SA Yearbook 2008, 121; SA Yearbook 2009/10, 116). The SABC has recently introduced the High Definition Television (HDTV) to improve the quality of its services. HDTV (high definition television) is a digital television broadcasting system with higher resolution than traditional television systems (standard-definition TV, or SDTV); it is digitally broadcast and is the latest technology originating from abroad (Wikepedia Foundation Inc 2008).

2.7.5.4 e.TV (Free-to-air television)

e.TV was launched in 1998 and is South Africa's first private free-to-air television channel, broadcasting a full-spectrum programming service to 80.5 % of South Africa's population (SA Yearbook 2009/10, 117). The station is owned by two Black Economic Empowerment (BEE) groups, Hoskens Consolidated investments Limited and Venfin Limited, and employs some 500 people countrywide. e.TV has offices in Johannesburg, Cape Town, Durban, Port Elizabeth and Bloemfontein. As a free-to-air channel, e.TV's only source of income is advertising revenue (SA Yearbook 2009/10, 117). The station's most popular programmes are wrestling, news, movies and South African drama. The channel has defied its inexperience in South Africa's media industry by being the second-largest channel in the country, with a recorded viewership of 17.9 million in 2008 (SA Yearbook 2009/10, 117). The channel appeals to all races, ages and income groups (its audience profile in 20089/09 was 54.1 % male and 45.9 % female) and is the most viewed English language channel in the country. Coincidentally, it was the first channel in South Africa to secure the rights to the Union of European Football Association's Champions League Football (SA Yearbook 2009/10, 117).

2.7.5.5 M-Net

M-Net, launched in 1986, is South Africa's first private subscription television service (SA Yearbook 2009/10, 116). M-Net channels are delivered through analogue terrestrial and digital satellite distribution, and offer international and local movies, sport, children's programmes, series, reality shows, and a range of other programmes. Multi Choice Africa (MCA) was formed in 1995 to manage the subscriber services of its sister company, M-Net, and became the first company on the continent to offer digital satellite broadcasting (SA Yearbook 2009/10, 116). Operations include subscriber management services and digital satellite television platforms, which broadcast 55 video and 48 audio channels, 24 hours daily (SA Yearbook 2009/10, 116).

A point worth noting is that presently, M-Net broadcasts its array of general entertainment and niche channels to more than 50 countries across Africa and the adjacent Indian Ocean islands (SA Yearbook 2009/10, 116). The second terrestrial channel, CSN (Community Services Network), offers sport and programming aimed at a variety of South African communities. M-Net is also well represented in the DStv bouquet of satellite TV channels. Development of the local film and TV industries is a priority for M-Net and is supported by various projects, such as EDiT, which gives final year film and television students the opportunity to produce programmes for broadcast on M-Net (SA Yearbook 2009/10, 116).

2.7.6 COPPER/ FIBER OPTIC CABLES

The Square Kilometer Array or SKA (2003, 48), in a supplementary report to the International Steering Committee (ISSC), notes that Telkom has an extensive optical fiber cable network in South Africa, which also penetrates into rural areas. Telkom SA (2006, 2) reports that the expansion of this high performance cabling in South Africa includes the following:

- The SAT3/WASC (Southern Africa-Western Africa Submarine Cable), which is a 15000 km, high performance fiber optic cable linking Europe to South Africa and a number of countries on the West African coastline. The SAT3/WASC is the third in a series of telecommunications projects that date back to 1964, when South Africa's Department of

Posts and Telegraphs proposed a cable system to link South Africa to Australia and Asia. The inadequacy of the radio circuits between South Africa and Europe led to the creation of the SAT 1 cable system, which is a coaxial system that is capable of transmitting 360 simultaneous telephone calls (Telkom SA 2006, 2).

- Telkom SA (2006, 1) explains that the SAT3/WASC/SAFE is a US $ 600 million project, and will not only support Africa's growing telecommunications requirements, but also provide a secure reliable traffic route between Western Europe, the Americas and Asia. According to Telkom SA (2006, 2), this project will bring the power of high speed connectivity to Africa, sophisticated communications, paperless faxing, access to the world's research facilities, and access to news almost as it happens. Furthermore, businesses will be able to engage in e-commerce, open up new markets, expand distribution, and reach various buyers, suppliers and other service providers.
- The report (Telkom SA 2006, 2) states that SAT 1 was replaced by SAT2 in 1993 to work alongside the existing satellite system. SAT2 can handle 15360 simultaneous transmissions in several different forms, including voice, television and data transfer.
- Additionally, SAFE (South African - Far East) continues the connection another 13800 km as far as Malaysia via re-union and Mauritius and India.
- With respect to neighboring countries, SKA (2003, 49) states that there are established transmission links between Telkom SA from/ to Lesotho, Swaziland, Namibia, Zimbabwe, and Mozambique. Optical fiber cable routes exist between Johannesburg (SA) and Windhoek (Namibia) and between Johannesburg and Gaborone (Botswana). In cases where the neighboring countries are not geographically linked, microwave links and sometimes satellite connections are available.
- The establishment of an East African cable is currently under discussion (SKA 2003, 50).

2.7.7 TELECENTRES

Telecentres have been praised as a solution to development problems around the globe because of their ability to provide remote, rural, and disadvantaged communities with much needed access to ICTs, thus narrowing the 'digital divide' (Dymond and Oestmann n.d; Colle and Roman 2001, 2). Multipurpose community telecentres provide the public with access to a variety of communication and information services. Many governments and organizations therefore encourage the use of these centres. Telecentres provide affordable IT access, training for disadvantaged individuals, and access to resources and information for social development. Despite their advantages, the South African government has often experienced significant obstacles in the establishment and maintenance of these centers, mainly because of the high cost of connectivity, low digital literacy in some communities, and high maintenance costs (Wikimedia foundation 2008, 1). Public ICT access centres are diverse, often varying in the clientele they serve and the services they provide. Some for-profit, private-sector cyber cafés cater for those able to pay for online time, and these provide more advanced facilities that target the youth, such as gaming and various social networking services (Fontaine n.d).

According to the SA Yearbook (2008, 112), South Africa has a number of telecentres, including:

- **Gaseleka Telecentre.** This was the first telecentre to be established by the South African Universal Service Agency (USA) in 1998. Gaseleka started out by only offering access to equipment. It has since developed various other services according to need and opportunity. Most people use it for phone calls, sending and receiving faxes, and photocopying. Schools close-by use it to bulk-copy question papers and reports, and to type curricula, reports and schedules on computers. Computer training is a major activity provided by the Gaseleka telecentre (2007).

- **Wudinna Telecentre**. This is the service center for the Central/Northern Eyre Peninsula. It started as a small office to introduce modern technology to rural people - the main focus of the center. It offers services such as printing and teaching computer skills to the community (Parker *et al.* 2004, 1).

- **Mamelodi Telecentre**. The centre is situated in the Mamelodi township in Pretoria, also known as Mamelodi Community Information Services (MACIS). The centre trains the community and facilitates the trainings on offer. While it has good community networks, its biggest challenge is that illiterate people do not visit the centre because they are not equipped to use the ICTs that are available (Colle and Roman 2001, 57).

2.7.8 SATELLITE LINKS

In their study, Milne *et al*. (2004, 1) note that Stellenbosch University developed the first successful micro-satellite program, SunSat (Stellenbosch University Satellite). SunSat 1 was South Africa's first satellite to reach orbit and was launched in February, 1999. Milne *et al*. further narrate that South Africa's second satellite - Sunsat (again from the University of Stellenbosch) - was launched late in 2005. South Africa's third satellite, named "Sumbandila" (meaning "lead the way"), is an 80-Kilogram micro-satellite and is expected to orbit the earth at a height of 500 kilometers (Southafrica.info 2006, 2). The authors illuminate that this satellite will be used to support, monitor and manage disasters such as floods, oil spills and fires.

2.7.9 THE INTERNET

Comninos *et al*. (2010, 30) observe that within sub-Saharan Africa, South Africa continues to dominate internet access. These authors add that the gap between South Africa and the rest of the continent has grown smaller, with access figures increasing only gradually in South Africa. Most of the lead that South Africa still has is based on its higher Gross Domestic Product (GDP) per capita and not due to any policy or regulatory foresight that has contributed to the development of the market. It is believed that there will be nine million Internet users in South Africa by 2014 (SA Yearbook 2009/10, 111). According to the document, commercial Internet access has been available in South Africa for only 15 years and during that time some 5,3 million users have gone online. Tracking back the history of Internet users in South Africa, it is interesting to note that for year-end 2008 were estimated at 4,590,000 (ISPA 2009). ISPA notes that previous projections for Internet users were somewhat optimistic, and now are being adjusted to more

realistic figures. For year-end 2007, the number of Internet users in South Africa was 4,070,000; for year end 2006 the number was 3,830,000; and for year-end 2005, the total number of Internet users was 3,600,000 (ISPA 2009). The table below provides the latest statistics on Internet utilization in South Africa.

Table 2.3: South Africa Internet usage and population statistics

Year	Users	Population	% Pen.	Usage Source
2000	2,400,000	43,690,000	5.5 %	ITU
2001	2,750,000	44,409,700	6.2 %	IWS
2002	3,100,000	45,129,400	6.8 %	ITU
2003	3,283,000	45,919,200	7.1 %	Wide World Worx
2004	3,523,000	47,556,900	7.4 %	Wide World Worx
2005	3,600,000	48,861,805	7.4 %	Wide World Worx
2008	4,590,000	43,786,115	10.5 %	W.W.W
2009	5,300,000	49,052,489	10.8 %	W.W.W

Adapted from: Internet World Statistics (2010)

According to the SA Yearbook (2009/10, 111), African Internet usage has trebled to more than 12 million since 2000, but South Africa remains the continent's dominant Internet centre, with a quarter of Africa's users. Johannesburg-based companies are central to the Internet industry. Nine of the 12 major Internet service-providers listed by the Internet Service-Providers Association (http://www.ispa.org.za) are based in Johannesburg. The Johannesburg Internet Exchange (JINX) is the larger of two national hubs that connect the Internet service-providers into a single network. All government departments in South Africa are online, and all but the smallest businesses have access, usually via a fixed line network. Internet cafes are also available, particularly in areas where tourists congregate. The Internet has become a mainstream and integral part of modern life. It has been noticed from the ratings of the Internet market research company, Nielsen//Net, that the number of South African citizens registered online has grown by over 121 % over the last years. In May 2007, some 3.9 million active unique browsers

were registered in South Africa, representing a 121 % increase in May 2005 (SA Yearbook 2008, 115). By the end of 2007, South Africa had registered at least 7.8 million users, which is an increase of about 163 % (Finn 2008). In South Africa, men are the majority of Internet users, rated at 54 % (or 2.15 million) of the Internet population (SA Yearbook 2008, 115). In terms of age, the dominating group is aged between 25 and 34 years, and of 1.42 million users, this group constitutes 36 % of the online population. The second largest group is the 35 to 49 year old category, a further 35 % (1, 37 million people) of the Internet population in South Africa. The majority of the Internet population speaks English; the majority of online content is English (SA Yearbook 2008, 115). According to ITU (2008) South Africa has exceeded the 1 million broadband subscriber mark. It has more than 1 million broadband connections, mainly made up of ADSL (Aerospace Systems Design Laboratory) and HSDPA (High-Speed Downlink Packet Access) subscribers.

2.8 IMPLICATIONS ON THE CURRENT STUDY

The central subject of this chapter has been the ICT infrastructure in South Africa. The current and future capacity of South Africa to generate and sustain access to ICTs for its citizens is an important development priority, and the public sector is no exception to this rule. The Accelerated and Shared Growth Initiative of South Africa (ASGISA), launched by the government in 2006, identified key factors affecting South Africa's drive to achieve 6 % economic growth and to halve unemployment and poverty in South Africa by 2014. One of these factors is the cost of telecommunications. Together, the cost of telecommunications and the availability of ICT infrastructure will crucially facilitate or frustrate attempts to improve levels of access to ICT. The mapping and auditing of ICT infrastructure should therefore be one of the first steps to be undertaken when implementing a roll out of ICTs in the country. This would ensure that a thorough understanding is obtained of the country's strengths and weaknesses in terms of its ICT infrastructure. It is also important that audits are conducted on a regular and ongoing basis to monitor whether the country's ICT infrastructure remains relevant to the strategy of the country. In so doing, the government would be able to get a clear understanding of its strength and weaknesses. Another important point worth noting is that with the ever-

increasing dependence on ICT tools and services for the civil servants it is important for government to conduct regular ICT audits.

It is interesting to note that South Africa's huge investments in ICT infrastructure has contributed to huge advancements in the utilisation of ICTs both for business and service delivery purposes and private utilisation. It is worth noting that for government to utilise ICTs for its own administrative functions, as well as for services delivery and information dissemination purposes, ICT tools and services such as intranets, the Internet, databases, telephone, copy machines to name a few, need to available to the government workers as well as to the citizenry in general. The literature shows that Africa has many different types of modern ICT infrastructure available such as satellite-based telephony, mobile cellular phone services, digital satellite television, computers, facsimile services, satellite radio services and many more (Van Brakel and Chisenga 2003). However, it should be emphasised that Africa is still behind compared to the rest of the world in as far as the availability of ICT infrastructure is concerned. Thus, mapping and auditing of ICT infrastructure should be done.

It is clear from the literature that South Africa has by far the largest number of fixed line and mobile connections in Africa and the most advanced ICT sector on the continent. This is good for the country because the government uses ICTs such as the Internet in order to improve work productivity and creativity in the sector. Also of note is that government uses the Internet to facilitate the sharing of information and communication in the sector. The literature shows that the civil servants use the Internet to search for information and communicate amongst themselves. Although South African is got sound ICT infrastructure, yet there are factors that hinder its economic participation in the world such as the high cost of access for end-users to foreign-own satellite telecommunication providers for cross border, regional and international telecommunications traffic, high internet costs, low bandwidth, poor ICT infrastructure and unreliable communication facilities. Social information is about the use of ICTs in organisational and societal contexts. With that in mind, it is true that many people around the globe have personal computers in their work places. Government departments are no exception to the rule. Government has provided the civil servants with a variety of ICT tools and services in order to improve work productivity and creativity in the sector. Having said that, it is interesting to note

that South Africa is in a unique situation as it is both a developing country in Africa with massive basic needs which are largely unmet. Also, it is a country with a major industrialised sector with great technological potential (LINK Centre 2004).

One of the massive basic needs which the country has not met is digital divide and computer illiteracy amongst the citizens. This is even a challenge in the public sector. Some civil servants lack ICT skills which then negatively affect services delivery. Also of note, ICT skills are key to business success. It is fair enough to note that SA government has done a tremendous job to put in place a world class ICT infrastructure. However, this infrastructure alone is insufficient and has to be accompanied by relevant skills. Therefore, if the civil servants do not possess relevant ICT skills to utilise ICTs, government is doomed to failure in as far as improving work productivity and creativity in the public sector is concerned.

To reiterate, South African ICT enthusiastic suggests that South Africa's re-entry into the global marketplace and the need to address major infrastructural and social backlogs requires great investment in creating knowledge and building the country's human potential, particularly in the field of ICT strategy. Another interesting point to observe is that wider access to broadband, ADSL and 3G access has boosted the country's internet connectivity. Although internet access is not at all a challenge in the public sector, not all South Africans have access to it. However, the number of South African internet browsers is increasing (South Africa.Info 2008). This pains a good picture for the country and electronic government. It is important to note that if South Africans have access to the Internet, this means they can enjoy the benefits of e-government in the country. Also, government can improve services delivery to the citizens. As indicated earlier, SA Yearbook (2009/10, 108) South Africa has a network that is 99% digital and includes the latest in fixed-line, wireless and satellite communications. Also of notes is that SA has the most developed telecommunications network on the continent. However, the majority of the South Africans do not have access to the Internet. It is very confusing and interesting that a country that has got very powerful ICT infrastructure on the African content cannot cater for its citizens.

Government has implemented and introduced a number of telecentres as a way of bridging the digital divide in remote, rural and disadvantaged communities. This is good more especially for

e-government purposes. However, a lot still needs to be done in as far as the implementation of telecentres is concerned. Telecentres enable citizens to access government information free of charge. Most communities in South Africa still do not have telecentres. As indicated, SA Yearbook (2008/09) indicates that African Internet usage has trebled to more than 12 million since 2000, but South Africa remains the continent's dominant Internet centre, with a quarter of Africa's users.

2.9 SUMMARY

This chapter has mapped and audited the ICT infrastructure in South Africa. The findings of this chapter reveal that:

I. ICT infrastructure is the backbone of ICT applications.
II. Huge investments in ICT infrastructure in mainly developed countries have contributed to huge advancements in the utilization of ICTs, both for business and service delivery purposes, and for private utilization.
III. ICTs are a powerful tool to boost economic growth and reduce poverty in Africa.
IV. Many people around the globe have PCs in their homes and in their work places, but this is not the case in Africa; the availability of desktop computers in Africa is the lowest compared to the rest of the world.
V. Presently Africa has poor fixed-line infrastructure, and as a result has seen high growth in mobile usage.
VI. Advances in microelectronics and telecommunications in conjunction with the convergence of technologies with new ICTs during the final quarter of the last century have transformed the way the world works.
VII. Television and radio broadcasting are widely available in Africa. However, radio is by far the most dominant mass communication tool or medium in Africa.
VIII. SADC governments seem to unanimously understand the benefits that telecommunications deregulation and liberalization can bring to the ICT industry, and the need for policy and market reforms.

IX. Telkom is Africa's largest integrated communications company, providing integrated communications solutions to a diverse range of customers.

X. South Africa is the fourth-fastest growing mobile communications market in the world. The country's three cellular network operators, Vodacom, MTN, and Cell C, provide telecommunication services to over 39 million subscribers, or nearly 80% of the population.

XI. A World Wide Worx survey indicates that Internet users in South Africa, for year-end 2008, were estimated at 4,590,000.

XII. A large number of telecentres have been introduced and implemented by different governments around the globe. They are seen as narrowing the digital divide in remote, rural and disadvantaged communities.

XIII. The South African Broadcasting Corporation (SABC) has 18 radio stations that broadcast in 13 languages. Over 19 million adults in South Africa tune into these stations daily. SABC also has four television channels (SABC 1, 2, 3 and eTV); in 2005, 18 million adults tuned in daily (Department of Communications 2005).

XIV. In 1986, a subscription based service known as M-Net launched its digital satellite TV service (DStv). This service offers viewers a greater choice of channels, including international services like CNN, MTV, BBC World, BBC Prime, Discovery Channel, Sky News, Zee TV (in Indian languages) and RTP International (in Portuguese), Summit TV, Channel O (music channel), and Kyk Net (for Afrikaans speakers). Currently, there is no cable TV service in South Africa.

There has therefore been tremendous growth in ICT infrastructure in Africa, and especially in South Africa.

The next chapter (three) looks at the evolvement of ICT policy in South Africa.

CHAPTER THREE

EVOLVEMENT OF INFORMATION AND ICT POLICY IN SOUTH AFRICA

3.0 INTRODUCTION

This chapter determines the status, developments, challenges and opportunities of information and ICT policy in South Africa. The role of information, communication, and knowledge in shaping socio-economic development has become a top priority in many African countries, and South Africa is no exception. The new government of South Africa has made it one of its central aims to eliminate social and economic inequalities and to create new opportunities for the country's most disadvantaged individuals and communities (Oberholzer 2000, 938). The country's government departments have launched an aggressive series of initiatives that seek to achieve broad-based growth and equitable development through ICTs (Oberholzer 2000, 938).

At the same time, it is the overriding purpose of the government to establish policies and practical programmes that will improve the quality of life of all South Africans. However, one cannot move blindly into the dynamic world of ICTs without taking careful stock of its implications on South Africa as a developing country. The effects of the information age are felt in every organisation as it continues to change the very fabric of day-to-day social life. The storage, retrieval and dissemination of information are crucial in all social practices. ICTs can therefore not be separated from the social role they play in society. South Africa is in a unique situation because it is a developing country in Africa with massive, largely unmet, basic needs, and it is a country with a major industrialised sector with great technological potential (LINK Centre 2004).

3.1 POLICY DEFINED

Different scholars offer different interpretations of what is meant by policy. Social or political scholars view policy as public directions set by government as a way to fulfil its constitutional responsibilities with respect to a particular area of public and/or private activity. Scholars view policy as government and public consideration of how to structure and regulate certain activities

so that they can contribute to the greater public good (Braman 1998, 12). According to Braman, policy constitutes sets of national or desired goals, which can also be employed as the evaluation criteria of other proposals (and in this instance, policy and national ICT development). He explains that policy can be enshrined in national documents such as the constitution; this is true of the 1996 South African Telecoms Act, because most goals of this act are enshrined in the constitution. For example, the idea of universal service or the equitable provision of ICT services is based on the principle of equality before the law in terms of the provision of telecom services in all areas, regardless of whether the area is urban or rural or whether the persons are poor or rich. Braman thus notes that policy can be viewed as a general principle that underlies the making of law and regulations, and proposes five different state attitudes towards industry intervention:

(a) Strategic sector intervention: state primacy in directing and providing incentives for industry development;

(b) Facilitation: the state provides structural conditions to encourage private sector responsibility for infrastructure and resource provision;

(c) Consensus building: the state attempts to integrate activities of the public and private sector through mutually beneficial collaborations. Most South African ICT laws have been born out of discussions and consensus building between stakeholders such as labour, government, business, civil society and other interested parties (e.g. academia);

(d) Supervision or mediation: a lesser interventionist role for the state involving only the supervision of market delivery of infrastructure and resources; and

(e) A non-interventionist role: complete reliance on the market.

3.2 ICT INTEGRATION IN SOUTH AFRICA

The increased use of ICTs in South Africa to store, process and communicate information has led to the need for different types of legislation. This includes:

- Data Protection Act (1998);
- Copyright, Designs and Patents Act (1980);
- Computer Misuse Act (1990);
- Health and Safety at Work Act (1974);
- EU Health and Safety Directives;
- Electronic Communications Act (2000);
- Cybersecurity (2010); and
- Broadband policy (2009).

ICTs are a vital catalyst for social change and economic development and are increasingly viewed as essential tools for development in developing countries. The South African government has recognized the potential benefits of harnessing the power of ICTs, and is working to create a technically literate workforce that can contribute to a dynamic economy and participate in the information society. According to Bridges.org (2002), the government established two ICT advisory councils under the leadership of former president Thabo Mbeki. These consist of national and international ICT experts who play a role in informing the government's decision-making in this area. Many other initiatives have also been underway aiming to integrate ICTs into people's lives and address the legacy of inequity in this country (Bridges.org 2002). In his study entitled, "The notion of the information society in South Africa",

Van Audenhove (2003, 129) points out that South Africa is considered to be one of the few developing countries that has fully embraced the concept of the information society and has formulated and implemented policy initiatives in order to change society accordingly. According to Van Audenhove, by 1995, the theme of the information society began to surface regularly in political discourse and policy documents. ICTs and access to ICTs started to have prominence both in policy formulation and implementation. Van Audenhove observes that although there

was much talk about a Green Paper/White Paper process on the information society during 1996 and the beginning of 1997, such a policy process never materialized. His study further established that there was no document defining the government's view of the information society, no policy document outlining an integrated strategy to arrive there and no government department officially responsible for the coordination of policy initiatives. This issue is revised by Kwake (2007, 74), who observes that South Africa does not have a comprehensive national ICT policy.

Kwake established that the South African government, in an effort to speed up the process of developing an ICT policy for the country, mandated the Department of Communications (DoC) to develop such a policy. The DoC is not alone in this process. However, the present study established that to date (2011), there is still no document defining the government's view on the information society, and no integrated policy document outlining an integrated strategy to arrive there. The ICT policy issue is one of the most complicated and challenging ones in South Africa. Having said this, it is also important to note that the government is not turning a blind eye on the issue as currently it has managed to develop two vital ICT policies, i.e. on broadband and cybersecurity. This is great for the country because in the information society it is very difficult to survive without these two mentioned policies. A recent study conducted by Comninos *et al*. (2010, 06), established that South Africa has had no major policy review of telecommunications since the mid-nineties when it embarked on a major consultative process that resulted in a White Paper on Telecommunications and the consequent Telecommunications Act of 1996. This resulted in the partial privatisation of the incumbent, Telkom, in 1997, and the introduction of a third mobile operator after a protracted and highly contested licensing process in 2002.

3.3 NATIONAL ICT STRATEGY

A few years ago, the Department of Trade and Industry (DTI) initiated a strategy to develop the ICT sector following extensive research and a number of related initiatives under the umbrella of the South African Information Technology Industry Strategy (SAITIS) project (Department of Communications [DoC] 2010). SAITIS is a bilateral project between the South African

government represented by the DTI and the Canadian government represented by the Canadian International Development Agency (CIDA), with PricewaterhouseCoopers (Canada) as the executing agency. The project is set to further the development of the ICT sector and is intended to be complementary to and supportive of broader socio-economic development goals, with an emphasis on social upliftment and empowerment (DoC 2010). While South Africa is one of the leading developing countries in the adoption and diffusion of ICTs, it is slipping in terms of digital capability, i.e. lack of computer skills amongst some South Africans (DoC 2010). This is primarily because of the current policy environment, which has not succeeded in broadening the industry's base or bridging the digital divide. The DTI has devised a five-year plan with the following mission for the ICT sector: "Through the application and diffusion of digital technologies, South Africa will achieve considerably higher levels of social development and strong sustainable and equitable economic growth. South Africa will be a catalyst in Africa and other developing countries by pioneering ICTs suited to developing countries, and diffusing these products and services". DoC (2010) notes that in consultation with other government departments, the DTI has identified the following eight factors that are critical to a successful ICT strategy:

I. Developing human capacity - skills and knowledge

II. Cost effective and ubiquitous ICT network infrastructure

III. Sustainable growth of the domestic ICT industry

IV. Strong content and application development for domestic and international markets

V. Rapid diffusion and adoption of ICTs through the economy

VI. Government - a model user of ICTs

VII. Enhanced innovation and R&D capabilities

VIII. Proactive, coordinated, and transparent policy and implementation processes

Before the African National Congress (ANC) rose to power, it discussed the importance of Telecommunications and ICTs in its Reconstruction and Development Programme (RDP), the election manifesto that was to serve as a blueprint for policy once the ANC alliance come to power (ANC 1994). After the elections, the new government started to reformulate overall policy frameworks, some of which touched on the issue of ICTs. This shows that SA government is aware of the importance of an ICT policy in the country.

3.4 THE ICT EMPOWERMENT CHARTER (2010)

The empowerment charter for the ICT sector is an industry-driven document being put together by major stakeholders in the ICT sector, together with valuable input from the government, represented in part by the DoC and the Department of Trade and Industry. Currently, the working group involved in the development of the document comprises members of numerous related associations like the Black IT Forum (BITF), the SA Communications Forum (SACF), the Computer Society of South Africa (CSSA), the Electronic Industries Federation (EIF), Information Industry South Africa (IISA), Information Technology Association (ITA) and the South African Chamber of Business (SACOB) (The ICT Empowerment Charter Working Group 2010).

3.4.1 The Department of Communication's mandate

According to the Department of Communication (2010) its mandate is derived from relevant legislation, which is as follows:

*"*To create a vibrant ICT Sector that ensures that all South Africans have access to affordable and accessible ICT services in order to advance socio-economic development goals and support of the African Agenda and contribute to building a better world." Consequently, according to the Department of Communications (2010), its core functions are as follows:

- To ensure the development of robust, reliable and affordable ICT infrastructure that supports and enables the provision of a multiplicity of applications and services to meet the needs of the country and its people

- To strengthen the ICT Regulator, the Independent Communications Authority of South Africa (ICASA), to enable it to regulate the sector in the public interest and ensure growth and stability in the sector
- To enhance the capacity of, and exercise oversight over, state owned enterprises (SOE's) as the delivery arms of government

  To fulfil South Africa's continental and international responsibilities in the ICT field.

The mandate of the DoC is further embedded in legislation as well as other policy documents. The legislative framework for the work of the DoC is contained mainly in the following:

- Broadcasting Act (Act 4 of 1999)
- Electronic Communications and Transactions Act (Act 25 of 2002)
- Electronic Communications Act (Act 36 of 2006)
- Former States Broadcasting Reorganisation Act (Act 91 of 1996)
- Independent Broadcasting Authority Act (Act 153 of 1993)
- Independent Communications Authority of South Africa Act (Act 13 of 2000)
- Sentech Act (Act 63 of 1996)
- Telecommunications Act (Act 103 of 1996)
- Post Office Act (Act 44 of 1958)
- Postal Services Act (Act 124 of 1998)
- Telegraph Messages Protection Act (Act 44 of 1963)

In executing its role, the department is also guided, amongst others, by:

- The Constitution of the Republic of South Africa, 1996 (Act 108 of 1996)
- Public Service Act, 1994 (Act 103 of 1994) as amended
- Public Finance Management Act, 1999 (Act 1 of 1999) as amended

The DoC is mandated by the SA government to execute the following as far as ICT policy development is concerned:

- To develop ICT policies and legislation that support the development of an ICT sector that creates conditions for the accelerated and shared growth of the South African economy, which positively impacts on the well-being of all our people and is sustainable;
- Develop strategies that increase the uptake ad utilization of ICTs by the public, thus maximizing the impact of the ICTs in service delivery, nation building and social cohesion as well as creating conditions for a better life for all; and
- Provide a base for informed, timely, forward-looking and proactive ICT policy decision-making in the department and sector as a whole and to evaluate the impact of those policies, laws and strategies on improving the lives of South Africans (DoC 2010).

3.4.2 ICT Public entities and agencies

The DoC's vision is to see South Africa as a global leader in the development and use of ICTs for socio-economic development. To reiterate, there are quite a number of ICT public entities and agencies who have been called on board to assist with the development of a sound ICT policy for the country. Some of these entities and agencies are discussed below.

South African Post Office	Post Office We deliver, whatever it takes.

The South African Post Office Ltd (SAPO) was established in accordance with the Post Office Act (1958) as a government business enterprise to provide postal and related services to the South African public. SAPO was granted an exclusive mandate to conduct postal services in

South Africa by the Postal Services Act (1998). The act makes provision for the regulation of postal services and the operational functions of the company, including its universal service obligations. The post office is seen to be the core ICT public access network and should be used to achieve South Africa's universal service goals in the sector. In this respect, post offices will be built using expanded public works principles in several communities each year for the next ten years (DoC 2010).

South African Broadcasting Corporation	SABC

The South African Broadcasting Corporation (SABC) was established in terms of the Broadcasting Act (1936) as a government enterprise to provide radio and television broadcasting services to South Africa. As provided in the Broadcasting Amendment Act (2002), from October 2004, the SABC has been incorporated into a limited liability company with two operational divisions: public broadcasting services and commercial broadcasting services. The SABC is the national public services broadcaster and operates 17 radio stations and 3 television stations. Its operations are based on the broadcasting charter, which guarantees independence and freedom of expression in creative, journalistic and programming terms (DoC 2010).

Sentech	SENTECH connecting You

Sentech Ltd was established in terms of the Sentech Act (1996) as a common carrier to provide broadcasting signal distribution for broadcasting licences. In 2002, Sentech was licensed, through the Telecommunications Amendment Act (2001), to provide international carrier-to-carrier voice services as well as multimedia services. Sentech is viewed as a core provider of wireless broadband in South Africa. The cabinet confirmed this policy statement and declared that Sentech shall remain as a strategic state-owned enterprise (DoC 2010).

National Electronic Media Institute of South Africa	

The National Electronic Media Institute of South Africa (NEMISA) was established as a non-profit organisation in terms of the Companies Act of 1973. It provides much needed skills training at an advanced level for the broadcasting industry. It is accredited by the Council for Higher Education and offers diploma courses, short courses and internships in three subjects: TV production, radio production and creative multimedia. The emphasis is on equipping students with the skills that they need to be market-ready in a wide-range of broadcasting disciplines, and to give them the ability to work effectively in constantly changing conditions (DoC 2010).

Universal Service and Access Agency of South Africa (USAASA)	

The Universal Service Agency of South Africa was established in terms of Section 58 of the Telecommunications Act of 1996. The main role of the agency is to promote universal access to communication technologies and services for all South Africans. It also facilitates and offers guidance on evaluating, monitoring and implementing programmes that propose to improve universal access and service. The agency is mandated by the Telecommunications Act (1996) to manage the Universal Service and Access Fund. The fund, with monies appropriated by parliament, is used to build/deliver infrastructure for universal services area licensees as well as infrastructure for tele-centres and school cyber labs (computer laboratories with ICT equipment that enables access to the Internet and provides multimedia services) [DoC 2010].

.za Domain Name Authority (.zaDNA)	.zadna

The .za Domain Name Authority was established to assume responsibility for the .za Domain Name Space. The .zaDNA was established in terms of Chapter 10 of the Electronic Communications and Transactions (ECT) Act of 2002. The Department of Communications currently provides funding for the .zaDNA until the Authority is fully operational. Funding will then be sourced through a funding model developed in accordance with Section 66 (3) of the ECT. The .zaDNA will also oversee the implementation of an alternative dispute resolution mechanism.

Independent Communications Authority of South Africa (ICASA)	ICASA

The Independent Communications Authority of South Africa Act of 2000 paved the way for the merger between the South African Telecommunications Regulatory Authority and the Independent Broadcasting Authority to form ICASA. ICASA is responsible for regulating the telecommunications and broadcasting industries in the public interest to ensure affordable services of a high quality for all South Africans. In addition to developing regulations, ICASA also issues licenses to telecommunications and broadcasting service providers, enforces compliance with rules and regulations, protects consumers from unfair business practices and poor quality services, hears and decides on disputes and complaints brought against licensees, and controls and manages the effective use of the radio frequency spectrum (DoC 2010).

3.4.3 South Africa's vision of the information society

Van Audenhove (2003, 130) and Comninos *et al*. (2010, 06) argue that the absence of a formal vision of the information society in the form of an integrated policy or policy document and an analysis of the country's political discourse pose a number of methodological problems in reconstructing South Africa's vision of the information society.

3.4.4 Political discourse and the information society

Van Audenhove (2003, 132) argues that telecommunications is no longer the consequence of development, rather "it is a necessary precondition". ICTs can play a catalyzing role in the functioning of all economic and social sectors. More specifically, ICTs can speed up, and even be an alternative to, the extension of services in areas such as health care, education, agriculture, business and government. As Mbeki (1995, 183; Matsepe-Casaburri 1999) stated: "We believe that the modern communication technology we are all talking about must help us educate our children, particularly in the rural and other underdeveloped areas of our country, teach our medical workers and parents how to care for babies, train our youth, and eliminate distance and infrastructure imbalances which act as a barrier in providing these social services."

3.4.5 Translating the vision

South Africa's political leaders share the vision that ICTs can help overcome some of the legacies of apartheid. ICTs are identified as both facilitators in the restructuring of sectors and perceived as a means to deliver services such as tele-education, tele-health and tele-government. Despite the fact that the latter services are not readily available, South Africa's political leaders seem to be aware of the fact that the information society is about much more than infrastructure and services. The information society is about global competitiveness and new forms of economic growth and development. The necessity to integrate telecommunications policy with broader developmental policies was already stressed by former President Mandela in his speech at the ITU Telecom 95 Conference held in Johannesburg in South Africa (Mandela 1995).

3.4.6 Schematic overview of initiatives

Although it is widely recognized that ICTs may wield social change, policies are all too often reduced to the extension of infrastructure and the development of applications and services. Recent experience with policy and policy implementation shows that information society policy encompasses much more than policies on infrastructure and services alone. With the convergence of ICTs, the formulation and implementation of new policies are starting to cut across existing policy domains such as technology policy, industrial (and trade) policy, telecommunications policy, and media policy (Mansell and When 1998; Van Audenhove 2003, 132).

3.4.7 From policy formulation to implementation and back again

When looking at the IS policy in South Africa, one can identify four distinct periods in the general policy formulation process. Broadly speaking, these are the transition period, transformation period, implementation period and evaluation period. The first, i.e. the transition period, ran from 1989 until the elections in May 1994 (Van Audenhove 2003, 137). During this period, the transition from 40 years of National Party (NP) rule to what ultimately became the Government of National Unity (GNA) was negotiated (Van Audenhove 2003, 137). Central to these discussions were the roles in the future of broadcasting and telecommunications and their accompanying market structures (Van Audenhove 2003, 137). Although the negotiations led to a new framework for broadcasting in terms of the Independent Broadcasting Agency (IBA), the negotiations failed to come up with a new telecommunications policy (Van Audenhove 2003, 137). The apartheid government had substantially changed the telecommunications regime by commercializing the national operator Telkom in 1991 and by introducing two licenses for mobile telecommunications in 1993, without introducing the accompanying legislation and regulatory framework (Van Audenhove 2003, 137). The Reconstruction and Development Programme (RDP), which laid out the election manifesto of the ANC Alliance in 1994, set out the ANC's ideas on telecommunications and ICTs. The document defined access to telecommunications as a basic need that had to be provided at affordable prices as quickly as possible. However, telecommunication was perceived to be much more than just a basic need. The telecommunications sector was seen as “an indispensable backbone for the development of

all other socio-economic sectors" (ANC 1994). According to the report, it was believed that upgrading IT infrastructure would "facilitate an upgrading of education, health care, recreation and other services, by improving the quality of information available and providing communities throughout the country with access to expertise and usable data" (ANC 1994).

The second period is the transformation period, which kicked off after the 1994 elections and ran until the first half of 1997 (Berlyn 1996, 47). During this period, a large number of policy frameworks was renegotiated and developed within the new democratic dispensation. Also, during this period, policy reformulation in different areas coincided with the mounting interest in ICTs and the information society in general (Berlyn 1996, 47). The issue of the information society surfaced regularly in political discourse from 1995 onwards and started to have an impact on policy formulation processes towards the beginning of 1996 (Berlyn 1996, 47). The main turning points were the Information Society and Development (ISAD) Conference in May 1996 and the subsequent Helderfontein Conference (Berlyn 1996, 47; NITF 1996a). Both conferences put the issue of the information society squarely on the political agenda of government departments and civil society (Berlyn 1996, 47). By the first half of 1997 when many policy formulation processes came to an end, many had integrated ICTs and information society issues into their policy frameworks (Van Audenhove 2003).

The first main policy process relating to ICTs that resulted in a new legislative framework was with respect to telecommunications. This led to the adoption of the White Paper on Telecommunications in March 1996, the Telecommunications Act in November 1996, and the license for Telkom in May 1997 (MPTB 1994; Republic of South Africa [RSA] 1996; RSA 1997). The main thread of the legislative framework was in line with international practice, in that policy, regulation and the operation of telecommunications were separated, and an independent regulator, the South African Telecommunications Regulatory Authority (SATRA), was introduced (RSA 1996). The first partial integration of ICTs in a wider information policy came about with the publication of the Communications 2000 or ComTask report towards the end of 1996. The ComTask report stemmed from an independent commission set up by the then deputy president to analyze the role and function of government communication, and the ownership structures and power relations within the media and their effects on government

communication. The recommendations made by ComTask were adopted by government and formed the basis of the restructuring of government communications. The document put considerable stress on the importance of ICTs for government communications and introduced the concept of multi-purpose community centres (ComTask 1996). The Department of Arts, Culture, Science and Technology, with its November 1996 White Paper on Science and Technology, developed another component of the IS policy. The White Paper formed the basis for the introduction of a new National System of Innovation (Department of Arts, Culture, Science and Technology 1996). In the educational sector, the potential positive use of media and ICTs in education was acknowledged early on. By mid-1996 a specially appointed commission presented its technology-enhanced learning investigation (TELI 1997), which contained a broad set of recommendations and guidelines. The main gist of the document was that ICTs should become part and parcel of the whole educational system (TELI 1997).

Interestingly, towards the end of 1996, different policy processes relating to ICTs and telecommunications came to an end (Van Audenhove 2003). All of the above documents called for a greater integration of policy initiatives concerning ICTs and information policy. The White Paper on Science and Technology, the ComTask report, the technology-enhanced learning investigation, the White Paper on Telecommunications, and the different initiatives of the NITF realized that the existing initiatives were fragmentary and pleaded for a greater level of integration (Van Audenhove 2003). The NITF ISAD position paper and the White Paper on Science and Technology called for a consultative Green Paper-White Paper policy process on the information society (Van Audenhove 2003). The NITF and the ComTask report proposed that the lead and coordination should proceed from the highest level possible, in other words from the cabinet. However, such a process did not materialize. The different departments proceeded with the implementation of their policies and programmes (Van Audenhove 2003).

The third period can be labeled the implementation period. It ran from mid-1997 until mid-2000 (Van Audenhove 2003). During this period, policies formulated under the transformation period were gradually being implemented, institutions responsible for implementation or regulation were being set up, and new policy processes were introduced to refine existing frameworks (TELI 1997). Within the telecommunications sector, both the regulator SATRA and

the USA were set up in the beginning of 1997. The regulator was put in place to protect Telkom's exclusivity and at the same time to stimulate the modernization of the sector (TELI 1997). Both the White Paper on telecommunications and the Telecommunications Act indicated that the regulator should play a proactive role in terms of social policy and development by ensuring the extension of the network and the regulation of tariff structures (TELI 1997).

The USA interpreted its mandate broadly and started with the implementation of telecentres (Van Audenhove 2003). In 1997, its stated goals were extremely ambitious. The organization calculated that to obtain full geographical coverage, South Africa needed 3 000 to 5 000 telecentres (Van Audenhove 2003). Although it realized it could not implement so many telecentres, the organization set itself the goal of testing different types of telecentres and working towards a sustainable model. Apart from the institutions set up in the telecommunications sector, two other institutions were established that have had particular relevance when talking about IS policy. In May 1998, the new Government Communication and Information System (GCIS) was launched. The GCIS was set up as an institution broadly responsible for government communications. Its official function was described as "playing a co-ordinating, facilitating and strategizing role for all of government communication, and to provide cost-effective communication services to all of government" (GCIS 2000). The GCIS was seen as the central institution to foster the link between government and the people, more specifically the disadvantaged community. In this sense, it was often emphasized that the GCIS should play an important role in terms of developmental communication. The GCIS started to play an important role in the field of ICTs and information provision in 1999 (GCIS 2000). It assumed responsibility of South Africa's government online portal site. It also initiated research projects to define the population's needs in terms of information.

Furthermore, from 2000 onwards, the organization (GCIS) became responsible for the implementation of some multi-purpose community centres (MPCCs). The organization also tried to play a role in the coordination of telecentre and MPCC initiatives (GCIS 2000). In January 1999, the State Information Technology Agency (SITA) was set up as a first solution to the government's IT problems (DoC 1998). This new public company was meant to provide IT-related services exclusively to public service with guaranteed performance levels. During the

implementation period, new programmes were conceptualized to develop the information society. The most important one was the info.com 2025, presented by the Department of Communications at the ITU Africa Telecom Conference in May 1998 (GCIS 2000). The info.com programme was conceptualized as a modular approach to the implementation of ICT services and applications (GCIS 2000). One project or a group of projects formed the components of the programme. The programme itself consisted of five main programme components: (1) Policy management and institutional framework; (2) Information access infrastructure; (3) Government information technology; (4) Education and training; and (5) Private sector development (GCIS 2000). The idea behind the programme was not to push applications to full implementation. Rather, by way of pioneering pilot projects, the programme wanted to showcase the possibilities of ICTs. The private sector or government departments could take these initiatives further once their feasibility and applicability had been proven. Around the time of the presidential elections of June 1999, it became clear that South Africa had serious problems with the implementation of its policy (GCIS 2000). This was true for all sectors relating to ICTs, but particularly for the telecommunications sector. The document adds that by 1999, the telecommunications sector faced a general crisis.

Although the national operator, Telkom, was proceeding with its roll out, the increasing churn encountered, that is the number of lines disconnected in comparison with the number of new lines connected, indicated that the boundaries of the market had almost been reached (GCIS 2000). The latter document notes that the USA had serious problems in implementing telecentres. The regulator did not succeed in developing a proactive policy geared at the development of the telecommunications sector or more generally directed at universal service in support of social development (GCIS 2000). On the contrary, almost all regulations and decisions made by the regulator were challenged in court, which had a negative effect on the market's investment climate (GCIS 2000). The tendering process for a new third license for mobile telecommunications ran totally into the ground. Ambitious programmes, such as info.com 2025, which were to be the driving force of the IS policy, were only partially implemented. The reasons for the problems of implementation are multi-dimensional and difficult to pinpoint. What is certain is that the euphoria of the transformation period was replaced with doubt by the end of

1999. It led to a questioning of existing policies and implementation structures by mid-2000 (Audenhove 2003, 140),

The last period, i.e. the evaluation period, has run from mid-2000 until the present. This period has seen policy frameworks and implementation evaluated and reviewed, and new policy processes instituted. The merger of the regulators for telecommunications (SATRA) and broadcasting (IBA) was the first move to strengthen sound regulation. More recently, the Department of Communications has introduced new policy formulation processes around convergence and e-commerce. It is redefining the role of the USA and is preparing a new policy in light of the introduction of competition in basic telecommunication. More recently in 2002, a new body was set up under the presidency, the Presidential National Commission on the Information Society and Development, bringing together all stakeholders to set out how ICTs can be harnessed for sustainable development.

3.4.8 From universal service to universal access

According to Van Audenhove (2003, 140), since the publication of the RDP base document in 1994, universal service has been central in the discussions of telecommunications and ICT policy. He further observes that although the RDP document was not very clear when it came to the goals of the future of telecommunications and ICT policy, the document conceptualized universal service in terms of individual access to basic telephony. In other words, each household in South Africa was to have its own telephone. This conceptualization of universal service also formed the basis of the discussions during the National Telecommunications Policy Project concerning the restructuring of the telecommunications sector. This was further clarified in the interpretation of universal access in the White Paper on Telecommunications (Van Audenhove 2003, 140).

Universal access, that is access to basic telephony by way of a public telephone or a telephone at community level, was seen as an intermediate step on the way to genuine universal service (MPTB, 1994). The same interpretation formed the basis of the legislative framework as stipulated in the Telecommunications Act of 1996 and Telkom's license of May 1997 (RSA 1996 1997). This legislative framework, and more specifically the license, stipulates the goals for the

extension of the fixed network. Broadly speaking, a dual strategy was aimed at furthering universal access through the installation of a considerable number of public payphones and through the provision of telephones to public institutions such as schools, hospitals and local government departments. In addition, all villages with between 500 and 1 000 inhabitants were to be connected to the network (Van Audenhove 2003, 140). Esselaar and Gillwald (2007) and Gillwald and Stork (2006) argue that universal service is probably an area of the greatest disappointment on the African continent. They add that despite political rhetoric on universal access and the hundreds of thousands of donor dollars spent, there are few African success stories. While most countries have developed universal access strategies, very often involving a levy on players for the creation of a universal access fund, plans lie unimplemented for years, and many countries are sitting on large unspent funds (Esselaar and Gillwald 2007).

3.4.9 Towards increasing complexity

As already indicated, South Africa has never formulated a formal integrated ICT policy. It's ICT policy has grown out of initiatives from different departments that have added components to a broader framework. In this process, one can observe a growing extension and complexity in the content of the discussions, number of initiatives, number of actors and stakeholders involved, interrelations of processes, and the societal level the policy targets. It is striking that, maybe with the exception of the issue of science and technology, all policy initiatives have been geared toward the establishment of sectoral policies. Strictly speaking, the policy processes with an ICT or IS-related component fell under the responsibility of four departments or authorities: The Department of Communications (DoC), the Department of Arts, Culture, Science and Technology (DACST), the Department of Education (DoE), and the Presidency. During the implementation period, a broadening of the policy process was taking place; new departments were entering the field of ICT and IS policy with important new policy initiatives. The Department of Trade and Industry brought its South African IT Industry Strategy (SAITIS) to a close towards 2001. The Department of Public Service and Administration was involved in the IT for government initiative that was mainly driven by actors outside of government. Departments that were already involved in ICTs drove new initiatives, such as the info.com 2025 programme by the foresight exercise of the DACST and, towards the end of 1999, the e-

commerce debate by the DoC. Apart from the existing institutions, a fair number of new institutions were created with specific responsibilities in terms of implementation or regulation. The most important institutions set up were the South African Telecommunications Regulatory Authority in February 1997 (later changed to ICASA), the USA in March 1997, the Government Communication and Information System in 1998 and the State Information Technology Agency in January 1999 (Esselaar and Gillwald 2007; Gillwald and Stork 2006).

It is remarkable for the implementation period that policy initiatives were becoming more cross-sectoral, falling under the responsibility of multiple departments or (were) at least dependent on multiple departments for their implementation. The info.com 2025 programme, conceptualized by the DoC, set out an IS strategy that covered a wide range of fields, including infrastructure, content, industry, commerce, and education. From the start, it was obvious that the implementation of the programme would depend on the collaboration of several other departments and institutions. The same can be said for the e-commerce debate, also driven by the DoC. The IT for government process did not have any impact on IS policy, but it is obvious that an IT policy for government would have an impact on the working of all departments (Esselaar and Gillwald 2007). The foresight exercise brought certain issues connected to an IS policy to the fore, setting out developmental paths South Africa could follow in the future that would have a major impact on economic, industrial and science and technology policies.

To succeed, it will have to be carried out by many different departments coordinating their efforts towards a single goal. However, the lack of policy integration and the degree of intertwining processes was made abundantly clear when policy and programmes were implemented - major programmes and policy initiatives ran into problems of implementation and coordination (Esselaar and Gillwald 2007). Although more recent policy processes such as SAITIS, Foresight and the e-commerce debate have tried to involve other departments in the conceptualizing stages of the policy process, implementation remains fragmented and coordination difficult. Outside the departments that pioneered the processes, other departments seem rather reluctant to buy into the process. Furthermore, although certain initiatives such as info.com, Foresight or SAITIS could function as a broader framework for IS policy, there remains a lack of one unified and central policy vision guiding initiatives in different fields.

3.5 BACKGROUND ON THE SA TELECOMS & ICT POLICY & THE HISTORY OF UNIVERSAL SERVICE POLICY

The background on this policy is described historically in four stages or phases. In the late-1980s and early-1990s, an interplay of forces led to the liberalisation of the telecom industry. During stage one (late- 1980s to1993 and pre-democracy period), the old South African Posts and Telecoms (SAPT) provided postal and telecom services (Petrazzini 1995). Petrazzini adds that the SAPT law was abolished in 1991. Furthermore, in September 1993, competition was introduced into the monopolized telecom market with the licensing of two cellular operators, Vodacom and Mobile Telephone Networks (MTN). Two regulators were established before the 1994 democratic elections, one for telecommunications (the former South African Telecoms Regulatory Authority or SATRA) and the other for broadcasting (the former Independent Broadcasting Authority or IBA). Stage one's policy developments were pushed by global changes in telecom regulation, which had an impact on local policy. Domestic forces also influenced local telecom policy formulation, e.g. political changes and demand from political parties that the telecom sector be restructured (Petrazzini 1995).

Petrazzini further observes that stage two (1994 to 1996) was characterised by democratic and consultative processes (consultation by government with stakeholders including business, civil society, academia and labour unions). This led to the Telecommunications Act of 1996. Stage three (1997 to 2000) involved more liberalization of the sector, privatisation of a 30 percent stake in the public parastatal Telkom, and changes in telecom policy to accommodate convergence and develop an ICASA Act (which merged IBA and SATRA). Liberalization refers to the introduction of competition into the market. Petrazzini (1995) states that liberalization is the lowering of entry barriers to all or part of a market, allowing third parties to compete with established – generally monopoly – providers of goods and services. Foreign influences included globalisation, global changes in telecom regulation (e.g. the World Bank's promotion of the privatization of state-owned telecom enterprises or SOTEs which influenced South Africa's management of public-owned enterprises), and South Africa joining the World Trade Organisation (WTO) in 1995. Privatisation refers to the selling off of whole or parts of a state's (public) assets to private bodies or companies (Petrazzini 1995).

Since the early 1980s, telecommunications developments worldwide have been dominated by two main processes: privatization and liberalisation or deregulation. Among the reasons for these developments are the changes or advances in telecommunications technology, and the growth in the public demand for telecommunications services. Another factor that has promoted these developments (i.e. privatisation and deregulation) is the completion of the multilateral trade negotiations on telecommunications equipment and enhanced services at the end of the Uruguay round of the General Agreement on Tariffs and Trade (GATT) in 1995, which represented a major step towards market liberalization (Petrazzini 1995). This agreement was, in turn, followed in February 1997 by further market liberalization measures for basic telecommunications services by the World Trade Organization's (WTO) General Agreement on Trade and Services (GATS) [Petrazzini 1995]. The liberalisation of the telecommunications market is usually accompanied or followed by the full or partial privatization of national telecommunications operators.

It was during the 1980s and 1990s that the concept of universal service and the initiatives towards building a universal telecommunications network took form as government initiatives and a desirable policy goal. Two important studies were conducted during the 1980s that provide evidence of the impact of the ICT infrastructure gap between developed and developing countries (Emiliani 2008:3). The first study is the report of the United Nations International Commission for the Study of Communications Problems, headed by Nobel Prize winner Sean McBride, entitled "Many voices, one World – Communications and Society, Today and Tomorrow". The report presented the commission's position on the imbalances in information flow and the marked inequalities in the distribution of communication resources (Emiliani 2008, 3).

The McBride Commission is widely written about in communications literature. Its main recommendation is that media imbalances between developed and developing countries should be bridged. The report specifically recommended that developing countries should start to strive more actively towards increasing the availability of telecommunications services in rural areas, with specific funds and projects and at universally accessible prices. As a result of the recommendations of the report, the United Nations Educational Scientific and Cultural

Organisation (UNESCO) created the International Programme for the Development of Communication (IPDC). The motivations that led to the formation of the commission are still present and are in some ways the same behind the WSIS programme (Emiliani 2008, 3).

The second study on ICT access issues was commissioned by the International Telecommunication Union (ITU) with the purpose of studying its role and that of other international cooperation and funding countries and organisations. The task was entrusted to the Independent Commission for Worldwide Telecommunications Development under the direction of Sir Donald Maitland. In its final report, entitled "The Missing Link" and also known as the Maitland Report, the commission provided an analysis of the state of the telecommunications infrastructure in the world based on information such as teledensity, GDP, loans per economic sector (agricultural, communications, transportation, power, etc.) and analysed the situation from several points of view: technology, training, the financing of telecommunications initiatives, the impact of telecommunications on the economy, and the mechanism and benefits of international collaboration (Emilian 2008, 4). The analysis of the telecommunications and economic indicators available at the time (around 1984) showed that 96 percent of the telephones around the world were located in high income countries. This uneven distribution was attributed to various factors, such as the fact that the immediate needs of the developing countries – agriculture, roads, hospital networks, etc. – limited the allocation of resources to the deployment of telecommunications infrastructure, even when the importance of a high quality and long range telecommunications networks is recognised by these countries. In essence, telecommunications initiatives were perceived as luxury projects (Emilian 2008, 4). In particular, the Maitland Report presents a partial cause of the under-investment in telecommunications considering the fact that conventional analysis fails to consider telecommunication externalities (Parkinson 2005, 37-38; Emilian 2008, 4). Another aspect was the final cost of equipment: when acquiring equipment from foreign providers, the cost of the project was increased due to risk and tax factors, to the point of making it excessive. Universal service is an evolving concept and changes over the years as countries have changing needs and technologies also change. The ITU provided a framework enclosing five stages in the development of universal service. These are summarised in Table 3.1 below. Countries go through these stages if universal service is to be achieved,

although some countries may use new media such as mobile phones to leapfrog some stages listed in the table.

Table 3.1: Stages of universal service

	STAGE 1: Network Establishment	**STAGE 2: Wide geographic reach**	**STAGE 3: Mass market take-up**	**STAGE 4: Network completion**	**STAGE 5: Service to individuals**
Universal service goal Type	Technological (acquire new technology)	Geographic (maintain regional parity)	Economic (stimulate economy)	Social (achieve national cohesion)	Libertarian (individual right to communicate)
Examples of universal service goals	Long distance service linking all major centres, public telephones where demand warrants.	Telephone service available in all population centres, widespread adoption of telephony in business.	Widespread residential take up of telephony; meet all reasonable demands for telecommunications	Telephone affordable to all; telephone services adaptable to special needs (e.g., disabled)	Everyone can meet basic communication needs, public access to advanced services.
Typical universal service policy measures	Licence conditions on network roll-out.	Profitable licences subject to unprofitable obligations.	Control speed of price rebalancing.	Targeted subsidies	Identify and meet non-market demand.

Adapted from Milne (1998)

Countries define universal service and universal access differently based on their socio-economic needs and demands. Two main reasons for divergence over the definition of universal service have been identified (Parkinson 2005, 37-38; Emiliani 2008, 7). First, the specification of the basic set of telecommunications services, i.e. which services are going to be subject to the goals of universality, and second, the feasibility of ensuring universality, i.e. the decision between

universal service and universal access with respect to the basic service set of specification. The changed meaning of universal service and technologies included in universal service definitions in different countries - based on the classification of services included in the specification of universal service from a sample of 91 countries in the ITU database (Emiliani 2008, 7) - indicated that most countries defined universal service in terms of Internet-related and mobile phone based services more than they relate to landline telephones. The service most commonly included is the telephone (public and residential) followed by emergency and directory services. It is also interesting to observe how basic access to the Internet is becoming more common, appearing 45 times (50 percent of the countries), and mostly in developing countries.

Stage four (of the telecommunications and ICT policy formulation processes in South Africa: 2001 - 2006) involved more changes to the South African Telecommunications Act No 103 of 1996 that aimed to further liberalise the sector. This included an introduction of two more cellular operators and the second national operator or Neotel, and the issuing of under-serviced area licenses (USALs) to small companies to provide telecommunications services in previously disadvantaged and rural areas.

3.5.1 Universal Access Policy/ Universal Service Agency (USA)

Dymond and Oestmann (n.d) state that universal access (UA) is a policy designed to provide convenient and affordable communications access on a community basis through public access facilities such as payphones and telecentres. Often in many countries public payphones, PCOs and phoneshops already exist in urban centres, thus a UA strategy often focuses on rural areas and on peripheral or un-served urban areas. This is mostly the policy objective in OECD countries, although some developing countries refer to their UA strategy also as a US policy. In reality, it is more practical for developing countries to think in terms of UA – i.e. the achievement of public access at the community or neighbourhood level - in the near-to-medium term, while viewing US as a long-term objective. UA may be defined as placing one or more publicly accessible telephones in every population centre above a certain population size, or placing public phones in such a way as to ensure that anyone, no matter where they live, need not walk more than a certain distance (e.g. 5 km) to reach a phone. A UA policy may also include targets such as the following:

- To connect all local government, social infrastructure (e.g. health clinics), schools, institutions and businesses to private line service, whether by wire or wireless means;
- To establish Internet points-of-presence and at least one public Internet access vehicle in all administrative centres down to a certain level (e.g. district headquarter towns); and
- To connect every school above a certain grade level or size (e.g. all secondary schools) to the Internet.

The South Africa Yearbook (2005/6, 138) states that the USA was launched in 1997 and is a statutory body whose objectives include advising the minister on ways to bring about universal access and service, coordinating initiatives by service providers such as Telkom, Vodacom, Mobile Telephone Network (MTN) and Cell C . The USA also works with community based organisations (CBOs), non-governmental organizations (NGOs), donor organizations and businesses. The report further states that the Universal Service Fund is used to reinforce the development of infrastructure in underserviced communities. According to Parkinson (2005, 37-38), the key policies guiding universal access are the Telecommunications White Paper of 1996, the Telecommunications Act of 1996, and the Telecommunications Act Amendment of 2001. The author explains that the 1996 Act set up the regulatory body for telecommunications (South African Telecommunications Regulatory Authority - SATRA), which in 2000 merged with the broadcasting regulator (Independent Broadcasting Authority - IBA) to form the Independent Communications Authority of South Africa (ICASA).

The two tables below provide summaries of South Africa's national goals with respect to universal access and national ICT policy.

Table 3.2: Summary of South African national policy goals related to universal access (Source: Parkinson 2005, 35)

Goal	*Evidence/where stated (not exhaustive)*	*Implementation mechanisms*
Universal access to telecom (and broadcasting) service, redressing historic inequities	Telecommunications Act 1996, revised Act 2001, mandate of Parliamentary Portfolio Committee on Communications	Regulatory authority (ICASA), licensing agreements, Universal Service Agency, Universal Service Fund
Delivery of government services including social services (e-health, e-education, etc.)	E.g. Department of Education White Paper on E-education (2003), research commissioned by PNC ISAD	Various government departments, GCIS, PNC ISAD, Universal Service Agency under 2001 mandate
Improvement of communication between government and citizens	RDP 1994	Various //government departments co-ordinated by GCIS (own services)
Democratization, diversification of media and expression	RDP 1994, MDDA Act 2002	DoC, MDDA, Department of Arts and Culture
Supporting local development through information provision	Mandates of DoC, Universal Service Agency	DoC, GCIS, Universal Service Agency, various government departments
Supporting SMMEs and job development	ICT Economic Empowerment Charter (2004 in progress)	Department of Trade and Industry, ISETT SETA, Universal Service Agency under 2001 mandate
Creating a South African information society	Presidential speeches, e.g. 2001 State of the Nation address, Telecommunications White Paper	Various: DoC, Universal Service Agency, Department of Arts and Culture, presidential

	1996	task forces

Table 3.3: Policy initiatives and actors

Source: Van Audenhove (2003, 135).Towards an integrated information society policy in South Africa

Policy documents or initiatives	**Description of the programme or part of the programme**	**Responsible department or institution**
DEVELOPMENTAL STRATEGY (Economy, industry, technology and innovation)		
White Paper on Science and Technology (November 1996)	Science and technology policy geared at innovation and growth	Arts, Culture, Science and Technology
Foresight (June 1999)	Prospective study directed at a long-term economic and industrial growth strategy	Arts, Culture, Science and Technology
South African Information Technology Industry (IT) Strategy (2000)	Industrial strategy for the IT sector	Trade and Industry
Growth, Employment and Reconstruction (June 1996)	Neo-liberal policy framework for economic development	Presidential Office and Department of Economy

e-commerce	Overall policy to stimulate and regulate electronic commerce	Communications
INFRASTRUCTURE (networks and infrastructure)		
Telecommunications Act (November 1996)	Establishes a new policy framework for telecommunications	Communications
Telkom	Under the new framework. Responsible for network extension and universal service	Communications (as major shareholder)
Satra	Responsible for regulating the telecommunications sector	Communications
USA	Responsible for the promotion of universal service and access. De facto responsible for the implementation of telecentres	Communications
GCIS	Responsible for the implementation of MPCC's and the coordination of telecentre initiatives	President
Technology-enhanced Learning Strategy (May 1997)	Strategy to translate the earlier TELI in concrete initiatives and projects	Education

Centre for Educational Technology and Distance Education (1997)	Centre responsible for policy preparation with respect to distance education and technology in education	Education
Schoolnet SA (November 1997)	Infrastructure in the educational sector	Education, communication, Trade and Industry
State Information Technology Agency	New structure responsible for IT in government. Should lead to a better integration of systems and networks	Public Service and Administration
Technology-enhanced Learning Strategy (May 1997)	Strategy to translate the earlier TELI in concrete initiatives and projects	Education
GCIS	Responsible for government communication and development communication	President
White Paper on Broadcasting Policy (May 1998)	New policy framework for the audiovisual	Communications
Broadcasting Act (April 1999)	Legislation reforming the audiovisual Sector	Communications

Schoolnet SA (November 1997)	ICT applications for the educational sector	Education, Communications, Trade and Industry
SKILLS		
Educational Policy in general	In as far as it provides people with the right skills to function in the information society	Education
National Qualifications Framework (from 1996)	Qualifications and certification system for the education system	South African Qualifications Authority
INSTITUTIONAL CAPACITY		
White Paper on Public Service (November 1995)	Reforms the old apartheid structures in one public service with one public administration	Public Service and Administration
Educational & vocational policy in general	In as far as it provide people with broad skills to function in society and in modern institutions and organizations	Education, Labour
Employment Equity Act (October 1998)	Sets out the policy framework to support disadvantaged groups in employment	Labour

In spite of all these efforts at ICT policy formulation, Parkinson (2005, 34) observes that the main problem with the act is that it has overlaps and does not clearly establish the roles and responsibilities of the agency and the regulator. Van Audenhove (2003, 6) goes further to say that South Africa still lacks a "formal vision of the information society in the form of an integrated policy or policy document", as different departments drive policy processes.

3.6 NATIONAL BROADBAND POLICY FOR SOUTH AFRICA

Gen (Ret) Siphiwe Nyanda, the Minister of the Department of Communications, in terms of Section 3(1) of the Electronic Communications Act No. 36 of 2005, published the National Broadband Policy (Department of Communication 2010). The vision of this policy is to ensure universal access to broadband by 2019 by ensuring that South Africans are able to access broadband either individually or as a household, are subscribed to a broadband service, or are able to access broadband directly or indirectly at a private or public access point. The objective of this policy is to facilitate the provision of affordable, accessible, universal access to broadband infrastructure to citizens, businesses, communities and all three spheres of government, and to stimulate the utilization of broadband services in order to promote economic development and growth and act as an enabler for further social benefits.

In 2007, South Africa's government approved the building of an information society (South African Government Gazette No. 32578 Draft 2009, 7). This decision was based on the outcome of the UN World Summit on the Information Society (WSIS). The WSIS resolved that ICT infrastructure is the foundation for the development of the information society (IS). The development of a broadband policy is in line with world trends and is critical for South Africa to ensure that the goal of an all inclusive information society that can enjoy the benefits associated with broadband (high-speed Internet) is realized in both urban and rural areas. However, broadband is not widely available in South Africa or as established as some believe, nor are fixed-line telephones. Mobile phones are widely available and help bridge the digital divide, but usage prices are still high, resulting in more people receiving rather than making calls. The onus is on the government and the regulator, ICASA, to negotiate and regulate cheaper prices. ICT

access, usage and skills training as well as affordability are challenges that the South African government still has to tackle to ensure that the national ICT policy achieves its objectives. In fact, the government finalized issues and processes of broadband policy by 2010, but the implementation of this policy will take years since many South Africans are without broadband services (South African Government Gazette No. 32578 Draft 2009, 7).

Broadband platforms promote the convergence of voice, data and audio visual services into a single network. Broadband infrastructure is central in achieving the goal of digital inclusion, enabling universal, sustainable, ubiquitous and affordable access to ICT for all, and providing sustainable connectivity and access to remote and marginalized areas at national, provincial and municipal levels. The Organisation for Economic Cooperation and Development (OECD) states, in their December 2008 broadband statistics report, that the average penetration rate in OECD member states for broadband is 22.4%. The International Telecommunication Union (ITU) confirms that in 2008, South Africa had a broadband penetration rate of 2 % and just over a million broadband connections. From these statistics, it is apparent that broadband penetration in South Africa is very low. This situation can be ascribed to the unavailability of electronic communication infrastructure and the high cost of broadband services, stifling the growth of the information society. The lack of affordable universal access to broadband services slows economic growth and inhibits social benefits such as better education and health services. It is acknowledged that both private and public sectors have played a significant role in the current provision of broadband infrastructure (South African Government Gazette No. 32578 Draft 2009, 7). Disadvantages associated with the lack of access to affordable broadband services include the following:

I. Reduced access to e-literacy in the educational system

II. Lack of access to quality health services

III. Lower efficiency in government processes

IV. South Africa becomes a less competitive destination for investment

V. Higher cost to communicate

VI. An increased in the digital divide, thus further disadvantaging rural and marginalized communities

VII. Reduced access to employment opportunities and job creation

The funding of broadband services in the South African context is fragmented and uncoordinated. At national level, all national departments have budgets that are allocated to ICT roll-out. However these budgets are not spent appropriately and in a coordinated fashion. Further provincial and local government competencies are not duty bound to coordinate ICT programmes and policies for national benefit and homogeneity. This policy therefore proposes to create a united, integrated, homogeneous and coordinated government approach to the roll-out of broadband in South Africa, thus ensuring both optimal utilization and the coordinated roll-out of infrastructure. The policy focuses on increasing accessibility, availability, affordability, and the utilization of broadband services throughout South Africa. Broadband services ("always available, high speed multimedia capable network services") have been identified globally as a powerful transformative force (South African Government Gazette No. 32578 Draft 2009, 7). Affordable access to these networks has become a key priority for governments internationally. Broadband empowers individuals, communities and businesses by providing access to the "information superhighway" which provides access to local and international electronic content. Broadband provides businesses with an extremely powerful tool that can increase work productivity and creativity and marketability through the use of communication services. This policy acknowledges the achievement of the public and private sector in establishing broadband infrastructure as it exists today. However, this infrastructure is mainly confined to urban areas and is limited in affordability and accessibility. The policy also acknowledges that broadband and ICT initiatives are already underway.

The policy aims to:

I. Define broadband for South Africa

II. Articulate the government's commitment to providing appropriate support for digital inclusion, thus building the information society

III. Clarify the roles of the government, state-owned enterprises (SOEs) and the private sector in developing world-class broadband infrastructure in the country

3.6.1 Broadband

While broadband is a widely used term, the precise speed at which a network connection is deemed to be a broadband service varies greatly both locally and internationally. Even within the ITU, the different sectors, in alignment with their functions, have different definitions of broadband. The standardization sector defines broadband as a speed of 1.5 to 2 Mbps, while the development sector defines broadband to be 256 kbps. Comparative research demonstrates that the definition of broadband in different countries varies between 128 kbps and 10 Mbps. South Africa follows the guidelines from the ITU development sector, where broadband is interpreted as an always available, multimedia capable connection with a download speed of at least 256 kbps (The Universal Service and Access Agency of South Africa 2010).

3.6.2 Increasing affordability

In the South African market, the provision of broadband services in certain areas is prohibitively costly. It is clearly indicated in the Broadband Policy that the government intends to intervene to expand networks into these marginal areas, as completed under Chapter 14 of the Electronic Communication Act 36 of 2005. Various options for the construction, operation, and maintenance of networks under the serviced areas will be developed by the Universal Service and Access Agency for South Africa (USSASA) and implemented in cooperation with other stakeholders in their locations. This will ensure that access to broadband services becomes

affordable and available for citizens, businesses, civil society and government (The Universal Service and Access Agency of South Africa 2010).

3.6.3 Increasing uptake and usage

The development of content to increase the uptake and utilization of broadband is especially important in the areas of education, health and e-government. ICTs have to be incorporated as a developmental tool in order to effectively increase their uptake and use, especially at household level. To achieve a knowledge-based economy, households and businesses should continuously be exposed to the use and benefits of ICTs, and particularly broadband services. To increase uptake and utilization, the government needs to develop its own local content across all South African languages to ensure that government services are available to citizens electronically. This content will be used by citizens to access and interact with the government and will further stimulate the demand for broadband services. Digital literacy is critical for the uptake and use of broadband services, there are other government's initiatives that focus on improving digital literacy (The Universal Service and Access Agency of South Africa 2010).

3.6.4 Benefits of broadband

Broadband is recognized as a strategic tool in the building of an information economy and society. Extensive international studies have been performed on the benefits of investing in broadband infrastructure. Broadband has demonstrated the ability to deliver substantial economic growth, increased employment, and vast societal benefits. The potential benefits would positively contribute to the improvement of the lives of many South Africans by, for example improving communication, access to services, employment and business opportunities. The benefits of investment in broadband infrastructure in South Africa will not be limited by our national borders but will extend to Southern African Development Community (SADC) region as a contributor to the regional strategy in relation to ICTs (The Universal Service and Access Agency of South Africa 2010).

3.6.5 Improved quality of government services

Universal access to broadband services can greatly enhance the government's ability to communicate with its citizens. Government services need to be updated to incorporate services that citizens could access online and use not only for information purposes, but also for transactional purposes. This would reduce the cost of governance and would enhance service delivery as turnaround times would improve significantly (Department of Communication 2010).

3.6.6 Usage

Awareness of the benefits of broadband services and confidence in security is essential to the uptake and utilization of broadband.

3.6.7 Uptake and utilization

South African government should seek to take the lead in increasing the uptake and utilization of broadband and promotion thereof in both urban and rural areas. Government needs to adopt ICTs in its everyday business practices and also develop interactive online capabilities. This would enable citizens to transact with the government electronically and thus enhance service delivery. The government also needs to promote awareness of ICTs and their benefits as well as ensure departments are connected to ensure communication between them. Relevant content development needs to be promoted in order to support and stimulate uptake and utilization for both current and new broadband users.

3.6.8 Drive economic development and GDP growth in the following ways:

- Stimulate the growth of ICT SMEs and cooperatives
- Increase employment in the ICT sector
- Reduce the cost to communicate
- Improve the marketability of regions and encourage local and foreign investment in the telecommunications and ICT sectors

3.6.9 Improve the socio-economic development of South Africa by improving the quality of:

- Education and educational facilities and technologies
- Health, e-health and other medical services, and government as well as e-government services, making all these services accessible and affordable to most people (South African Government Gazette No 32579 of 2009, 11**)**

The real challenge for governments is making sure that these goals are achieved and not just indicated on public documents. In their study, Comninos *et al*. (2010, 09) observe that in September 2009, the Department of Communication issued a draft broadband policy for comment, with the purpose of increasing accessibility and affordability throughout South Africa. While the need for a broadband policy is acute, the policy itself fails to address the existing constraints on sector development more generally, and specifically the institutional arrangements and the market structure. Without the correction of the structural constraints on the sector, the objectives of the broadband policy are unlikely to be met (Comninos *et al*. 2010, 09).

Comninos *et al*. further observe that the draft broadband paper lacks vision. Also they note that the policy is not integrated into national economic growth and development strategies. Unlike the US broadband policy which underpins the economic strategy of the country - no reference is made to it's role as a lever for economic recovery, economic stimulation and job creation, nor recognition of the linkages between broadband penetration and increases in GDP. These authors argue that perhaps more important is the absence of a demand stimulus strategy – whether by stimulating personal computer ownership, education computer literacy strategies, or

the co-ordination across Government in sectors from health to education as well as public services.

3.7 CYBERSECURITY POLICY OF SOUTH AFRICA

The Cybersecurity Policy is an ICT policy that South Africa's government has put in place as a way of curbing cyber crime in the country. Cyber crime is a serious issue in many countries, especially in those that have a strong Internet access. Although South Africa is still considered to be a developing country, it is slowly but surely graduating into an information society with its sound ICT infrastructure. In fact, one can expect to see South Africa eventually rated amongst the best countries in the world. Wherever there is the Internet, cyber crime will always be a serious concern. Many Internet users have lost their money via Internet transactions. The South African government has put relevant processes in place in order to address the issue of cyber security in the country. These include a Computer Security Incident Response Team (CSIRT) and a draft policy on cyber security, tabled on the 19th of February 2010 by the Communications Minister, Siphiwe Nyanda. The aim of the policy is to create an environment that would ensure confidence and trust in the secure use of information and communication technology (Polity 2010). This policy clearly spells out that there is a need for a vigilant and proactive approach to information security through the continuous mapping, assessment and prediction of potential threats and vulnerability. South African cyberspace will be secured through the following:

- The development of proactive measures for preventing and combating cyber crime;
- The development of technical, regulatory and legal measures for the reduction of cybersecurity threshes and vulnerabilities; and
- The identification and protection of critical information infrastructure (CII).

There are many benefits to be reaped from the Cybersecurity Policy. This policy presents the country with a unique opportunity to ensure that South Africa builds confidence and trust with respect to the use of ICTs. The implementation of the policy leading to a secure cyberspace is intended to achieve the following benefits:

- Confidence and security in the use of ICTs by government, businesses, society and the individual;
- Higher rates of investment;
- Safe and secure cyberspace;
- Economy growth and competitiveness of South Africa;
- Identification and protection of critical information infrastructure; and

This policy is guided by the unique challenges that the country faces. In addressing these challenges, the policy seeks to make South Africa a global leader in harnessing ICTs for socioeconomic development. The policy will help the government meet its commitments/ obligations to the people of South Africa as well as the global community, particularly the developing world. It is the government's intention to continue an open and inclusive partnership, carrying along all stakeholders in an effort to build confidence and trust in the secure use of ICTs. This policy promises good things for South Africans and one should applaud the government for putting it together. The policy can be accessed using the following link: http://www.doc.gov.za/images/stories/1-32963%2019-2%20comm.pdf (Department of Communication 2010).

3.8 THE ELECTRONIC COMMUNICATIONS AND TRANSACTIONS BILL

South African Parliament enacted the Electronic Communications and Transactions (ECT) Bill in June 2002. Chapter II of the bill states that within 24 months of the legislation being adopted, the Minister of Communications, in consultation with the members of cabinet, must have developed a five-year national e-strategy for South Africa. This far-sighted and comprehensive piece of legislation has the potential to deliver not only a national strategy, but also act as a catalyst that can draw together the various efforts currently under way. The e-strategy must include detailed plans and programmes that would address the development of a national e-transactions strategy; the promotion of universal access, e-readiness, human resource development and small, medium and micro enterprise (SMME) development; empower

disadvantaged persons and communities; and contain definable objectives and timeframes (DoC 2010).

3.9 IMPLICATIONS ON THE CURRENT STUDY

The use of ICTs by civil servants can improve work productivity and creativity in the public sector. However, if there is no ICT policy that guides the civil servants in their use of ICTs in the sector, there will be little or no work productivity and creativity in the public sector. The development of an ICT policy would address the issue of computer skills in the public sector and also in South Africa as a whole. This would then improve the use of ICTs by civil servants, a goal the government is striving to achieve. The use of ICTs can help the government streamline services to its citizens and improve its overall functioning. Some of the factors used to measure this include the volume of transactions that businesses have with governments and the presence of government services online.

Human resources and skills are central to the ability of any country to develop in the globalised, competitive new century. Maximizing the benefits of the information society requires information literacy at all levels of society. This is one of the roles of an ICT policy - to address the issue of computer illiteracy in the country. The key mechanisms for growth in this knowledge and skills base include access, training and relevant content. Without an ICT policy to address the aforementioned issues, there may be more computer illiterate civil servants. If there is an ICT policy, it will guide and compel government to make sure that all civil servants are equipped with necessary skills to effectively use ICTs. Thus, it is useful to have a policy framework that can serve as a support and reinforcement for civil servants and for all South Africans. UNECA has also created an Information Policy Development and Implementation Unit that assists member states in the development of sectoral, national, village, and regional policies, plans and strategies related to ICTs (Etta and Parvyn-Wamahiu 2003). An Information and Technology Centre for Africa (ITCA) demonstrates to African policy makers and planners the value of ICT for development. Many countries are in the process of developing policies to improve their positions in the information society. Guided by the AISI vision, most African countries have

started on their "national information and communication infrastructure" (NICI) and by 2003, 17 had completed their strategies. High on their list of priorities has been the improvement of access to ICTs. In 2003, these countries included: Benin, Burkina Faso, Cape Verde, Cote d'Ivoire, Egypt, Gambia, Mauritania, Mauritius, Morocco, Mozambique, Rwanda, Senegal, Seychelles, South Africa, Sudan and Tunisia (Etta and Parvyn-Wamahiu 2003).

It is clear that ICTs offer the country numerous prospects for development and full participation in the global economy. Given the speed with which ICTs are developing and the breadth of their socio-economic impact, it is imperative that all civil servants are not excluded from the technology revolution. The use of ICT has been integrated into virtually every aspect of commerce, education, governance and civic activity in developed countries and has become a critical factor in creating wealth worldwide. The government has provided civil servants with a variety of ICT tools and services that are good for service delivery and work productivity and creativity in the sector. Having said this, government should do more to support the diffusion of these technologies. It is not enough to only introduce technology; it has to be supported by relevant policies. However, policies to foster the uptake of ICTs are no longer sufficient. Policy action is needed to help civil servants make more effective use of ICTs and to address the barriers affecting demand. Moreover, policies specific to ICT diffusion and use will not, on their own, lead to stronger performance - they should be part of a comprehensive set of actions to create the right conditions for growth and innovation. ICTs are therefore technologies that have the potential to enhance business performance if they are made to work effectively. Policies that foster productive investment and enable government to make the changes needed to seize the benefits of ICTs are likely to be the most beneficial. For this to happen, governments will need to shape a regulatory framework that strengthens security and trust in the use of ICT and also introduce an integrated ICT policy which should also help foster the effective use of ICTs in the sector, which will then filter throughout the country.

The development of an ICT policy as set out in the ECT Bill will act as a catalyst to encourage even greater use of ICTs in more meaningful and relevant ways. This is especially important if civil servants are to understand how ICTs can improve work productivity and creativity in the sector, and as a result support the government in its efforts to introduce policies

and legislation that facilitate such developments. Due to the diverse range of initiatives under way both inside and outside government, there is a pressing need for all of these efforts to be coordinated if the proposed e-strategy is to bear the results that the government intends. But it is not apparent whether there is an adequate level of co-ordination in these efforts.

3.10 SUMMARY

The government's vision of the information society is based on the premise that ICTs can help improve work productivity and creativity in the sector. This chapter has looked at the status, developments, challenges and opportunities of information and ICT policies in South Africa.

The next chapter (4) looks at the uses of ICTs in organizations

CHAPTER FOUR

THE USES OF ICTS IN ORGANIZATIONS

4.1 INTRODUCTION

This chapter reviews literature from journals, conference papers, research publications, official government publications and books on various uses of Information and Communication Technologies in organizations. The chapter attempts to realize the following objectives:

a) To identify different types of ICT tools and services (e.g. the Internet, e-mail, databases, etc.)

b) To determine how social informatics can add value to government departments

c) To explore the impact of ICTs on organizations

d) To establish the uses and values of ICTs within the context of organizations

The chapter therefore answers the following research questions:

a) What are the different types of ICT tools and services that can be used in an organization?

b) How can ICTs add value to the public sector?

c) What are the concomitant effects of introducing ICTs to an organization?

d) How can ICT tools and services be used within the context of organizations?

4.2 BACKGROUND INFORMATION

Globally, ICTs have been transforming the landscape in the public sector and progress is being made daily in making more information available to the citizenry. According to Kling (2001), Johnston (2001); Kaisara and Pather (2009, 4), ICTs have shrunk the traditional barriers of time and space while increasing the rate of growth of the amount of knowledge; information can be

transmitted faster, in bigger bulk and easier than ever before, making human endeavours, in all spheres of life, appear limitless.

With respect to organizations, ICTs have become an important ingredient in organizational competitiveness because ICT resources get increasingly linked to the overall organizational strategy, such as ICT-related decision-making in corporations. In the current information-driven economy, ICTs are considered to be power tools in the information/ knowledge industry because they are more efficient economic substitutes for labour and older technologies. The United Nations Development Programme (2001, section 2.1.1) sums it up, referring to ICTs as a "powerful enabler of development" because of their significant impact on the individual, economic, scientific, academic, social, political, cultural and other aspects of life.

The ICT sector continues to grow tremendously, branching into a wide array of specialties, particularly software engineering, hardware development, networking, telecommunications and artificial intelligence. As each of these branches develops with more enhanced products and services, each organization, including the public sector, has to constantly re-examine its ICT needs and adapt ICT tools relevant to its purposes. Kling (1999) and Ajit (2003, 1) have both argued that the use of ICTs has great potential to improve and enhance organizations. Becta (2003), supported by Vernon (2001), also noted that the use of ICTs would improve the way we do work and communicate in our daily life. A large body of research has emerged to examine the uses of ICTs in organizations. For example, Chu and Tang (2005, 849) found that the ICT revolution and the attendant process of globalization have brought about far-reaching social and political transformations. According to these authors, the ICT revolution has given rise to a new economy, new society and new politics at macro level. They observe that society has become network based and identity and culture have replaced class and material interests as the causes of social conflicts. As a result, the nature, organization and sources of strength of civil society have been transformed. Other observers have also pointed out that at the macro level, the ICT revolution, together with the globalization of economic activities, are believed to have brought about fundamental changes in power and politics (Melucci 1996; Webster 2001; Castells 1998). Because information is playing a very crucial role in individual, national and international life, success in any of these areas lies more and more in the ability to control information processing

and flow (Umubano 1998). Umubano (1998) notes that the adequate use of ICTs (such as computers and networks) improves efficiency, transparency, and in most cases reduces the operating costs of organizations. Furthermore, he observes that combining ICTs has made it possible to manage information in a decentralized yet integrated and coherent way for the benefit of all information producers and users.

The world has moved into an era of advanced technological innovation, affecting the way countries run their businesses and their institutions. The digital revolution and the concept of the information society have dramatically influenced the lives of citizens. The North Dakota Information Technology Department [NDITD] (2004) observes that ICTs facilitate the sharing of information and increase the functionality of communication between different individuals and groups of people across the world. Kling (2000) provides an example of how ICTs have become so advanced that it is possible for a person to be at the highest point on Earth, Mount Everest, and make a satellite telephone call to anyone in the world. De Sutter (2003) argues that ICT is not only about computers, software or services. According to the author, it is a combination of all these elements capped by a vision of how technology can help an organization reach its goals. He opines that businesses today concentrate more on their core activities in their struggle to survive.

The effective use of ICTs can contribute towards improving quality of life, encouraging peace and strengthening unity, establishing good governance, raising the level of education, and building a strong and competitive economy. ICTs have the potential to transform service delivery and to catalyze the development of the information society. With new ICTs now an integral part of society, it has been claimed that we are in a period of almost revolutionary social change. Computers are universal tools in all leading economic nations and increasingly becoming so in poorer countries. The Internet is a tool in the daily lives of hundreds of millions, while third-generation mobile phones will soon be the norm. New, less hierarchical networks of communication are being developed, and new goods and services are proliferating. Services and information can be acquired virtually instantly.

Thus, Mossa (2003) opines that ICTs play a key role in the economic and social developments of countries by improving the efficiency and effectiveness of public administration, businesses and other activities. Mossa further notes that this is because ICTs such as telephones, the Internet, facsimile, websites, broadcasting, computer hardware and software and related technologies are strategically important factors behind social and economic changes. The author adds that these ICTs and digital infrastructures are tools that provide people with more convenient access to information and services.

4.3 THE USES OF ICTS IN AN ORGANIZATION

Many organizations use ICT systems to store, process, present and communicate information. Large organizations could not function without ICT systems that support their operations. One need only think about all the uses of digital technology that already exist to help individuals, businesses and organizations on a daily basis. Different types of ICT systems have affected the methods of production in many organizations and often improved the processes of production control and process control. ICTs have aided the speed and cost of various processes, safety of the workers involved, and the quality of the final product(s).

The specialized use of ICTs depends on the nature of the organization. However, there are universal uses, such as communication; advertisements and promotional material; letters and memos; storing customer, stock, membership, employee details; building management; mailing lists; and accounts and payrolls. With ICTs, organizations can collect, disseminate and use information. They can manage the flow of information to and from sections or departments and use ICTs to access and exchange information. Some organizations exist solely to gather and disseminate information, meaning that for them, ICTs are indispensible. Information is also important because it enables organizations to make informed decisions. Senior managers need information to help with their business planning. Middle management needs more detailed information to help them monitor and control business activities. Employees with operational roles need information to help them carry out their duties.

According to Tusubira and Mulira (2004, 01), while it is widely accepted, it is often not fully appreciated that the integration of ICTs in organizational functions is necessary for increased efficiency, cost effectiveness, and competitiveness. The tendency unfortunately has been to approach such integration from a technological level, leading to escalating costs without corresponding efficiency gains. According to these authors, this leads to disillusionment, skepticism, and reduced organizational commitment and resources to support ICT services and systems.

Spears, Postmes, and Wolbert (2000) are of the view that in organizational applications, some of the paradoxes of modern communication technology become most apparent. In this domain, technology has made rapid progress principally because of assumptions with respect to the effectiveness of ICTs and their promise of increasing productivity. Organizations have generally used ICTs for three purposes: (a) As a tool for teamwork, (b) As a vehicle for organizational communication, and (c) As a tool to aid decision making processes (Spears, Postmes, and Wolbert, 2000). They found that teamwork is one of ICTs' main growth areas, often referred to as CSCW: Computer-Supported Co-operative Work. The idea here is that technology may be used to facilitate collaborations over long distances. This often involves "virtual teams" that spearhead the development of networked organizations.

ICTs are also useful in numerous instances to facilitate the development of various aspects of an organization. For example, ICTs can be of value in fields like public administration where they (ICTs) can be used to enhance the social, economic and political developments of the citizenry at large. Kling (2000); UNDP (2001) and Sopchokchai (2004) all speak of the paperless office, where all business information and documents are created, stored, accessed and disseminated digitally, and where people employ a wide range of ICTs to make their routine work practices more flexible. While some offices, especially those where clerks process large volumes of routine transactions (e.g. travel reservations) may function effectively with less paper, the use of computerized office technologies has had a different effect on many professional offices, transforming work in unexpected ways.

4.3.1 The Internet and World Wide Web

Many people use the terms 'Internet' and 'World Wide Web' (also referred to as the 'WWW' or 'web') interchangeably, but as discussed below, the two terms are not synonymous.

(a) The Internet

The Internet is a 'live', constantly moving, theoretically borderless, potentially infinite space for the production and circulation of information (Xu *et al*. 2000). Gillies and Cailliau (2000, 01) define the Internet as a network of electronic roads criss-crossing the planet - the much-hyped information superhighway. Dreyfus (2009, 03) observes that the Internet is made up of interconnected computer networks all over the world that send, receive and store information. An individual with a computer and the relevant communication equipment can gain access to this network by subscribing to an Internet Service Provider (ISP) so that he or she can connect to the Internet as often or as seldom as he or she likes (or can afford). Large companies, educational establishments and government offices have their own arrangements and are usually connected to the Internet all the time. Weber (2004, 18) describes the Internet as a massive network of computers from around the world all connected by cable and satellite. When users are connected to the Internet, they can receive text, images, video and sound on their computer from computers located anywhere in the world. And just as there is a book or magazine on nearly every subject in local libraries, bookshops or newsagents, so is there information on virtually every subject on the Internet.

The Internet can be conceived as a rich, multi-layered, complex, ever-changing textual environment. Companies all over the world have websites that enable them to market their products and services to the world. The Internet has become a major tool used by companies to run their businesses. Through the Internet, companies and organizations are able to compete globally and beyond local boundaries. It is a mechanism for collaborative interaction between individuals and their computers without the geographic limitations of space (Leiner *et al*. 2000; Singh 2002).

Content created on the Internet ranges from simple e-mail messages to sophisticated documents (sites) that incorporate sounds, images and words (Evans 1996). Peters and Lankshear (1996) note that while printed material has a certain fixity and finitude, texts published via the Internet have a much more fluid character. With texts no longer housed between library or bookshop walls, it becomes impossible to pin down all or even most of the available material in given subject areas for archival and classification purposes. The Internet may thus be described as a sea of information, subject to the ebb and flow of various forces (political, corporate, institutional, etc.), with an ever-shifting shoreline (Peters and Lankshear 1996).

(b) The World Wide Web

The web can best be described as a subset of the Internet and is therefore smaller than the Internet. Xu *et al*. (2000) define the web as a global information network that provides the capacity for accelerating cultural interaction and social change. According to Gillies and Cailliau (2000, 1), the web was first introduced in 1991, and it made it possible for organizations to make certain kinds of information available on their network to other networks and users. Since its introduction, interest in and the use of the web have grown at a phenomenal rate. Many researchers have described the web as a library where all types of knowledge are stored, from the trivial and mundane to the highly scholarly and respected. Mostafa, Newell and Trenthem (1994, 134) define the web as a wide-area, hypermedia information retrieval initiative, the goal of which is to provide access to a large universe of documents. Gillies and Cailliau (2000, 01) describe the web as an encyclopaedia, a telephone directory, a record collection, a video shop, and 'speakers' corner' all rolled into one and accessible through any computer. The application blends information retrieval and hypertext into an easy yet powerful global information system. Castro (2003, 14) describes the web as a huge set of interlinked documents, images and other resources that are linked by hyperlinks and Uniform Resource Locators (URLs). These hyperlinks and URLs allow the web servers and other machines that store originals and cached copies of these resources to deliver them as required using Hypertext Transfer Protocol (HTTP).

4.3.2 A BRIEF HISTORY OF THE INTERNET

The Internet was initiated in the 1960s as a way for government researchers to share information. Computers in the 60s were large and immobile, and in order to make use of information stored on any computer, one had to either travel to the site of the computer or have magnetic computer tapes sent through the conventional postal system (Leiner *et al*. 2000; Online Library Learning Centre 2011). The Online Library Learning Centre (2011) explains that another catalyst behind the formation of the Internet was the 'heating up' of the Cold War. During this period, the Soviet Union's launch of the Sputnik satellite spurred the U.S. Defense Department into considering ways in which information could still be disseminated following a nuclear attack.

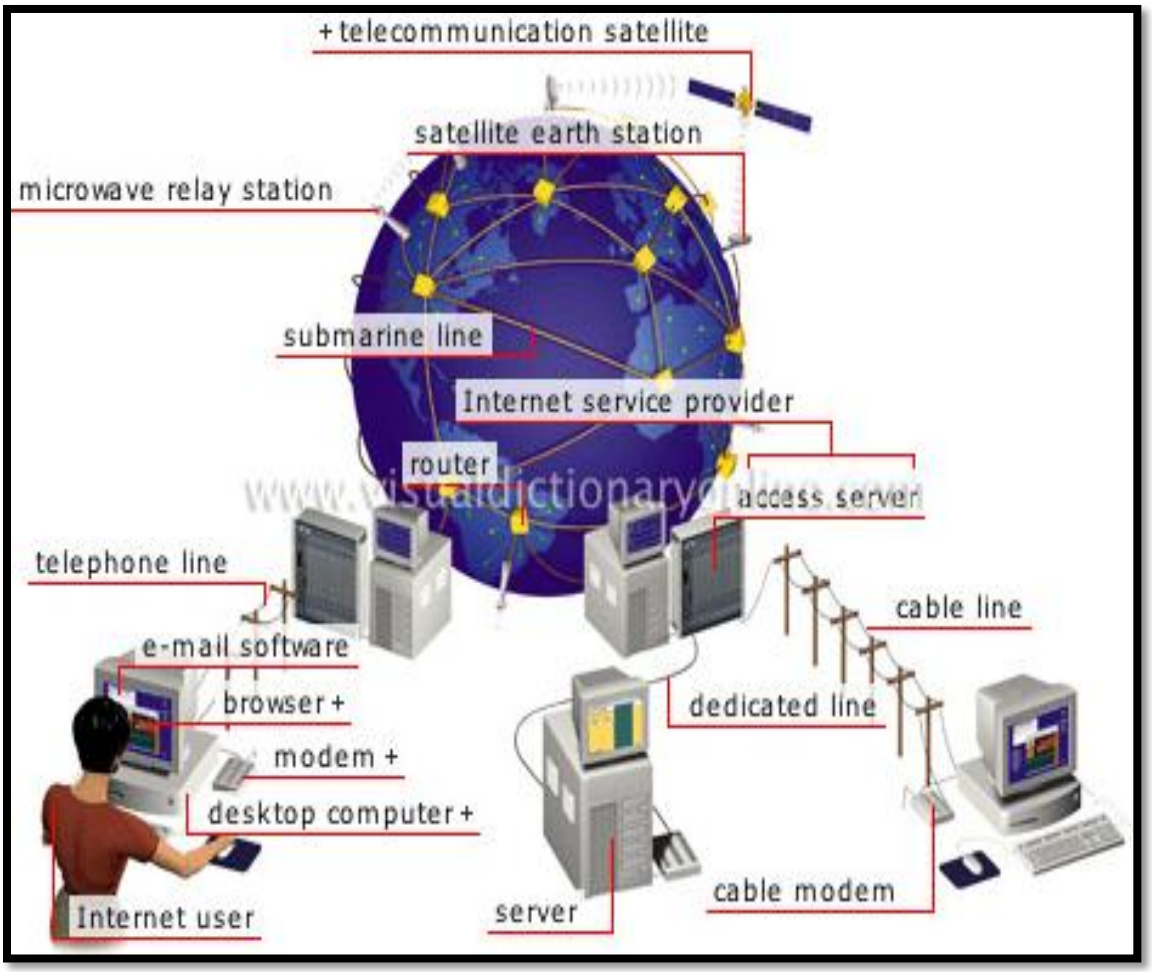
This eventually led to the formation of the ARPANET (Advanced Research Projects Agency Network), the network that ultimately evolved into what we now know as the Internet. ARPANET was a great success but membership was limited to certain academic and research organizations who had contracts with the Defense Department. In response to this, other networks were created to provide information sharing (Online Library Learning Centre 2011). Kleinrock (1976) and Cerf and Kahn (1974) cite January the 1st 1983 as the official birthday of the Internet. According to these authors, prior to this, the various computer networks did not have a standard way to communicate with each other. However, a new communications protocol was established called the Transfer Control Protocol/ Internetwork Protocol (TCP/ IP) that allowed different kinds of computers on different networks to "talk" to each other. ARPANET and the Defense Data Network officially changed to the TCP/ IP standard on January 1, 1983. All networks could now be connected through a universal language (Online Library Learning Centre 2011).

4.3.3 CONNECTING TO THE INTERNET

One of the greatest and most impressive things about the Internet is that nobody really owns it. It is a global conglomeration of networks that connect together in many different ways to form the single entity that we know as the Internet. In fact, the very name stems from the idea of interconnected networks. It is amazing that since its inception in 1969, it has grown from four

host computer systems to tens of millions of computers. Figure 4.1 below illustrates what is necessary to connect to the Internet.

Figure 4.1: Internet Communication Protocols



Adapted from QA International (2008)

Table 4.1: Important Internet concepts and applications

Dedicated line Telephone or cable communications link reserved for one use or for a specific user.	**Router** Interconnecting device that transmits data between two or more networks by determining the best path for them.
Microwave relay station Facility that receives and amplifies signals transmitted in the form of microwaves and relays them to another receiver.	**Internet user** Person using the Internet.
Modem Device that converts digital signals into analog signals so that computers can communicate with each other over telephone lines.	**Telephone line** Linking of two off-site devices by cable within a telephone network.
Desktop computer Small workstation or microcomputer designed for stationary use.	**E-mail software** Software used to format, send and receive messages over the Internet.
Browser Software used to search and consult Internet sites.	**Submarine line** Linking of off-site devices by underwater cable.
Cable modem Modem used to connect a computer to the Internet over a cable line.	**Cable line** Linking of two off-site devices by cable within a cable network.

Access server Communications server that provides subscribers with remote connection to the Internet.	**Internet service provider** Company that is permanently connected to the Internet; it provides individuals and organizations with access to various Internet services.
Server Computer that hosts various resources (including files, applications and databases) and places them at the disposal of all the devices connected to the network.	**Satellite earth station** Facility that transmits radio waves to a satellite and receives radio waves from a satellite.
Telecommunication satellite Satellite designed and placed into geostationary orbit to ensure long-range reception and transmission of signals in the form of radio waves.	

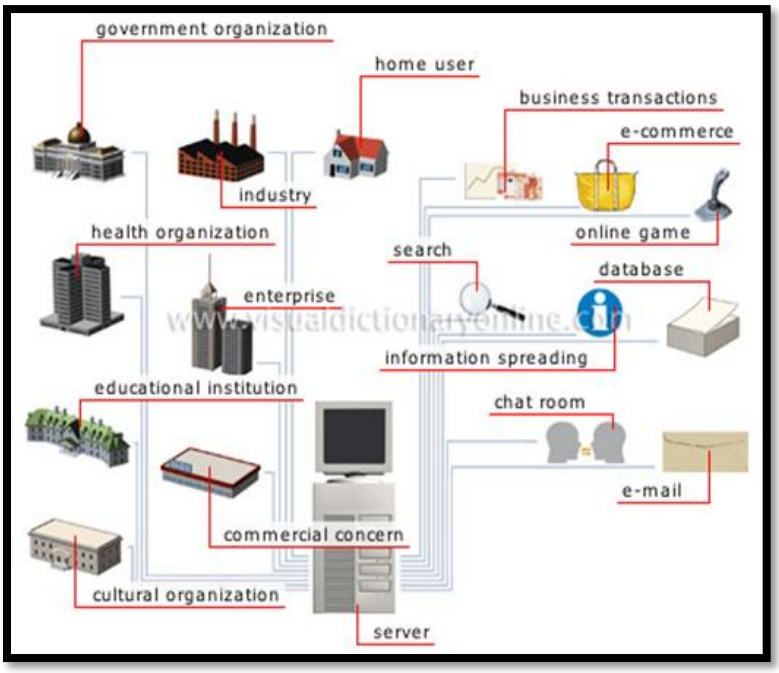
Adapted from: QA International (2008)

4.3.4 INTERNET APPLICATIONS AND SERVICES

The Internet allows people to circumnavigate the world. Beard (2002) observes that Internet users around the world have derived many benefits from this technology which has changed the nature and diversity of economic, social, and interpersonal contact. As with every single innovation, the Internet has its own advantages and disadvantages. However, its advantages significantly outweigh its disadvantages, a feeling shared by many researchers (Pakhare 2007; Sadli 2009; Eastman 2009). ICT enthusiasts and professionals such as Kling (2000), Belawati (2002), Gomez and Martinez (2003), and Razzaghi (2002) state that ICTs have great power in

driving organizational change. They see ICTs as enablers that help organizations to streamline operations, exploit new business opportunities, and globalize production operations. According to Kling (2000), Information Technology (IT) networks or links geographically distant work groups, distributes decision-making authority, and engages the organization in new product and service markets. For example, it is now expected of businesses and organizations to create websites through which they can market their products and services, hence making it easier for their customers to access their information. Many other services are now provided via the Internet, ranging from online banking to job seeking, purchasing movie tickets, guidance services on an array of topics engulfing every aspect of life, and hotel and airline reservations, to name a few. More often than not, these services are not available off-line and can cost you more. However, when these services are offered over the Internet, they are much cheaper as they often cut out the middleman and reduce the amount of labour required (see Figure 4.2 and Table 4.2 below).

Figure 4.2: Internet applications and services



Adapted from: QA International (2008)

Table 4.2: Internet applications and services

Chat room Activity allowing two or more Internet users to converse in writing in real time.	**E-mail** Service by which messages are exchanged between users of a computer network.
Online gaming Video game accessible over the Internet; users can play solo or with multiple players at a distance.	**Home user** Anyone can access the Internet from home through an Internet service provider (ISP).
Educational institution The Internet provides teachers, researchers and students with countless opportunities to research and exchange information.	**Government organization (e-government)** The Internet has made it easy for government departments and agencies to communicate with other organizations and with the citizens they serve.
Commercial concern A company that specializes in product marketing can use the Internet to contact suppliers and customers.	**Search** Locating information on a given topic in the hope of finding something useful; it is usually done with the help of a search engine.
Electronic Commerce Sale or promotion of products and services over the Internet.	**Health organization** The Internet fosters exchanges between researchers, health professionals and patients.
Cultural organization The Internet allows the public to learn about programs offered by cultural organizations in a	**Industry** The Internet allows a manufacturer to communicate with its suppliers, customers and

city or region.	regulatory bodies.
Enterprise The Internet facilitates exchanges between employees within the same company and between the company and its customers and suppliers.	**Database** Group of data related to the same topic that is arranged in order and available for direct consultation by several users.
Information spreading Transmission of information about an organization, an event, a product or a topic, usually by creating or updating a web-site.	**Business transactions** Operations involving financing and funds management (e.g. arranging a loan or transferring funds) over the Internet.
Server Computer that hosts various resources (including files, applications and databases) and places them at the disposal of all the devices connected to the network.	

Adapted from: QA International (2008)

In his study, IIboudo (2003) explains why ICTs constitute a powerful resource and information exchange tool. On the one hand, they allow the dissemination of information, and on the other, they facilitate the search for and receipt of information. Kling (2000), Belawati (2002), Gomez and Martinez (2003), and Razzaghi (2002) affirm that IT-enabled organizational change is the explicit arrangement of information technology for the purpose of enabling changes in the practices, processes or structures of an organization. They add that IT-enabled change targets an organization's processes, structure, management, culture and competitive position for positive change. At the point of production, rearrangements in the IT infrastructure can shift patterns of worker interaction, communication, and process workflow, thereby streamlining operations and

increasing production efficiency. The promise of these IT-enabled transformations is a powerful lure for executives seeking more direct control over an organization and searching for the capability to impress a particular direction upon it (Kling 2000; Gomez and Martinez 2003; Belawati 2002; Razzaghi 2002). Successful IT-enabled change, however, hinges upon unearthing opportunities to use IT strategically and applying these opportunities systematically. Moreover, managers who want to make major organizational changes can turn to several models that place IT as a strategic resource. Models of IT-enabled organizational change circulate widely through managerial discourse, promising wholly new forms of organizational strategy through the deliberate and calculated deployment of IT (Kling 2000; Belawati 2002; Gomez and Martinez 2003; Razzaghi 2002).

Internet technologies have been adopted by most organizations for business process reengineering (Xu *et al*. 2000). Schmitz and Fulk (1991), Beard (2002), Jagboro (2003) maintain that the Internet is arguably one of the most significant technological developments of the late 20th century. Some of its most widely known advantages include that it is fast, accessible 24 hours a day, seven days a week, and can be used at any time (with the right ICT in place). This has resulted in many organizations opting to do their research exclusively on the Internet. Our social systems at work, home and elsewhere have moved from being bound up in hierarchically arranged, relatively homogeneous, densely knit, bounded groups, to vast and geographically dispersed social networks (Wellman 2002). A study by Chu and Tang (2005, 849) established that the Internet has indeed strengthened civil society by empowering organizations, extending the public sphere, and enriching the repertoires of collective action. The findings of their study suggest that ICTs have much potential for pluralizing public discourse and involving more people in the rational and critical debate of political issues. They also note that ICT tools and services such as web-based news reports and discussion forums have been particularly helpful.

Putnam (2000) and Castells (2001) found that at micro level, the discussion at the end of the 20th century centered on the emergence of the Internet, which, given its architectural characteristics of connecting computers globally and anonymously, held great promise for enhancing internal and external networking, mobilizing collective action, and extending the public sphere. Examples of this now abound, and ICT enthusiasts such as Chu and Tang (2005)

and Mutula (2008) have since added other characteristic advantages, such as how the Internet allows government departments to access and disseminate information promptly, globally and inexpensively. Glasius (2001, 153) observes that subscribers to the World Wide Web can instantaneously retrieve government documents, databases, and accounts of the activities of other organizations. It also allows civil servants to publish and distribute pamphlets, videos and sound recordings worldwide. They no longer need to depend on traditional mass media, which more often than not focuses on newsworthy occurrences, distorts their activities, and fails to explain their rationales (Glasius 2001, 153).

Anonymity on the Internet has also made it difficult for security services to track down dissidents or to censor disseminated information. But insofar as the Internet can facilitate access to and disseminate information, it provides the foundation for informed public debates and therefore makes the expansion of civil society possible. Glasius (2001, 153) further observes that the Internet enhances the internal and external networking of civil society organizations (CSOs). According to the author, within these organizations, leaders can use email, list-servers, chat rooms and other devices to communicate directly and informally with members at all levels. Individual members can also use the same devices to better understand these organizations, express opinions and take initiatives. Altogether, the Internet is believed to facilitate informal connectivity, horizontal structure and self-organization, which help to both democratize the CSOs and develop solidarity (Glasius, 2001, 153). According to the Independent Sector (2001), government departments with tiny budgets can take advantage of the Internet's inexpensive trans-local communication capability to build solidarity and mobilize resources globally, as well as to orchestrate protests within a country and all over the world. This is particularly important when potential supporters are scattered geographically or where a solution to the problems at hand requires extraterritorial cooperation (Independent Sector 2001). In the view of Castells (2001), such Internet-based movements tend to be particularly vibrant and resilient because the Internet allows movements with no permanent organization, centre or command structure to emerge and participants can engage in debates without paralyzing the movement.

Chu and Tang (2005, 855) conducted a research study entitled: "The Internet and civil society, environmental and labour organizations in Hong Kong." Most of their interviewees reported browsing web pages for technical information, while some representatives from an environmental group had looked at web pages of the United Nations and related organizations for funding opportunities. Their study established that most CSOs have used the Internet to supplement conventional printed and electronic media as a means to enhance public awareness of their presence and to broadcast their goals, achievements and positions on controversial issues.

In the past, organizations published their background information and educational material in newsletters or pamphlets. However, all this changed with the Internet at many organizations' disposal. The Internet allows CSOs to economize on the use of paper and postage, present the materials more comprehensively, and generate a highly accessible archive for the public, and especially new members. Chu and Tang (2005, 855) further point out that the potential of the Internet to enhance the plurality of public discourse and to present the viewpoints of CSOs becomes most apparent when these organizations are involved in controversial public issues. Most of their interviewees agreed that the Internet and e-mail in particular had facilitated communication among decision-makers in their organizations. This was particularly true for decision-makers who held full-time positions elsewhere. E-mail services allowed them to read the documents carefully and engage in in-depth discussions on controversial issues at a time and place most convenient to them. Chu and Tang (2005, 855) also observed that the Internet facilitated the mobilization of collective action. For example, the spokesperson for the Hong Kong Professional Teachers' Union acknowledged that the Internet allowed the union to instantaneously alert members about changing government policies, to overcome the censorship imposed by some school authorities, and to remind members of the time and venue of protests concerning a compulsory benchmark examination.

Moreover, they assert that the Internet expanded the repertoire of collective action by making it possible to e-mail petitions or online signature campaigns. For example, Green Peace Hong Kong successfully urged more than a thousand people to e-mail letters to protest against Nestlés' use of genetically engineered food products. The Hong Kong Professional Teachers'

Union also obtained several thousand online signatures to support three students detained by the police.

4.3.5 BENEFITS OF THE INTERNET IN AN ORGANIZATION

Snell (1995), supported by Young and Levine (1995) and Fuller and Manning (1999), outline the benefits of using the Internet in an organization to include the following.

(a) Remote access

The Internet allows computer users to connect to other computers and information stores easily, wherever they may be across the world. They may do this with or without the use of security, authentication and encryption technologies, depending on the requirements. This is encouraging new ways of working from home, collaboration, and information sharing in many industries. For example, an accountant sitting at home can audit the books of a company based in another country on a server situated in a third country that is remotely maintained by IT specialists in a fourth. These accounts could have been created by home-working bookkeepers, in other remote locations, based on information e-mailed to them from offices all over the world. Some of these things were possible before the widespread use of the Internet, but the cost of private leased lines would have made many of them infeasible in practice. In another example, an office worker away from his or her desk, perhaps on the other side of the world on a business trip or a holiday, can open a remote desktop session into his or her normal office computer using a secure Virtual Private Network (VPN) connection via the Internet. This gives the worker complete access to all of his or her normal files and data, including e-mail and other applications, while away from the office.

(b) Collaboration

The low cost and nearly instantaneous sharing of ideas, knowledge, and skills has made collaborative work dramatically easier. Not only can a group cheaply communicate and share ideas, but the wide reach of the Internet allows such groups to easily form in the first place. An example of this is the free software movement, which has produced, among other programs,

Linux, Mozilla Firefox, and OpenOffice.org. Version control systems allow collaborating teams to work on shared sets of documents without either accidentally overwriting each other's work or having members wait until they get "sent" documents to be able to make their contributions. Business and project teams can share calendars as well as documents and other information. Such collaboration occurs in a wide variety of areas including scientific research, software development, conference planning, political activism and creative writing. Social and political collaboration is also becoming more widespread as both Internet access and computer literacy grow. From the flash mob events of the early 2000s to the use of social networking in the 2009 Iranian election protests, the Internet allows people to work together more effectively and in ways that were virtually impossible in the past.

(c) File sharing

A computer file can be e-mailed to customers, colleagues and friends as an attachment. It can be uploaded to a website or File Transfer Protocol (FTP) server for easy download by others. It can be put into a "shared location" or onto a file server for instant use by colleagues. The load of bulk downloads by many users can be eased by the use of "mirror servers" or peer-to-peer networks. In any of these cases, access to the file may be controlled by user authentication, the transit of the file over the Internet may be obscured by encryption, and money may change hands in exchange for access to the file. The price can be paid through remote charging, for example via a credit card whose details are also passed—usually fully encrypted—across the Internet. The origin and authenticity of the file received may be checked by digital signatures or by other message digests. These simple features of the Internet are changing the production, sale, and distribution of anything that can be reduced to a computer file for transmission across the globe. This includes all manner of print publications, software products, news, music, film, video, photographs, graphics, and other arts. This in turn has caused seismic shifts in each of the existing industries that previously controlled the production and distribution of these products.

(d) Electronic government

Over the past decade, the WWW has had far reaching implications on the way in which information is shared and on the way services are rendered by both public and private organizations (Kaisara and Pather 2009, 4). The authors note that an important issue on the research agenda has been the adoption of the web in the public sector in the form of electronic government or e-government. Studies by Evans and Yen (2006) and Mutula (2008) list some of the benefits of e-government as increased convenience for citizens in administrative processes such as filing tax returns, increased transparency of government activities, and greater access to government information. In South Africa's young democracy, there continue to be high expectations of the government with respect to improved service delivery and better consultation with citizens. Such expectations are not unique to this country, prompting Mutula (2008, 235) to call on all governments to recognize that the implementation of e-government systems affords them the opportunity to enhance service delivery and good governance. The implementation of e-government has been widely acclaimed in that it provides new impetus to deliver services quickly and efficiently (Evans and Yen 2006, 208).

Kitaw (2006, 7) and The World Bank (2008) define e-government as the use of ICTs such as Wide Area Networks, the Internet, and mobile computing by government agencies in order to transform their relationships with citizens, businesses, and other arms of government. These technologies can serve a variety of different ends: better delivery of government services to citizens, improved interactions with businesses and industry, citizen empowerment through access to information, and more efficient government management. The net benefits include less corruption, increased transparency, greater convenience, revenue growth, and cost reductions (The World Bank 2008). Likewise, UNESCO (2008) describes e-governance as the public sector's use of information and communication technologies to improve information and service delivery, encourage citizen participation in decision-making processes, and make the government more accountable, transparent and effective. The government, as the biggest service provider to any country's citizens, should ensure that all people, irrespective of race, religion and education, receive equal treatment, services, and access to information. The ICT tools used by the government should therefore be able to reach all people, even in the most remote areas. ICT tools

are able to give citizens a platform to voice their complaints and concerns, even when they are not able to contact government offices directly. Citizens should, for example, be given access to the telephone numbers of the various departments, e-mail addresses and cell phone numbers, so that they can communicate with civil servants at any time (Royal Government of Bhutan 2006).

According to van Jaarsveldt (2008), when a government decides to introduce e-government into its service delivery systems, it should ensure that the mindset of the public servants is changed and that they agree with its inception, since people normally fear change, especially with new technologies. The government should also inform and engage with the public to inform and convince them of the importance and advantages of e-governance and the use of ICTs to enable it. In order for e-government to make an impact on service delivery, there needs to be interaction and partnerships among all stakeholders--customers, the government, private organizations, businesses, and so on. Farello and Morris (2006) see e-governance as a participatory process that needs the continuous input and feedback from the customers (the public, businesses and officials who use e-government services) who voice their ideas for the improvement of services.

According to European E-government Services (2007, 3), the Department of Public Service and Administration recommended that an e-government initiative should address three main domains:

- E-government: the application of IT intra-governmental operations (government to government or G2G)
- E-service: the application of IT to transform the delivery of public services (government to citizens or G2C)
- E-business : the application of IT to operations performed by government in government to business (G2B) transactions (e.g. procurement).

(e) Access to information

A large number of information resources on virtually every topic are available on the Internet. Most of these can be accessed free of charge. Therefore it is one of the most powerful research tools for researchers and students alike. Through a search engine such as Google, one can easily and quickly access virtually any information. Government departments also have their own websites which they use to provide information about their respective departments. Forms, policies and acts are easily accessible, and job application forms can be accessed from the departments' websites. Some jobs can be applied for online without having to post or e-mail the application. Many present day companies advertise jobs on their websites or using sites such as Gumtree, meaning that looking for a job is slightly less strenuous for those people who have access to the Internet.

4.3.6 COMMUNICATION MADE EASIER

All businesses need to be able to communicate with their suppliers and customers. An organization must have good internal communications so that each department is kept up to date about everything that is going on in the organization (Yacapaca 2009). In many organizations, e-mails or an internal messaging system are used to send written communications such as letters and memos within the company. Yacapaca (2009) explains that customers may also order products using the company's online ordering system on their website. This requires computers with a large amount of memory and a very fast Internet connection (Yacapaca 2009).

Since its inception in 1969, the Internet and the products it has spurned have become very powerful tools for information and communication and are commonly used as a short-hand indicator of a country's level of ICT adoption and integration. Communication has improved vastly due to the Internet. This saves time and company money in the long run. The expansion of communication networks and e-mail services has also markedly enhanced the development of professional networks and online communities of practice by making it possible to skip across geographical boundaries and communicate with others quickly and easily (RHO 2004).

Traditional communication media, such as the radio and television, also benefit extensively from the Internet. Listeners and viewers are able to tune into live streaming audio and visuals through the Internet. These media are also able to report breaking news via electronic newspapers on the Internet. The Internet has enabled people and organizations to reduce some of the communicational restrictions of space and time in ways that we do not yet grasp. Many studies indicate that e-mail is the top most activity conducted online, followed by general surfing, news reading, and shopping (Pawar 2008; Kling 1999).

(a) Electronic mail

The first service, and perhaps of greatest importance for many subscribers to online services, is electronic mail. E-mail, also called email, is simply the shortened form of electronic mail, a protocol for receiving, sending, and storing electronic messages. E-mail has gained popularity with the spread of the Internet. In many cases, it has become the preferred method of communication. Parsons and Oja (2007, 125) point out that it has become enormously popular because it is easy to use, delivers mail in a matter of seconds, and can broadcast the same message simultaneously to more than one person. According to wiseGREEK (2011), although there is some degree of uncertainty as to when electronic mail was invented, the father of the modern version is generally regarded to be the American, Ray Tomlinson. wiseGREEK explains that before Tomlinson, messages could be sent between users, but only when they were connected to the same computer, and even once computers were networked, messages could not be sent to a particular individual. Tomlinson devised a way to address e-mail to certain users and is thus credited for one of the most important communication inventions of the 20th century (wiseGEEK 2011).

Researchers involved in the initial development of the Internet used electronic mail to exchange ideas, information and reports related to their scientific projects (Schmitz and Fulk 1991; Beard 2002). Today, e-mail is probably the most popular communication application of the Internet. It is fast, economical and an easy way of exchanging messages and files. Computer connectivity has allowed a new form of correspondence to evolve and this, though seldom noticed, has completely transformed the way people do things the world over. Organizations now send more words to others, more often than ever before. While bureaucratization has contributed

to an increase in 'busy work' of all kinds (including memoranda and correspondence), e-mail seems to have exacerbated the effects of this trend. But it has also conferred some wonderful advantages. E-mail is matched by similar incessant discourse in myriad discussion groups, blogs and chat rooms of all kinds that are now available on the Internet. Some of these are outgrowths from, or affiliated to, formal publications or professional societies. In such cases, participants usually take considerable care in their submissions. However, the ease with which contributions to a discussion or chat group can be made sometimes encourages those who might otherwise not be bothered to 'comment', often in a less than productive manner.

(b) Skype

Founded in 2003, Skype's purpose is to break down communication barriers (Skype 2011). Skype had an average of 124 million connected users per month in the second quarter of 2010. Skype's users made 95 billion minutes of voice and video calls in the first half of 2010, approximately 40 % of which were video (Skype 2011; Telecompaper 2011). It is one of the latest technologies that organizations use for communication purposes because Skype's text, voice and video make it simple for organizations to share experiences wherever they are (Skype 2011). In the world of business, this means organizations can bring their entire ecosystem of workers, partners and customers together to get things done (Skype 2011). Organizations can use Skype to stay connected to their customers and clients when working in different locations. Those who use Skype for business purposes can save money on calls, manage all their business and personal contacts, and do more together via video conferencing.

Skype (2011) summarizes the following benefits of using the technology:

(i) Cheap calls

Reduces the cost of calling landline and mobile numbers across the world.

(ii) Group video calling

Saves time and cuts traveling expenses by enabling face-to-face or group video calls. Provides the organization with instant access to customers, colleagues and suppliers from around the world.

(iii) Easier collaboration

Works more flexibly with instant messaging and allows one to share large files at the click of a button.

(iv) Get more out of communication at work

Enables organizations to work together in more collaborative and productive ways. It is now easier to build relationships with a wider group of customers and suppliers no matter where they are in the world.

(v) Increase productivity while driving down costs

Skype helps large organizations communicate and collaborate, whether between desks and departments, cities and continents, or even office and home.

(vi) Always available

Provides call forwarding and voicemail for missed calls.

(vii) Global reach

Lets customers call an organization on its online number from anywhere in the world; the intended recipient answers the call on Skype.

(c) **Videoconferencing**

Good business depends on real-time, efficient information exchange. These exchanges need to be built on the foundations of reliable communication solutions and great support resources. An ICT tool such as a video conferencing enables organizations to increase efficiency levels, turnover, market visibility and social responsibility through understanding their organization's unique communication needs and creating a tailor-made, turnkey solution to optimize business output. Gorman (2011) defines the term 'videoconference' or 'video conference' (also known as a 'video-teleconference') as a set of interactive telecommunication technologies that allow two or more locations to interact via two-way video and audio transmissions simultaneously.

It has also been called 'visual collaboration' and is a type of groupware. Gorman explains that videoconferencing differs from videophone calls in that it's designed to serve a conference rather than individuals. It is an intermediate form of video-telephony, first deployed commercially by AT&T during the early 1970s using their picture-phone technology. Gorman (2011) observes that videoconferencing is rapidly growing in popularity, which is hardly surprising seeing as it allows people to communicate in real time, no matter where they are located. Gorman further notes that the participants can hold a meeting or conference, compare charts, and generally do everything they could do if they were all in the same room together. Owen (2011) outlines the general uses for video conferencing to include business meetings, educational training or instruction, and collaboration among health officials or other representatives. This is all done via audio and video transmission through the wonders of the Internet.

There is no doubt that a business will be quick to utilize videoconferencing once its numerous benefits become clearer. The potential for business is enormous, and as technology improves and prices drop, videoconferencing will become as standard as the fax machine or personal computer. Although videoconferencing has frequently proven its value, research has shown that some non-managerial employees prefer not to use it for various reasons, including anxiety (Wolfe 2007). Such anxiety can be avoided if managers use the technology as part of the normal course of business. Researchers also find that attendees of business and medical videoconferences must work harder to interpret information delivered during a conference than

they would if they attended it face-to-face (Ferran and Watts 2008). They recommend that those who coordinate videoconferences should make adjustments to their conferencing procedures and equipment. While the list of advantages gained from using videoconferencing is long, Gorman (2011) summarizes a few of the main advantages as follows:

- **Enormous savings**

Enormous savings involved when people don't need to travel. An average business trip usually involves at least one night spent in another place, and costs incurred include flights, transport, meals, accommodation, entertainment, etc. Thus if ten people are involved, the total is staggering.

- **Saves money**

Travelling also takes time. For example, those ten executives have to take two days out of their busy schedule to attend a half-day meeting at the head office. With videoconferencing, they can allocate the half-day and spend the other day and a half doing productive work in their offices. Using videoconferencing saves both money and time.

- **Saves time**

If the videoconference involves one person or a team making a presentation, they do it in their 'home environment'. They cannot accidentally leave the most important graph on their desk back at the offices because they have everything readily available. It also means that questions can be answered fully instead of the presenter needing to return to his or her office before he or she can access the required information.

- **Collaboration**

Videoconferencing also makes it easier for the business to access outside experts. In a medical environment, for example, researchers from around the world can get together regularly and compare notes, making it easier to pool their findings and accelerate the process of finding answers. This type of collaboration would never happen if the experts were constantly required

to travel because they would never have time to do their research. Cooperation on this level is not just beneficial for the medical profession, but for almost any profession one can think of.

- **Up to date with information**

A slightly less direct benefit, but a benefit nevertheless, is that employees will need to learn the basics of presentation skills and research in order to participate productively in videoconferencing. This encourages the employee to stay up to date with information relating to their field so that they are confident that they can answer questions during a videoconference.

- **Access to information**

Videoconferencing is also a great deal more personal than a phone conference. A high percentage of organizational communication is through non-verbal cues, so seeing the person making a presentation can provide one with much more information. It also means that visual aids can be used, which speeds up the process of explaining certain types of information. There is no need to wait while a set of graphs is posted, faxed or even e-mailed and printed - one can see them instantly. Thus if extra information is required, it can be pulled out of the file and displayed with no need for any delay, and if one is using videoconferencing to deal with a potential client, it becomes much easier to develop a personal relationship, which is an important element in any business relationship.

- **Telecommuting**

Videoconferencing also means that all the required people can be present at the meeting. Previously, expense considerations may have meant that only one employee could attend a certain meeting, and upon their return they would brief everybody else about what went on. This inevitably left gaps in the feedback, as no one person would take in every single thing that occurred, or would even know that one particular piece of information was of special importance to another staff member. Videoconferencing means that everybody hears and sees everything, and can extract the information that is most relevant to them. They also get a personal feel for the other people involved in the conference. Diana (2010) states that technology such as VoIP can be

used in conjunction with desktop videoconferencing to enable low-cost face-to-face business meetings without leaving the desk, especially for businesses with widespread offices.

The technology is also used for telecommuting, where employees work from home. She notes that one research report, based on a sample of 1,800 corporate employees, showed that as of June 2010, 54 % of the respondents with access to video conferencing used it "all of the time" or "frequently". Owen (2011) opines that video conferencing can stimulate better brainstorming, knowledge sharing and information gathering. Owen (2011) further asserts that perhaps the greatest advantage or benefit videoconferencing has to offer is the ability to meet with people in remote locations without incurring travel expenses or other expenses associated with face to face communication. Business meetings, educational meetings, healthcare conferences and more can all be easily conducted thanks to video conferencing technology. Individuals living in remote areas can also use video conferencing to keep in touch with the world at large. More people are easily accessed and contacted using video conferencing. Because of this technology, information and knowledge are often disseminated at more rapid rates, and collaboration between people occurs more willingly and freely.

- **Profitable relationships**

Diana (2010) notes that videoconferencing is also currently being introduced to online networking websites in order to help businesses form profitable relationships quickly and efficiently without leaving their place of work. This has been leveraged by banks to connect busy banking professionals to customers in various locations using video banking technology. Moore (2011) explains that while a phone call may suffice for two people who need to have a short conversation, web-based conferencing allows large rooms of people at different locations to interact with one another effectively. For example, ten business executives in Amsterdam can easily interact with five others in New York and two in Tokyo to create a full conference with everyone able to see and hear perfectly.

- **Virtual whiteboards**

Moore (2011) observes that virtual whiteboards allow people from different locations to add their own thoughts or ideas into one collaborative space. This enables everyone to form a plan of action or collaborate on a design or slogan instantly.

4.3.7 INTRANET

An intranet can best be described as the Internet that is used inside an organization and walled off from the rest of the Internet community. Yen and Chou (2001, 80) define an intranet as a network that uses Internet technology within the organization for corporate communication purposes. Likewise Callaghan (2002, 3) observes that an intranet is a closed off/ cordoned area of the Internet with added security and guaranteed quality of service. The author explains that it enables low cost access to information in a wide variety of forms without unnecessary restrictions on location. With an intranet, the dependence on paper-based information storage can be minimized. Stambro and Svartbo (2002, 10) observe that intranets have existed for as long as companies have been able to inter-connect their computers. They define an intranet as an internal network, similar to the Internet but smaller, containing databases and data about the company that can only be accessed by authorized personnel.

Many organizations have already realized that intranets empower their employees. Yen and Chou identified many success stories that showed that intranets bolstered a company's competitive advantage, improved employee morale, and improved communication among customers and suppliers. A powerful intranet system allows a company to communicate within itself quickly and freely (Yen and Chou 2001, 80). Inside an intranet website, one can find information about an organization that it might not wish to divulge to the public at large. South Africa's e-government infrastructure includes a government intranet which interconnects all the government departments and their back office systems and a government online centre (GOC) which hosts the governmental portal.

The GOC also provides a centralized Internet access and e-mail facility to the entire sector, along with a data centre facility for departments. According to Yen and Chou (2001, 82), the major benefits of intranets include reducing cost, saving time, rich formats, improving collaboration, and their integrated and distributed computing environment. According to Vernekar (2010), most of today's modern businesses are adopting intranet technology because of its competitive advantages in dealing with corporate information. Yen and Chou (2001, 82), supported by Vernekar (2010), broadly classify the various benefits of an intranet to businesses or organizations under the sections below.

(a) **Communication**

Intranets are extremely useful for communication and collaboration between employees for the successful functioning of any business organization. Intranet technology provides this to businesses through tools such as discussion groups, intranet forms, and bulletin boards. Using intranet tools assists with conveying and distributing necessary information or documents to the employees of an organization. This results in improved communication and a sound relationship between the employees and top level management.

(b) Time saving

All businesses know the importance of time. Using intranet technology allows them to distribute valuable information to their employees in a fast and efficient manner. Above all, intranets save time through interactivity. For example, employees can access information at relevant times that suit them, rather than having to send and wait for e-mails.

(c) Productivity

Intranet technology provides information to employees quickly and helps them perform their various tasks responsibly. An employee can access any data from any database of the organization without wasting time. Employees working on projects can collaborate easily, ensuring better and faster results.

(d) Reduces costs

An important benefit of an intranet is that it is cost effective because it is paperless. Because the intranet supports online publishing, it significantly cuts down on printing and distribution costs as well. All the documents of the company can be published freely through an intranet using web pages or bulletins. The information can then be accessed from the respective workstations of the employees. Intranets thus result in reduced costs for corporate training and administrative and operational purposes.

(e) Incorporated and distributed computing environment

Intranets support an active distribution of stored information through different types of operating systems and computer types from which the employees can access information. Intranets result in distributing information at a lower cost due to their web architectural features.

(f) Increases collaboration

As intranet allows all employees to access data, and this helps improve teamwork within the organization. Certain components of the intranet, such as the declaration section, help desk, FAQ, handbook for employees, etc., aid in collaboration among the employees.

(g) Rich in format

The intranet allows employees to view documents in various rich format applications as well as video and audio. Multimedia programs can be used with the intranet as well, allowing for better and faster communication.

4.3.8 EXTRANET

The Internet can be said to belong to all its users, whereas an intranet solely belongs to the organization that maintains and uses it (Stambro and Svartbo 2002, 11). These authors note that the extranet represents the bridge between the public Internet and the private corporate intranet where the majority of business activity occurs. Loshin (1997, 05) describes an extranet as a

“slice of an intranet” that provides a public window into a company’s services or collected data. Wilkinson (2005, 184) defines an extranet as a computer network that allows controlled access from the outside for specific business or educational purposes. The author explains that an extranet can be viewed as an extension of a company's intranet that is extended to users outside the company, usually partners, vendors, and suppliers. Wilkinson observes that an extranet has also been described as a "state of mind" where the Internet is perceived as a way to do business with a selected set of other companies (business-to-business, B2B) in isolation from all other Internet users. Callaghan (2002, 4) argues that there is little difference between an intranet and extranet save for who has access to information.

IGLOO Software (2010) outlines the following advantages of an extranet:

- Exchange large volumes of data using Electronic Data Interchange (EDI)
- Share product catalogs exclusively with trade partners
- Collaborate with other companies on joint development efforts
- Jointly develop and use training programs with other companies
- Provide or access services provided by one company to a group of other companies, such as an online banking application managed by one company on behalf of affiliated banks

4.4 IMPLICATIONS OF ICTs ON CIVIL SERVANTS

The South African government has adopted a variety of ICT tools and services in the sector in order to improve work productivity and creativity and service delivery. ICT tools and services such as the Internet and electronic mail have in turn completely changed the way the government operates. Although the issue of ICT skills is always a concern, the government should realize why it should invest in training. For one, e-mail services, instant messaging, video conferencing and more offer an electronic way to converse with employees without time-consuming meetings. These services are also highly cost effective. For example, instead of government officials flying to Cape Town for a meeting, video conferencing and Skype are available to connect them to other officials in Cape Town or elsewhere. This potentially saves millions of Rands. An intranet

can also be useful to civil servants because it can enable them to share information, collaborate, and improve communication within the sector. In order for the government to function effectively, it must have good internal communications so that all departments know about everything that is going on in the sector. Civil servants can also make use of the information available on the Internet in order to make informed decisions.

Shopping is also one of the easiest things to do in this era of the Internet. The government can now purchase items from overseas via the Internet that get delivered by cargo or in shipment containers. This also saves time and improves work productivity, which is what the government is striving for. Through the Internet and cell phone banking, people are able to make transactions in the comfort of their homes or offices and without having to physically visit the bank. The government can also benefit from this by enabling online transactions which would save time and resources. Government departments can also transfer documents across an intranet, saving money on printing and time by distributing the data to multiple recipients at once. Intranets are available 24/7, which enables endless information access. In terms of savings, intranets drastically reduce the production costs of paper-based information such as employee handbooks, job advertisements, and travel and expense reports.

4.5 SUMMARY

The review of related literature has in general supported the view that ICTs have contributed to the expansion of both civil service and civil society. The social aspects of computers, telecommunications, and related technologies are crucial in shaping organizational and social relations and in enhancing the ways in which the social settings influence the use and design of ICTs. ICTs have brought about a dramatic reduction in the cost and time involved in storing, processing and transmitting information, leading to a fundamental reshaping of the labour market and society as a whole.

The cases analyzed in this chapter have shown that ICTs have a key role to play in organizations and can offer critical improvements to the efficiency and effectiveness of

government; they will probably offer critical future legitimacy for governments. Furthermore, ICTs have the potential to dramatically transform government practices in ways that greatly benefit the public, for example through the delivery of electronic and integrated public services, greater public access to information, the creation of a more participative form of government, and the provision of personalized services. The government should be committed to promoting the development and use of ICTs in meeting the socioeconomic objectives of the country.

The next chapter, Chapter five, discusses the theoretical framework informing the study.

CHAPTER FIVE

THEORETICAL FRAMEWORK

5.1 INTRODUCTION

While Chapter 4 was about the uses of ICs in organizations, this chapter attempts to filter theories and models by different authors on the diffusion and adoption of ICTs in different social systems. An analysis of the objectives of the study suggests a theoretical framework that has components of technological innovation, adoption, diffusion and communication. The researcher carefully examined several theories in an attempt to find one that encompassed all the above mentioned components. Roger's Diffusion of Innovations Theory (DoI) was selected because it provides a sound theoretical framework for the diffusion and use of modern ICTs in the surveyed government departments. Also of note is that the theory is applicable to IT ideas, artifacts and techniques, and has been used as the theoretical basis for a number of information systems' research projects. DoI is one of a few well known theories that attempts to explain or map the acceptance of technology.

5.2 THE DIFFUSION OF INNOVATION THEORY

Roger's (1995), in his now famous "Diffusion of Innovations (DoI) Theory", argued that one of the greatest pains accorded to human nature is the pain of a new idea. Thus, the fact that innovations (ICTs) are available in government departments does not necessarily mean that they are being used. Some inventions like the cell phone "take the world by storm" while others (video conferencing) seem to fail. Others (like the fax machine) lie dormant for decades, but when their "time comes", their use spreads rapidly, even explosively. Conversely, most new innovations (depending on their purpose, need and acceptance) often achieve slow penetration at first, but then grow quickly as their adoption and rate of use increases. Others may grow fast in the beginning but slow down as their use is exceeded by newer, simpler and cheaper technology. A good example here is the use of broadband Internet access. Its adoption and utilization is directly related to its availability, speed and affordability with respect to both government

departments and the general public.

Roger's Diffusion of Innovations Theory clearly purports that innovations are more readily adopted when they provide a relative advantage to older ideas, and even more so if they are compatible with the existing value system of the adopter. Roger (1995) postulates that there are certain characteristics that determine the rate at which an innovation is adopted by a social system, and that these characteristics are discussed latter in this chapter (see Section 5.3.1). It is because of the above that Rogers developed a broad socio-psychological theory that he referred to as the Diffusion of Innovations Theory (DoI). The theory purports to describe the patterns of adoption of innovations, explain their mechanisms, and assist in predicting whether or not a new invention will be successful (Clarke 1999, 1).

In his comprehensive book, "Diffusion of Innovation", Rogers (1995) defines diffusion as the process by which an innovation is communicated through certain channels over time among the members of a social system. Rogers' definition contains four elements that are present in the diffusion process (see 5.3 below). His theory is essentially a social process in which subjectively perceived information about a new idea is communicated and rests on the premise that a new idea, practice or object has perceivable channels, time and a mode of being adopted by individuals or organizations (Rogers 1995). Clarke (1999, 1) sums it up by observing that the theory is concerned with the manner in which a new technological idea, artifact or technique, or the new use of an old one, migrates from creation to use.

5.2.1 Innovation and diffusion defined

Innovation is used in this study to mean an item, thought or process that is new. Good examples of innovation would be automobiles, cell phones (touch screen) or a new kind/ prototype of running shoes. It is important to point out that something can be an innovation in one place having already been accepted somewhere else. By and large, DoI is a theory of how, why, and at what rate new ideas and technology spread through cultures (Rogers and Scott 1997). The authors lucidly describe innovation as an idea, practice, or object that is perceived as new by an individual or other unit of adoption. They add that newness is a central characteristic on two

counts. Firstly, it is the key difference between an innovation and other forms of organizational change because although something new requires change to accommodate it, not all changes require something new. Secondly, the innovation need only be perceived as new for the unit of adoption - it may already be in use elsewhere. The second key term in the definition is diffusion. In essence, diffusion is the process by which innovations spread from one locale or one social group to another. People do not just welcome and embrace every innovation that is put in front of them. Every person reacts differently in the ways that they hear about, understand, and finally accept or reject an innovation.

5.3 KEY ELEMENTS OF THE DIFFUSION THEORY

There are four main elements in the Diffusion of Innovations Theory, namely the innovation, communication channels, time, and the social system (Clarke 1999, 1; Rogers and Scott 1997, 4). Rogers and Scott (1997, 4) note that diffusion is a special type of process of communication whereby an innovation in the form of new ideas, practices or products is spread through certain channels over time among the members of a social system. The elements that make up the theory are each explained below.

5.3.1 Innovation

Rogers wrote the Diffusion of Innovations Theory in 1995 when he sought to explain why some innovations are adopted and others are not. Rogers notes that the rate of adoption of an innovation is influenced more by an individual's perception of the newness of an innovation than by the actual time it has been around. He further observes that newness can also mean new knowledge of the innovation or a new decision to adopt it. Larsen (1997, 01) adds that by this definition, computers may be considered as innovations even though they have been available to the public for almost 40 years, if or whenever someone makes a new decision to purchase one. Innovations tend to be adopted when they are compatible with the existing value system of the adopter. Innovation theorists such as Rogers (1995), Clarke (1999, 2), Larsen (1997, 01) postulate that there are certain characteristics that determine the rate at which an innovation is

adopted by a social system, and these characteristics as discussed below include relative advantage, compatibility, complexity, trialability and the observability of the innovation.

(a) Relative advantage

Relative advantage is the degree to which an innovation is perceived as being better than the idea it supersedes (Rogers 1995). An individual may perceive an innovation to have a relative advantage if the price drops for a new and higher quality product. For example, the cost of a VCR dropped in price in 1993 to R 1,000 from an initial price in 1980 of R 5,000. This made adoption favorable and increased its relative advantage. According to Rogers (1995), other dimensions of relative advantage that may influence diffusion include profitability, low cost, decrease in discomfort, social prestige, time or labor savings, and the immediacy of the reward. In the case of household technology, low cost and time or labor savings are probably the greatest factors influencing diffusion (Rogers and Scott 1997).

(b) Compatibility

Rogers (1995) explains that compatibility defines how closely an innovation ties into existing values, past experiences and the needs of potential adopters. Compatibility also decreases the uncertainty of adoption by helping the individual feel that the innovation is meaningful and applicable in his or her life. This makes the innovation seem familiar to the individual. Furthermore, he notes that an innovation may be compatible or incompatible with the societal culture, previously introduced ideas, or the needs of the individual.

(c) Complexity

Rogers (1995) defines complexity as how difficult an innovation is to understand and use. He notes that complexity negatively impacts on the adoption of an innovation. According to Rogers (1995), the complexity of using a home computer made the diffusion of that technology relatively slow. As an example, when computers and computer software became more user-friendly, the rate of adoption increased to approximately 30 percent of US households in 1994 (Rogers and Scott 1997).

(d) **Tria-lability**

Trialability can best be described as the degree to which an innovation may be experimented with and tried out prior to full adoption (Rogers 1995). Rogers adds that innovations which can be tried out are adopted at an increased rate. He further notes that trying out the innovation provides meaning to the individual and helps decrease uncertainty about its use. Clearly trialability is positively related to the rate of adoption. Trialability is especially important to early adopters who do not have the benefit of peer support and must depend on their own experiences with the innovation. Rogers (1995) observes that laggards usually move quickly from trialability to adoption because they accept the trials of their peers as their own.

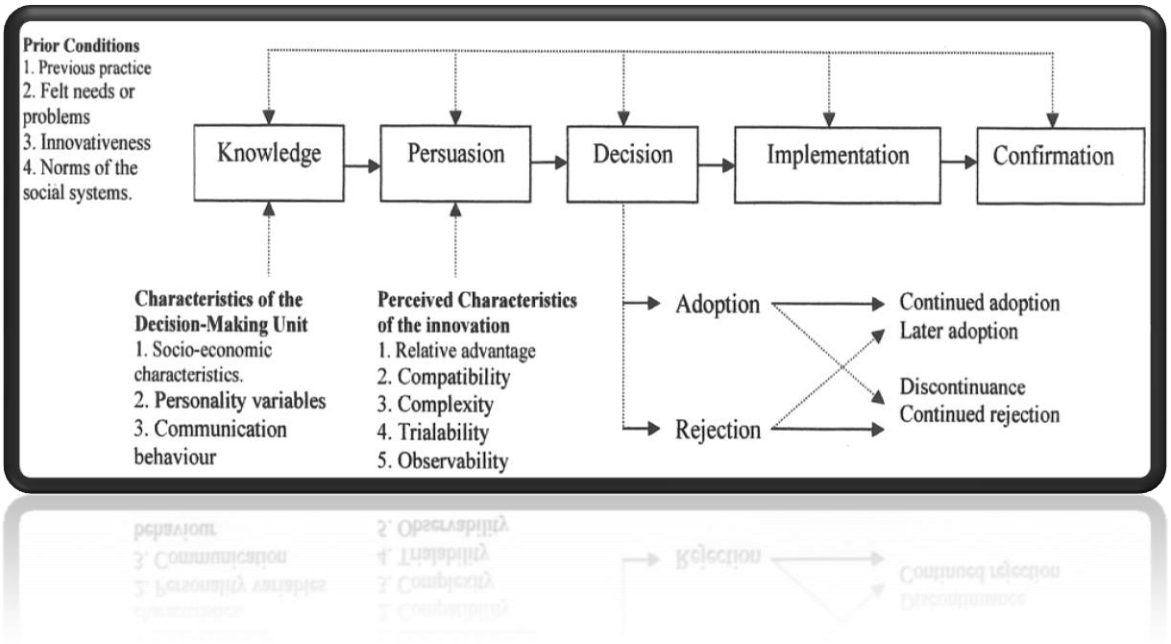
(e) Observability

Rogers (1995) explains that observability is the degree to which the innovation offers visible results. Observability positively impacts on the adoption of an innovation. The results of adoption of some innovations are easily seen. Thus, such innovations tend to be adopted very quickly. Rogers (1995) further clarifies that innovations whose software components are dominant and not easily observed diffuse at a slower rate.

5.3.1.2 Innovation Decision Process (Model)

Rogers proposed a model outlining the innovation-decision adoption process that emphasizes the role of individual behavior in the technology adoption process (see Figure 5.1). In essence, the model highlights the actions and choices during which an individual evaluates a new innovation and decides whether or not to incorporate or adopt it.

Figure 5.1: Innovation Decision Process (Model)



Adapted from Roger (1995, 163)

5.3.2 Communication through channels

The second main element in the diffusion of new ideas is communication through channels. Rogers (1995, 18) describes a communication channel as the means by which a message gets or is relayed from an initial source to a receiver. Rogers categorizes communication channels first as either interpersonal or mass media in nature, or second as originating from either local or cosmopolite sources. He defines mass media channels as a means of transmitting messages through media such as the radio, television and/or newspapers, which enable a source consisting of one or a few individuals to reach an audience of many. Rogers states that interpersonal channels involve the face-to-face exchange of information between two or more individuals. As far as ICTs are concerned, the main channel of communication has been the technology itself.

The diffusion process involves the spread of a new idea from its source to potential adopters. Rogers (1995) notes that mass media, such as television, radio, newspapers, etc., are considered to be a more effective way to generate awareness of an innovation, whereas

interpersonal communication is considered to be more effective in influencing an individual's decision to adopt the innovation. Interestingly, most individuals evaluate an innovation not on the basis of scientific research by experts, but through the subjective evaluations of peers who have adopted the innovation (Rogers 1995; Yates 2001). These peers thus serve as role models whose innovation behavior tends to be intimated by others in their system (Rogers 1995). Communication is the process by which participants create and share information with one another in order to reach a mutual understanding (Rogers 1995). Diffusion has a special character because of the newness of the idea in the message content. Therefore some degree of uncertainty is involved in the diffusion process (Rogers 1995). Rogers states that an individual can reduce the degree of uncertainty by obtaining information.

5.3.3 Time

The third main element in the diffusion of new ideas is time. The time dimension focuses on how long it takes for the group to adopt an innovation as well as the rate of adoption of the individual (Rogers and Scott 1997, 6-7). In order to truly understand the diffusion of innovations, one has to understand the adoption process of the individual consumer. As stated earlier, the difference between the diffusion process and the adoption process is the "who". Essentially, the diffusion process deals with people or groups while the adoption process focuses on the individual person. In order to realize how an innovation diffuses in society, one should first understand how an individual adopts an innovation. By and large, the adoption process is the step that consumers take as they accept a new product, idea, or service. This process can be broken down into five stages that occur in all the fields where the adoption of an innovation occurs. The first stage of the adoption process is awareness (Rogers 1995).

(a) Awareness

At this stage, the innovation is introduced to the individual but there is no true knowledge of the product (Rogers 1995). Because of this lack of information, a person may not feel the need to run out and find out more, much less consider purchasing the innovation. The awareness stage merely sets the groundwork for the following stages. A person who often stumbles upon the innovation during the awareness stage will have little incentive to get more information. Others

feel that in order to raise awareness levels, the innovation must fill a particular need in the life or lives in question (Rogers 1995).

(b) Interest

The person decides to invest time and energy in finding out more about the innovation. At this point, he or she feels good about the innovation but does not really know how or if it can be useful in his or her own life. In essence, the interest stage is purely about gathering information or knowledge, and not about deciding whether to adopt (Rogers 1995).

(c) Evaluation

Here, the individual firsts begins to make a decision about the innovation. According to Rogers (1995), evaluation is associated with the following questions: How could I use it? Do I really need it? Would it be to my advantage if I had it? These are all questions consumers ask themselves during the evaluation stage. If the innovation appears to be positive (in life, work), they will most likely try it out. If the innovation has a negative connotation, they may seek the advice and knowledge of their peers (Rogers 1995). This leads to the next stage, i.e. the trial stage.

(d) Trial

In the trial stage, Rogers (1995) observes that the individual physically gives the innovation a chance by trying it out for a limited time. What they are looking to find during this trial stage is how the innovation can meet their needs, objectives and desires. Research proves that most people will not adopt an innovation without personally testing it first to see if it really works (Rogers 1995).

(e) Adoption

The final stage is the adoption stage. Here, individuals use information that they have gathered in the interest and evaluation stages, and with the outcome of the trial stage, decide to adopt the innovation (Rogers 1995). At this point in the adoption process, the individual not only adopts the innovation but embraces it for the future. However, there is another possible stage to the

adoption process. After the individual adopts the innovation, they may decide to reject it for whatever reason. This decision to reject the innovation after agreeing to adopt it is called discontinuance (Rogers 1995).

5.3.4 The social system

The fourth element in the diffusion of new ideas is the social system. A social system is defined as a set of interrelated units that are engaged in joint problem solving to accomplish a common goal (Rogers 1995). Rogers notes that the structure and stability of a social system helps researchers predict its behavior with some degree of accuracy. In a social system or unit, there are norms, opinion leaders and change agents that variously influence the diffusion process. For instance, innovation-decisions may be optional (where the person or organization has a real opportunity to adopt or reject the idea), collective (where a decision is reached by consensus among the members of a system), or authority-based (where a decision is imposed by another person or organization which possesses requisite power, status or technical expertise). The higher education social system is full of bureaucracies that sometimes stifle and at other times facilitate adoption. In many sub-Saharan African countries, these bureaucracies have been accused of more often impeding rather than facilitating the adoption of innovations.

Rogers (1997) outlines the attributes of a social system that influence diffusion as follows:

- **Norms** are the established behavior patterns for the members of a social system.
- **Change Agent** is an individual who attempts to influence clients' innovation-decisions in a direction that is deemed desirable by a change agency.
- **Opinion Leaders** refers to the degree to which an individual is able to informally influence other individuals' attitudes or overt behavior in a desired way with relative frequency.
- **Innovation-Decisions** is the mental process that an individual (or other decision-making unit) goes through from the first knowledge of an innovation to forming an attitude

towards the innovation, the decision to adopt or reject it, the implementation of this new idea, and confirmation of this decision.

- **Consequences of Diffusion** is the final way in which a social system influences diffusion - the changes that occur to an individual or to a social system as a result of the adoption or rejection of an innovation.

5.4 RELEVANCE OF THE THEORY TO THE STUDY

This section examines the various elements of the diffusion theory in the context of this study. According to Clarke (1999, 2), Rogers' theory has been used as the theoretical basis for a number of IS projects. Rogers (1995) observes that the theory has also been widely applied to investigate the diffusion of organizational and societal innovations. Thus, the theory's application to ICTs and organizational relations made it the most appropriate theoretical framework for this study. Organizations are increasingly relying on the use of ICTs to support collaboration/ communication among team members in different locations.

The South African government has also made ICTs available in the public sector in the hope of improving work productivity and creativity. However, ICTs are not universally adopted by potential users. For example, The School of Information and Media (2000) observed that the use of ICTs by some of civil servants was generally restricted to word processing and the use of specific educational software packages. The School of Information and Media (2000) found that other forms of ICT, such as the Internet/ World Wide Web, electronic mail, computer conferencing, video conferencing, fax machines, digital scanners and digital cameras, were used relatively less. Surry (1997) clarifies that diffusion research in its simplest form investigates how the major elements of diffusion and a multitude of other factors interact to facilitate or impede the adoption of a specific product or practice among members of a particular adopter group. According to Surry and Farquhar (1997), professionals in a number of disciplines have used the theory of diffusion to increase the adoption of innovative products and practices. For example, while a variety of ICT tools and services are available in government departments, some of them are not being used (Ntetha 2010).

In government departments, ICT tools and services such as computers, the Internet, telephones, intranet and e-mail are used frequently (Ntetha 2010). However, some innovations seem to fail or lie dormant for decades. For example, ICT tools and services such as video conferencing, video cameras, radios, TV and digital cameras are used relatively less (Ntetha 2010). However when their time comes, the use of some of these inventions grows quickly, even explosively. The fact that they are not being used does not necessarily mean that they will never be used. Most innovations achieve slow penetration at first, their adoption then grows more quickly, but this may later slow down again. As already mentioned, an innovation can be an item, thought or process that is new. Ideal examples of a present day innovation would be sending a letter using e-mail services instead of the post, or using the intranet to communicate with employees in an organization. Civil servants have access to the Internet, intranet and e-mail services. The government has adopted the use of these ICTs in order to facilitate the sharing of information and communication in the sector. Undeniably, e-mail is one of the most used ICTs in the public sector. Below, all four main elements in the Diffusion of Innovations Theory are discussed, namely innovation, communication channels, time, and the social system.

5.4.1 Innovation

The government previously used conventional communication channels to disseminate information to civil servants and other stakeholders e.g., community members. Although these channels have been used widely, they have been monologue/ one sided and have not allowed much interaction. New ways of communicating are presently being adopted using ICTs such as the Internet and email mobile phones. ICTs are therefore ‘new’ innovations that have been adopted by the government to help it achieve its goals. The rate of adoption of an innovation is influenced more by an individual's perception of the newness of an innovation than by the actual time it has been around. Newness can also mean new knowledge of the innovation or a new decision to adopt it. For example, quite a number of ICT tools and services such as computers and telephones have been available to civil servants for many years; however, they are not fully used. These ICTs may be considered to be innovations even though they have been available to civil servants for many years whenever civil servants make a new decision to use them.

To reiterate, Rogers (1995) notes that innovations are more readily adopted when they provide a relative advantage to old ideas. For example, civil servants now use emails instead of telegrams to communicate because it is quick, cheap, and convenient to communicate using this innovation. As indicated earlier, innovation theorists postulate that there are certain characteristics that determine the rate at which an innovation is adopted by a social system, and these characteristics include relative advantage, compatibility, complexity, trialability and the observability of the innovation.

(a) Relative advantage

Relative advantage is brought about in different ways. Some innovations are not adopted because of the high cost associated with them. A variety of innovations have been adopted in government departments. However, not all the required or most useful innovations have been adopted. Some innovations, such as video conferencing, are very expensive. Interestingly, Rogers (1995) explains that an individual may perceive an innovation to have a relative advantage if the price drops for a new and higher quality product. This means that should it happen that the price of video conferencing drops, the government may decide to adopt the technology. Once it is adopted, civil servants will consider it to be an innovation. This would then make video conferencing favorable and increase its relative advantage. Consequently, it would cut down the travelling costs of government officials.

(b) Compatibility

Compatibility defines how closely an innovation fits in with existing values, past experiences, and the needs of potential adopters. It also decreases the uncertainty of adoption by helping the individual feel that the innovation is meaningful and applicable in his/her life. For example, the government adopted different types of ICTs in the public sector in order to improve work productivity and creativity. ICT tools and services such as computers, e-mail, the Internet, and the telephone, to name a few, are the most popular in the case of civil servants (Ntetha 2010). This is because these ICTs tools and services are compatible with the civil servants. Consequently, these innovations improve work productivity and creativity in the sector.

(c) Complexity

Complexity refers to how difficult an innovation is to understand and use. Complexity has a negative impact on the adoption of an innovation. Some innovations are not adopted because they are not user-friendly or are difficult to operate. For example, not all ICTs are being used or adopted in the public sector because they are difficult to use.

(d) Tria-lability

In essence, this refers to the degree to which an innovation may be experimented with and tried out prior to full adoption. This is why professional researchers constantly maintain that in order for a project to be successful, it has to be piloted first. ICT enthusiasts such as Clark (1999) and Rogers (1983, 1995) note that innovations that can be tried out are adopted at an increased rate. Therefore, it is important for the government to start by piloting its ICTs prior to their adoption. This way, ICTs would make sense to the civil servants and help decrease uncertainty about their use.

(e) Observability

By and large, this refers to the degree to which the innovation offers visible results. 'Observability' has a positive impact on the adoption of an innovation. The results of the adoption of some ICTs are glaringly obvious. Such ICTs tend to be adopted very quickly. For example, the rate of adoption of ICT tools and services such as e-mail, the Internet, intranet, computers, mobile phones, telephones and fax machines, to name a few, is intense in government departments. This is mainly because they offer visible results.

5.4.2 Communication through channels

Information regarding the innovation has to be disseminated so as to introduce the innovation; formulate or change attitudes; influence decisions with respect to the innovation; and support the evaluation of the innovation. This means that if the government wants to introduce an ICT tool or service, it has to inform the civil servants about that ICT tool or service. This would prevent a situation whereby new ICTs are introduced, only to find that they are not adopted because the civil servants are unaware of them. Therefore, communication and awareness are fundamental.

5.4.3 Time

There are many factors that contribute to one's decision to adopt or not adopt an innovation. Evidently, in order for civil servants to adopt ICTs, they have to be aware of them and their benefits.

5.4.4 The social system

A social system may consist of individuals, households, informal groups or social organizations. Some social systems/ individuals do not use technology because of their norms and beliefs. The government should be aware of such unfavorable perceptions in order to be able to overcome them.

5.5 CRITICISM OF THE DIFFUSION OF INNOVATIONS THEORY

Rogers (1995) argues that although diffusion research has made numerous important contributions to understanding changes in human behaviour, its potential would have been even greater had it not been plagued by shortcomings and biases. Rogers identifies pro-innovation bias as the most serious shortcoming of the theory. He notes that this was the implication in most diffusion research, i.e. that an innovation should be diffused and adopted by all members of a social system. Furthermore, he notes that most researches held the view that innovation should be diffused more rapidly, and that it should neither be re-invented nor rejected. Therefore he suggests that the problem of pro-innovation bias can be overcome by investigating an innovation

while the diffusion process is still underway. He adds that such an in-process diffusion research design allows a scholar to investigate less successful as well as more successful cases of innovation diffusion.

Critics of the theory include Clarke (1999, 3), who argues that the Diffusion of Innovations Theory is at best a descriptive tool, less strong in its explanatory power, and less useful still in predicting outcomes and in providing guidance as to how to accelerate the rate of adoption. He further argues that there is doubt about the extent to which it can give rise to readily refutable hypotheses because many of its elements may be specific to the culture in which it was derived (viz. North America in the 1950s and 60s, and hence less relevant in other areas, e.g. East Asian and African countries) [Rogers 1983]. However, the current study, being largely descriptive, exploited this aspect of the theory.

Stephenson (2003) is of the opinion that criticisms of the theory began to appear in the late 1960s when it was applied to international development. Stephenson recognizes that initial criticism of the theory focused on methodological problems with the research, but interest in the theory declined as it began to be viewed as a source of inequity among farmers. Goss (1979) observed that the application of the DOI in developing countries had undesirable consequences. According to Goss, these problems stemmed from the assumption that benefits resulting from the adoption of innovations would spread and become homogeneous. However, experiences in Latin America showed the gap in equities actually widened; aggregate statistics for development projects may show improvement in elements like production, but commonly the farmers most in need of help received little benefit, and non-adopters were affected by the diffusion of innovations process because larger farmers increased production because of adopting an innovation, resulting in a decrease in the prices received by all farmers (Goss 1979).

Stephenson further observes that the other criticism of DoI stemmed from business and marketing perspectives. Downs and Mohr (1976) severely criticized the theory, arguing that it needs to be organized around attributes of both the innovations and the organizations adopting them. He notes that they tossed aside the notion of static categories of adopters, maintaining that

anyone can be an innovator if innovations are matched with the organizations targeted for adoption. Brown (1981), offering his market and infrastructure approach, points out that the implementation of projects using DoI requires focusing monetary and personnel resources on a small number of people, the category traditionally referred to as innovators. Brown's recommendation was using marketing techniques to target appropriate innovations to specific segments of farmers. Rogers (1983) the father of DoI acknowledges criticisms of the theory, noting that the absence of critical viewpoints in the early development of the theory may have been a weakness in the long run. Rogers contends that had adjustments been made earlier through critique and debate, perhaps some of the current problems with the theory would have been avoided.

5.6 SUMMARY

This chapter has discussed the Diffusion of Innovations Theory and how it is applied in the adoption of ICTs in the public sector. The four key elements of the theory have been described in detail. The applicability of the theory has been discussed, with a showcase of how each of the key elements fitted into the study. These elements include innovation, communication channels, time and social systems. ICTs represent innovation in this study. Elements of ICTs as an innovation are investigated in this study in terms of their relative advantage, compatibility, complexity, trialability and observability. The strengths and shortcomings of the theory have been highlighted. The theory was found to be suitable as a framework as it can be applied to information technology. It has been used as the theoretical framework for a number of information systems projects that include diffusion of hardware and software packages. Thus, the theory's application to information technology and society made it the most appropriate theoretical framework in this instance. The shortcomings of the theory have been examined, with a discussion of how these did not affect the study.

The next chapter (Chapter 6) looks at the research methodology of the study.

CHAPTER SIX

RESEARCH METHODOLOGY

6.1 INTRODUCTION

The preceding chapter reviewed related literature on the uses of ICTs in an organization. This chapter justifies the research design and methodology by explaining how the research sample was chosen and the method and instrumentation used for data collection, and describing the analytic techniques employed in the study. The chapter also discusses the trustworthiness and rigor of the results and sets the tone for the analysis and interpretation of the results in the next chapter. The chapter is organized into the following sections: i) Introduction, ii) Research design, iii) Area of study, iv) Population and sampling, v) Data collection instruments, vi) Validity and reliability, vii) Research strategy, viii) Data presentation and analysis, and ix) Ethical considerations. This social informatics study sought to examine the design, use, impact, interaction and contextualization of ICTs among civil servants and within the civil service work environment in the KwaZulu-Natal government.

6.2 RESEARCH DESIGN

Many researchers, such as Neuman (2000, 190) and Terre Blanche, Durrheim, and Painter (2008, 36), have defined methodology as a research plan of action to measure variables of interest. Bailey (1987, 33) describes research design and methodology as the philosophy of a research process. He states that this includes, firstly, the assumptions and values that serve as the rationale of a study, and secondly, the standards the study uses to interpret data and come to conclusions.

A research method is understood as the first step in the way and the means by which a research project is implemented. Research design, therefore, is the structure of research that describes what to do and how to do it (Singleton, Straits, Straits, and McAllister 1988, 69; Peters 1996). Kothari (1985, 1) describes it as a voyage of discovery following a well-laid plan to steer correctly and on course. It is a strategic framework for action that serves as a bridge between research questions and the execution or implementation of the research (Durrheim 1999, 29). It

involves the structuring of variables in a manner that enables their relations to be determined (Nkpa 1997, 40). The design requires a formal and even rigid adherence to a defined system of inquiry to find out unknown facts or to allocate old ones in a new way. Its overall purpose is to extend and accumulate knowledge. Babbie (2010, 117) describes research design as the process of focusing a researcher's perspective for the purposes of a particular study.

The objective of a research design is to plan, structure and execute the study in a way that maximizes the validity of its findings. Bless, Higson-Smith, and Kagee, (2006) observe that research design relates directly to the testing of hypotheses and is a specification of the most adequate operations to be performed in order to test a specific hypothesis under given conditions. Bless, Hugson-Smith, and Kagee further note that a research design asks important questions, such as what steps should be taken in order to demonstrate that a particular hypothesis is true, and/or that all other possible hypotheses must be rejected. It also pays particular attention to three important areas, namely the focus of the study, which takes into account the current status of the subjects in question; their orientations, i.e. their beliefs and attitudes; and their actions.

Selltiz (1976, 90), supported by Flick (2009, 128), states that research design provides a plan that specifies how research is going to be executed. According to Kothari (1991, 41), research design should be able to yield maximum information and provide an opportunity for considering many different aspects of a problem. Kothari further states that research design must consider the following factors: the means of obtaining information; the skills of the researcher and his or her assistants; the objectives of the study or the problem at hand; and the amount of time and money available for research work. Likewise, Singleton *et al.* (1988, 69); Peters (1996, 144) explain that research design is an exploratory and systematic organization of strategies aimed at discovering facts that relevantly answer the proposed research problem. The research design of this study took into account factors such as the purpose of the research, the level of accuracy required in the results, and logistics, such as the cost and time involved. The selection of a research method and design is crucial since they not only determine the route by which research outcomes will be reached, but also influence and set out the expected outcomes.

Leedy and Ormrod (2010, 135) indicated that qualitative research serves one or more of the following purposes:

- Description
- Interpretation
- Verification
- Evaluation

Qualitative research allows one to answer questions of what and how. According to Leedy (1997, 104), quantitative methods are designed to study variables that can be measured in numbers, such as income, age and educational level. Leedy further explains that a quantitative approach is typically used to answer questions about the relationships between the measured variables with the purpose of explaining, predicting and controlling phenomena. According to Marsland, Wilson, Abeyasekera and Kleih (2000), quantitative research is aimed at testing theories, determining facts, statistical analyses, demonstrating relationships between variables, and prediction.

Marsland *et al*. (2000) provide examples of quantitative studies, with the primary group consisting of experiments, survey research, content analysis, and existing statistics. On the other hand, Crabtree and Miller (1999, 6), supported by Potter (1996, 13), observe that qualitative methods explore the meaning, variations, and perceptual experiences of phenomena and will often seek to capture their holistic or interconnected nature. Padgett (1998, 1) describes qualitative research as a family of methods, with some members more compatible than others. Padgett (1998, 2) further observes that qualitative methods are inherently inductive--they seek to discover. Qualitative studies seek to convey the complex worlds of respondents in a holistic manner using 'thick description' rather than particularistic categories and variables. The research design used was chosen to meet the specific requirements of the study. Information was captured both qualitatively and quantitatively to address the research problems as described in Chapter one. This is known as the mixed methods approach, and it was used to triangulate data sources –

a means of seeking convergence across qualitative and quantitative methods (Creswell 2009, 14). According to Creswell (2009, 14), "Recognizing that all methods have limitations, researchers felt that biases inherent in any single method could neutralize or cancel the biases of other methods." In this instance, the quantitative method was used to solicit information from the civil servants, while qualitative measures were used in a review of literature on different studies of social informatics. The literature review helped in the formulation of questions for the quantitative study.

6.2.1 The survey method

This study is basically a descriptive survey. A descriptive survey involves the in-depth description of phenomena, whereby "a researcher's goal is to describe that which exists as accurately as possible" (Mouton and Marais 1991, 44). According to Leedy (1997, 191), the survey method deals with a situation that demands the technique of observation as the principal means of data collection. Neuman (1997, 31) explains that in a survey, a researcher asks people questions in a written questionnaire that can be mailed or delivered or during an interview where the answers are recorded. Neuman notes that in survey research, the study uses a sample or smaller group of selected people but generalizes the results onto a larger group. The author suggests that the word 'survey' is most often used to describe a method of gathering information from a sample of individuals. This way, the results can be reliably projected from the sample group onto a larger population. He further notes that surveys serve a wide variety of purposes, and can be conducted over the telephone, by mail, or in person.

In this study, questionnaires were distributed to the targeted population. McNeill and Chapman (2005, 28) describe a social survey as a method of obtaining large amounts of data, usually in a statistical form, from a large number of people in a relatively short time. The survey method was an excellent vehicle for the measurement of the civil servants' attitudes, behaviors and views or opinions with respect to the use of ICTs in their respective departments. The survey method was also a relatively quick and cheap way of obtaining data from the targeted population. It is a very effective and non–experimental quantitative method of obtaining data. It allows one

to carefully choose the population and the data is organized and presented systematically and is easier to interpret. This method helped the researcher identify the present needs and issues of the sample population (civil servants).

6.2.2 Literature review

A literature review is a means of collecting and organizing the results of previous studies in order to produce a composite of what has already been learned about a particular topic (Schwandt, c2001, 229). In this study, the literature survey was undertaken across a broad spectrum of sources including conference papers, journals, government policy documents, and several Internet sources. McNeill and Chapman (2005, 31) state that every researcher, of whatever status, should spend time reading what other people have written about the topic or field in which they are interested. The main goal of a literature review is to gather a basis for the practical work and to show that the researcher is familiar with existing literature and research on the topic.

It is not smart to re-invent the wheel--one has to know what has already been done (Babbie 2010, 117). Thus a literature review is a comprehensive review of published and unpublished work from secondary sources of data in the areas of specific interest to the researcher (Babbie 2010, 117). It is grounded in books and academic publications. The topics of literature reviews are selected so that they support the assignment (Marshall and Rossman 2010, 77). Marshall and Rossman (2010, 77) and Babbie (2010, 119) observe that a thoughtful and insightful discussion of related literature builds a logical framework for the study and locates it within a tradition of inquiry and a context of related studies. The authors add that the literature review serves four broad functions, the first being that it demonstrates the underlying assumptions behind the general research questions. Second, it demonstrates that the researcher is knowledgeable about related research and the scholarly traditions that surround and support the study. Third, it shows that the researcher has identified a gap in previous research and that the proposed study will fill the demonstrated gap. Finally, the review refines and redefines the research questions by embedding them in larger traditions of inquiry.

Marshall and Rossman therefore describe the literature review as a conversation between the researcher and the literature review. Creswell (2003, 3) asserts that one of the first tasks for a researcher working with a new topic is to organize the literature about the topic. Creswell explains that this enables a researcher to know how his or her study adds to, extends or replicates research already conducted on the topic.

6.3 AREA OF STUDY

The study focused on government departments in KwaZulu-Natal. Spanning a total area of 94 361 square kilometers, KwaZulu-Natal is roughly the size of Portugal (SouthAfrica.info 2011). While it is the country's third-smallest province, taking up 7.7 % of South Africa's land area, it has the largest population, estimated at 9.9 million people in 2006 (SouthAfrica.info 2011). This is approximately 20.9 % of South Africa's population. Of this total, approximately 1.9 million people in KwaZulu-Natal fall into the economically active category, consisting of those aged between 15 and 65 years. While 43 % live in urban areas, 57 % reside in rural areas (KwaZulu-Natal 2010).

The KwaZulu-Natal province has 26 government departments, namely: Agriculture and Land Affairs; Arts and Culture; Science and Technology; Communications; Correctional Services; South African National Defense Force (SANDF); Education; Environment Affairs and Tourism; Finance; Foreign Affairs; Health; Home Affairs; Housing; Intelligence; Justice and Constitutional; Development; Labor; Mineral and Energy Affairs; Public Enterprises; Public Service and Administration; Public Works; Safety and Security; Social Development (previously Welfare and Population Development); Sport and Recreation; Trade and Industry; Transport; and Water Affairs and Forestry (South African Statistics 2001). Below is a map of the KZN province.

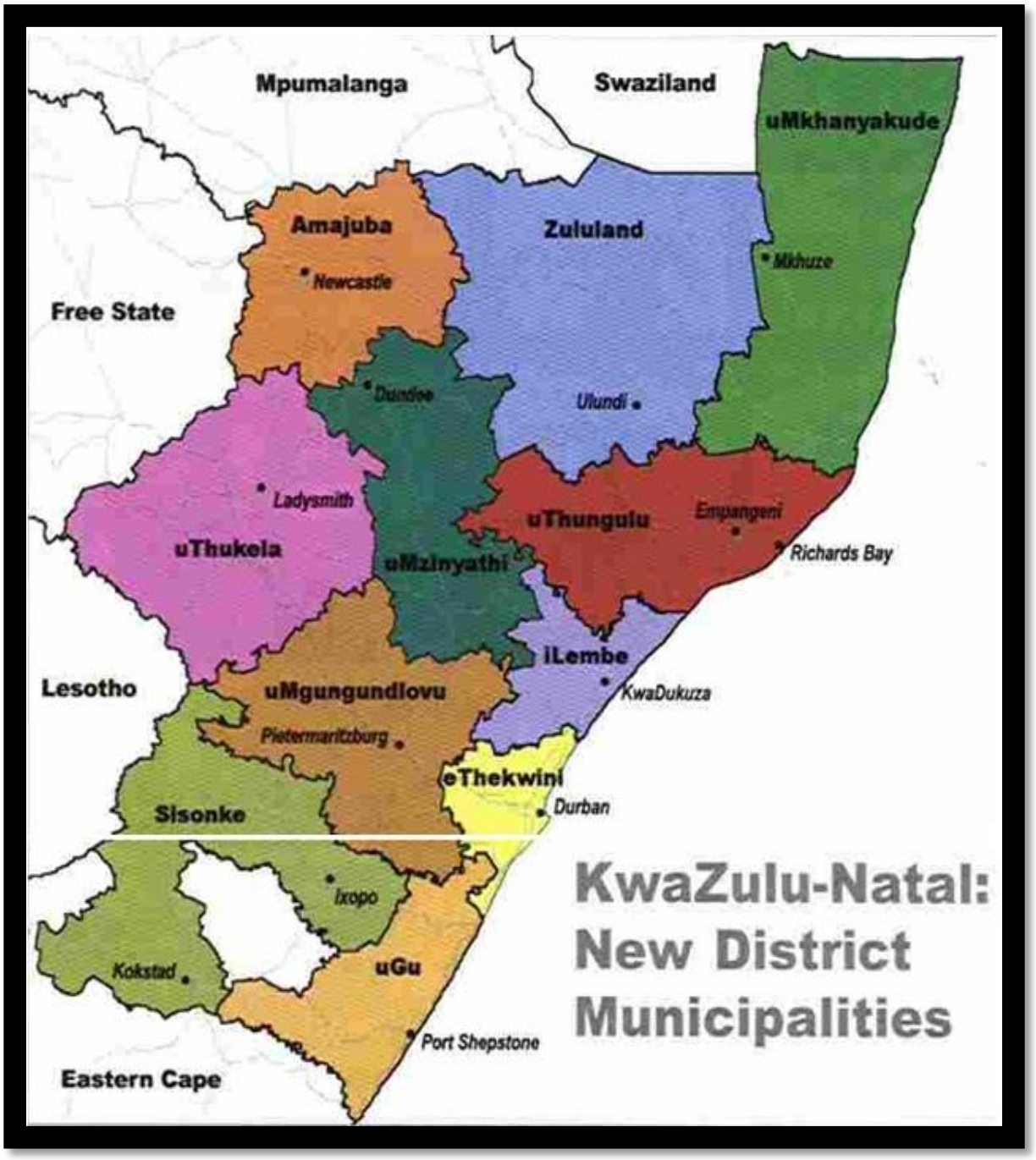
Figure 6.1: Map of the KZN Province

Adapted from South Africa-travel (2011)

6.3.1 KZN District Municipalities

According to SANTAG (2002), before December 2000, KwaZulu-Natal (KZN) had one metro council with six substructures, seven regional councils, and 61 transitional local councils. Now KZN has three types of municipalities: Local Municipalities, District Municipalities and one Metropolitan Municipality (SANTAG 2002). Each District Municipality consists of a number of Local Municipalities (typically five) [SANTAG 2002]. There are fifty Local Municipalities in the province. There are also six District Management Areas in conservation areas such as the Drakensberg and St. Lucia. The map below shows the boundaries of the ten District Municipalities in the province as well as the eThekwini (Metropolitan) Municipality (SANTAG 2002).

Figure 6.2: Map of KZN District Municipalities



Adapted from the Durban Film Office (2010)

6.4 POPULATION

Babbie (2010, 116) describes a population as that group (often of people) that is the focus of the study or about which the study wishes to draw conclusions. Fraenkel and Wallen (2000, 104) explain that before a researcher can select a sample, he or she has to define the population of interest. These authors define a population as any finite or infinite collection of individual objects on which a researcher would like to generalize the results of a study. It therefore consists of a number of units of enquiry. Nachmias and Nachmias (1996) define a population simply as consisting of all households in a given community or all registered voters, for instance, in a particular district. A population may be composed of all the residents in a specific neighborhood, houses, etc. In short, a population is a list of all the elements under investigation.

Due to the diverse and enormous nature of the public sector in South Africa, this study narrowed its focus down to selected and suitable government departments that have considerable reach and are service intensive in KZN, namely the Departments of Arts and Culture, Home Affairs, Health, and Education (see Table 6.1). These departments were selected from the following District Municipalities: uMgungundlovu, uMzinyathi, Zululand, uThungulu and Sisonke. These districts are discussed below. In these departments, only managers in the top, middle, and lower levels of management were targeted.

(a) Zululand District Municipality

Zululand is named after the inhabitants of the area, the Zulus. 'Zulu' means 'heaven' in the Zulu language. Zululand, part of the province of KwaZulu-Natal, is peaceful, with green hills of rich soil, waving grasslands, abundant forests, and an unhurried lifestyle (KwaZulu-Natal Top Business 2010). The seat of Zululand is Ulundi. Most of its 804 456 people speak IsiZulu. It is part of a larger historical area also known as Zululand (KwaZulu-Natal 2010; Wikipedia Foundation Inc. 2010). According to Wikipedia Foundation Inc, Zululand is surrounded by Amajuba to the north-west, Gert Sibande in Mpumalanga to the north, the Kingdom of Swaziland to the north, uMkhanyakude to the east, uMzinyathi to the south-west, and uThungulu to the south. Wikipedia Foundation Inc. lists local municipalities contained by this district as Ulundi, Nongoma, Abaqulusi, uPhongolo, and eDumbe. In 2001 females dominated the district

with a population of 434 244 or 53.98 % [males were 370 212 or 46.02 %] (South African Statistics 2001). The dominant ethnic group was black Africans (788 551; 98.02 %) followed by whites [13 769; 1.71 %] (South African Statistics 2001).

(b) uThungulu District Municipality

The magnificent uThungulu District is located in the northeastern region of the KwaZulu-Natal Province on the eastern seaboard of South Africa (KwaZulu-Natal Top Business 2010). KwaZulu-Natal Top Business adds that the district has the third highest population in the province and stretches from the agricultural town of Gingindlovu in the south to the uMfolozi River in the north, and inland to the mountainous beauty of rural Nkandla. The seat of uThungulu is Richards Bay (Wikipedia Foundation Inc. 2010). uThungulu is surrounded by iLembe, UMkhanyakude, UMzinyathi and Zululand. Local municipalities contained in this district include uMhlathuze, uMlalazi, Nkandla, Mbonambi, Ntambanana and Mthonjaneni. In 2001, the main spoken language was Zulu (829 039; 93.58 %), followed by English [31 146; 3.52 %] (South African Statistics 2001). Females outnumbered males in the district (476 161 or 53.75 %, males 409 783 or 46.25 %). The population of black Africans was 838 738 (94.67 %), followed by 31 934 (3.60 %) whites (South African Statistics 2001).

(c) uMzinyathi District Municipality

uMzinyathi means 'home of the buffalo'. uMzinyathi District spans a total area of 8 079 square kilometers and is located in the north central areas of KwaZulu-Natal (KwaZulu-Natal Top Business 2010). This district lies between the main N3 corridor between Durban and Gauteng and the coastal corridor running along the east coast. uMzinyathi includes some of the poorest and most underdeveloped rural areas of KwaZulu-Natal, most notably the Msinga and Nquthu Municipalities. In 2001, a census of the municipality counted 456 454 people (South African Statistics 2001). Of this population, 93 % were rural and 7 % were urban based (KwaZulu-Natal Top Business, 2010). The seat of uMzinyathi is Dundee (Wikipedia Foundation Inc. 2010). The majority of its people speak IsiZulu. uMzinyathi is surrounded by Amajuba, iLembe, uMgungundlovu, uThukela, uThungulu, and Zululand. Local municipalities contained in this district include Msinga, Nqutu, Umvoti, and Endumeni (South

African Statistics 2001). In 2001, females here also outnumbered males (225 660 or 56.01 % females, males were 200 792 or 43.99 %). Indigenous Africans were the dominant ethnic group (439 889; 96.37 %) followed by whites [7 336; 1.61 %] (South African Statistics 2001).

(d) **Sisonke District Municipality**

Sisonke ('we are all together') is an inland municipality situated in the south of the province (KwaZulu-Natal Top Business 2010). Sisonke is well endowed with natural resources and has vast potential for the development of its foremost economic sectors, i.e. agriculture and tourism. According to Wikipedia Foundation Inc. (2010), the seat of Sisonke is Ixopo. Sisonke is surrounded by uMgungundlovu to the north-east, uGu to the south-east, OR Tambo to the south, Alfred Nzo to the south-west, the Kingdom of Lesotho to the north-west, and uThukela to the north. Local municipalities contained by this district include Ingwe, Ubuhlebezwe, Greater Kokstad, Kwa Sani, and Mkhomazi Wilderness Area. Statistics for the year 2001 place the language that was mostly spoken as Zulu (220 295 or 73.83 %), followed by IsiXhosa at 50 431 [16.90 %] (South African Statistics 2001). Female numbers dominated here as well (160 005 or 53.62 %, males 138 387 or 46.38 %). With respect to ethnicity, black Africans dominated (280 332; 93.95 %) followed by coloureds [10 081; 3.38 %] (South African Statistics 2001).

(e) uMgungundlovu District Municipality

According to KwaZulu-Natal Top Business (2010), the uMgungundlovu District Municipality has excellent infrastructure. A key feature is the N3 national road which traverses the entire length of uMgungundlovu and offers substantial opportunity for a development corridor of national significance (KwaZulu-Natal Top Business 2010). The population of about 920 000 (as at 2001) live in dwellings ranging from traditional farmland communities and informal rural settlements to up market urban areas (South African Statistics 2001). Furthermore, the region has a rich and complex natural environment with numerous resources accounting for 13.5 % of KwaZulu-Natal's Gross Geographical Product and 14.5 % of the province's formal employment (KwaZulu-Natal Top Business 2010). The seat of uMgungundlovu is Pietermaritzburg. uMgungundlovu District Municipality is surrounded by eThekwini (Durban), iLembe, Sisonke, uGu, uMzinyathi, and Uthukela. This district contains eight (8) local municipalities (KwaZulu-

Natal Top Business 2010). The language that dominates in this district is Zulu (79.06 %), followed by English (16.16 %), while the least spoken language is Venda [0.01 %] (South African Statistics 2001). In 2001, female numbers also dominated at 52.75 % of the total population. 767 145 people (82.68 %) were black Africans, followed by Indian Asians [73 083 or 7.88 %] (South African Statistics 2001; Wikipedia Foundation Inc. 2010).

6.5 SAMPLING PROCEDURE

Lohr (2009, 420) observes that the basic idea in sampling is to indicate who or what will be studied, and why. It refers to the selection of some units from a study's population of interest. According to Baker (1999) and Singleton *et al* (1988, 69) sampling refers to specific ways of selecting subjects, or simply to "who will be studied". He observes that the major goals of sampling include ascertaining the "representiveness" of what is being studied, thereby reducing bias, and applying inferences from findings based on a sample to a larger population. Bless and Hugson-Smith (1994) further explain that a sampling theory is a technical accounting device used to rationalize the collection of information, and to choose in an appropriate way a restricted set of objects, persons, or events from which actual information will be drawn.

This study used multistage probability samples to select the elements for the survey method and to achieve the desired representation from the population. Probability samples also helped the researcher to conduct an in-depth study and to acquire a demonstrable degree of reliability and validity. The sampling techniques used were simple random, systematic, and stratified sampling. The selection process for the targeted population consisted of five stages as discussed below.

Stage 1: Simple random sampling

Simple random sampling was first used to identify government departments in the province, namely the Departments of Arts and Culture, Home Affairs, Education, and Health. The departments were selected using simple random sampling. The sample was representative because these departments are scattered across the province and are quite service intensive.

Stage 2: Systematic sampling

Systematic sampling was used to select suitable district municipalities. This sampling technique was used in order to further increase the chances of obtaining a representative sample. An initial starting point was selected randomly, and every second district municipality from a list was selected thereafter. This sampling technique also helped to prevent bias in the selection process.

Stage 3: Stratified sampling

The first stage of stratified sampling was the stratification of the division of the service area into rural and urban based areas. In short, the study targeted government departments that can be found in both rural and urban areas (see Table 6.1 below).

In the second stage, stratification of personnel in the selected departments into top, medium and lower level management was done. This was to ensure that all the levels of management were equally represented in the study.

Stage 4: Simple random sampling

In this last stage, a simple random sample was used to select the sample elements from the different levels of management (see Table 6.1).

6.5.1 Sample size and sample frame

The sample size depends largely on the degree to which the sample population approximates the qualities and characteristics of the general population. According to Leedy (1997, 210), the larger the sample, the smaller the margin of sampling errors to be expected. However, a large sample does not guarantee good results if it is not representative. Leedy believes that for a large population of over 5000, population size is almost irrelevant and a sample size of 400 is adequate. This is supported by Peter (1994, 76), who states that for a population size of more than 10000, the recommended sample size is up to 370.

In order to conduct an in-depth study and to acquire a demonstrable degree of reliability and validity, the researcher used a variety of sampling techniques in selecting the population sample (multistage sampling). The sampling size was 260 randomly selected civil servants drawn from the upper, middle and lower management strata of the civil service with equal strata sizes as depicted in Table 6.1 below.

Government departments in South Africa have a well defined organogram such that the number of managers is almost equal across departments. This was reflected in the equal number of managers from each department in the sample. A sample size of 20 % of the population elements was used, resulting in 65 personnel being selected from each ministry and a total target sample of 260 managers.

Table 6.1: Distribution by district municipalities

DISTRICT MUNICIPALITY	EDUCATION	HOME AFFAIRS	ARTS & CULTURE	HEALTH	TOTAL
uGu					
uMgungundlovu	13	13	13	13	**52**
Uthukela					
uMzinyathi	13	13	13	13	**52**
Amajuba					
Zululand	13	13	13	13	**52**
uMkhanyakude					
uThungulu	13	13	13	13	**52**
iLembe					
Sisonke	13	13	13	13	**52**
Total	**65**	**65**	**65**	**65**	**260**

6.6 DATA COLLECTION INSTRUMENTS

Any device that researchers use for the measurement of data is called a research instrument (Goddard and Melville 2004, 41). According to Neuman (1997, 30), every researcher collects data using one or more techniques, and some techniques are more effective when addressing specific kinds of questions or topics than others. A number of different methods or instruments exist, and their use depends on the nature of the study.

6.6.1 Questionnaire

Questionnaires are often used in surveys as primary data collection instruments (Busha and Harter 1980). Questionnaires come in different shapes and sizes, from postcards to be filled in by the respondents, to multi-page documents to be filled in by the interviewer or the respondents (Hoinville and Jowell 1989, 26; Brace 2008, 2). Brace (2008, 35) explains that a questionnaire that is going to provide accurate, good-quality information needs to be thought about and planned before a single question is written. Brace describes a questionnaire as the medium of communication between the researcher and the subject, sometimes administered on the researcher's behalf by an interviewer.

A decision to use questionnaires for this study was made because:

(a) The nature and scope of the study pointed to this technique. Questionnaires were viewed as the logical technique to study a population that is dispersed across the whole province. Questionnaires were also found to be cheaper and more cost effective.

(b) The quantitative data required for this study could best be obtained through questionnaires because the study targeted only managers who are very difficult to access. Moreover, questionnaires permitted respondents to provide well thought-out responses and where necessary, verified information that would be analysed to reveal the actual diffusion and adoption of ICTs in government departments.

(c) The fixed format of questionnaires often helps to reduce variation in answers. However, this could not be guaranteed because respondents' interpretations could still introduce a lot of variation.

The self administered questionnaire was administered to 260 civil servants who were allowed to answer the questions without any pressure. Anonymity allowed the respondents to provide answers freely without feeling intimidated and prevented any influence on the answers or bias on the part of the researcher. It also allowed the researcher to cover a wider area of study and also proved to be cost effective in terms of money and travelling. The general disadvantages of

self-administered questionnaires are that there is the possibility of a low response rate and questions might be left unanswered. In this case, a contact person was used in each department to assist with feedback, and the questionnaire was designed to ensure that the questions were clear and to the point.

The self-administered questionnaire consisted of both structured and non-structured questions. The questionnaire was divided into six sections, namely: 1) Demographic profile of the respondents, 2) ICT accessibility, 3) Types of ICT tools and services, 4) The level of interaction of the civil servants with ICTs, 5) Impact and value of ICTs, and 6) The training needs of the civil servants.

6.6.2 Literature survey

An extensive literature review on social informatics under the following subheadings was undertaken:

- Uses of ICTs in organizations
- ICT infrastructure in South Africa
- Evolvement of ICT policy in South Africa

The literature survey was undertaken across a broad spectrum of sources including conference papers, journals, government policy documents and several Internet sources (see Chapters 2, 3, and 4). The chapters focused on the following:

(a) Chapter 2

This chapter mapped and audited the ICT infrastructure in South Africa. The chapter was based on the following research objectives: to establish the types of ICTs and products (systems/ software) currently in use (e.g. the Internet, intranets, databases, etc.). It answered the following

research question: What kinds of ICT tools, services and infrastructure are available in government departments?

(b) Chapter 3

The government's vision of the information society is based on the premise that ICTs can help improve work productivity and creativity in the sector. Therefore, the researcher reviewed the status, developments, challenges and opportunities of information and ICT policy in South Africa.

(c) Chapter 4

This chapter reviewed literature on various uses of ICTs in organizations. The chapter made an attempt to realize the following objectives of the study: to identify different types of ICT tools and services, e.g. the Internet, e-mail, databases, etc.; to determine how social informatics can add value to government departments; to explore the impact of ICTs on an organization; and to establish the uses and values of ICTs in an organizational context. The chapter addressed the following research questions: What are the different types of ICT tools and services that can be used in an organization? How can ICTs add value to the public sector? What are the concomitant effects of introducing ICTs to an organization? And how can ICT tools and services be used in an organizational context?

6.7 VALIDITY AND RELIABILITY

Leedy (1997, 32) explains that validity is concerned with the soundness of a study, in other words the effectiveness of the measuring instruments. Neuman (1997, 141) and Maxwell (1992, 279) specify that it is concerned with the precision with which an instrument measures the problem under investigation. Reliability refers to the consistency of the measurements or the degree to which an instrument measures the same way each time it is used in the same conditions with the same subjects (Moss 1994). The validity of the data collection instruments used in the study was enhanced by the fact that questions were derived from the objectives of the study. Each question was checked to determine whether it contributes to the research objectives.

6.7.1 Internal Validity

Face or content validity refers to the extent to which the measuring instrument actually addresses the topic under study and the measurement it is intended to measure. The instrument must also be able to discriminate between similar constructs (Stacey 2008). In this case the supervisor of the project critically looked at the work to ensure that the researcher was adhering to the topic and measuring what he intended to measure. Internal validity was also ensured by reviewing studies by other researchers in the same field.

6.7.2 External Validity

External validity refers to the ability of the research to generalize across persons, settings, industries and times (Stacey 2008). In this case, the population of the study consisted of 260 civil servants in selected government departments and the results of the quantitative study were only be generalized onto this population.

6.7.3 Reliability

A pilot study is a fourth principle for improving the reliability of a hypothesis-testing situation. Teijlingen and Hundley (2001, 1) refer to pilot studies as mini versions of a full-scale study, otherwise referred to as "feasibility studies", and include the specific pre-testing of a particular research instrument, such as a questionnaire or interview schedule. Teijlingen and Hundley further observe that these studies are a crucial element in the formulation of a good design as they increase the likelihood of success. They state that conducting a pilot study could give advance warnings about where the main research project could fail, where research protocols may not be followed, or where proposed methods or instruments are inappropriate or too complicated. The questionnaire was pre-tested for clarity, completeness, relevance and shortcomings in a pilot study. The aim of the pilot was to establish the questionnaire's effectiveness, reliability and validity before the actual study. Most importantly, the pilot survey aimed to test the subject matter of the current research, the population it was to cover, its spatial

variability, and the possible reactions to questions by the respondents. The reliability of the research instrument was enhanced by having both close ended and open ended questions. The researcher ensured that he used simple, direct and unbiased wording. The pilot study took place during the month of September, 2005.

6.7.4 Results and lessons learnt from the pilot study

The study revealed that the initial questionnaire was too long, as respondents had to spend almost an hour trying to fill it. Consequently, the "no response" alternative was highly recurrent throughout the results. It was necessary to redesign the questionnaire in order to make it less cumbersome for both the respondent and the researcher.

6.8 THE RESEARCH STRATEGY

The research strategy consisted of formulating the topic, writing the proposal, applying for research funds, and seeking permission.

6.8.1 Permission

Necessary steps were followed in order to obtain permission prior to the pilot and main studies. Visits were made to the selected departments to notify and explain the purpose of the study. The researcher struggled to obtain permission that would have given him access to all the targeted departments in order to administer the questionnaires. No government official was willing or in a position to give the researcher permission to distribute the questionnaires in all the targeted departments. Instead, the researcher was advised by one of government officials from the premier's office of the KZN government to apply for permission in each and every targeted department. After asking each and every targeted department, only two departments were able to give him the permission he was looking for, namely the Department of Arts and Culture and the Department of Education (see Appendix B). The Departments of Health and Home Affairs allowed the researcher to distribute questionnaires without any written permission.

The survey involved one researcher and one research assistant. The research assistant was a PhD candidate from the Department of Information Studies at the University of Zululand. Questionnaires were personally delivered to all targeted government departments in the province. The respondents were given one week to complete the questionnaire. The researcher then visited and collected the completed questionnaires personally. Questionnaires were hand-delivered and collected because it was more convenient and easier for the researcher to administer them this way.

6.9 DATA PRESENTATION AND ANALYSIS

Wood and Kerr (2010, 292) describe data analysis as a practice in which raw data is ordered and organized so that useful information can be extracted from it. The authors explain that the process of organizing and thinking about data is essential to understanding what the data does and does not contain. According to Majanja (2004, 132), analysis and the interpretation of data refers to studying data or tabulated material in order to determine inherent facts or meaning. The data collected was tabulated under the various themes and subheadings and presented using tables, bar graphs, frequencies, percentiles and generalisations with the help of the Statistical Package of Social Sciences (SPSS) and Microsoft Excel. Subsequent relationships between variables were compared and interpretations made.

6.10 ETHICAL CONSIDERATIONS

Researchers face ethical situations in almost every step of the research process, from selecting participants to reporting findings at the end of the study (Houser 2007, 53). Thus ethical considerations were kept in mind when conducting fieldwork.

6.10.1 Informed consent

Informed consent was obtained from each participant in the study in order to ensure that they understood what they were doing and verify their willingness to participate. The respondents were assured of their rights, including the right of consent, protection from disclosure of information, and respect for their privacy. Department heads spoke to the participants in their respective departments to ensure their willingness to participate. All the research participants voluntarily participated and were not forced to take part in the study.

6.10.2 Protection from harm

The researcher ensured that the participants were not at any risk and would not be exposed to embarrassment, unusual stress, or any demeaning treatment. Anonymity and confidentiality were promised and maintained. The information they provided was not made available to anyone else who was not directly involved in the study and cannot be traced/ identified to the participants. The researcher also ensured that the participants would remain anonymous throughout the study.

6.10.3 Professional standards

The supervisors ensured that the results were gathered in a professional manner without misrepresenting anyone and/or intentionally misleading the respondents about the nature of the study. The researcher ensured that all the findings were presented honestly without fabricating any data to support any particular finding/ result. The researcher also adhered to the institutional guidelines.

6.11 SUMMARY

This chapter outlined and described the methodology used to conduct the study. It also justified the research design that was used by explaining how the sample was chosen and the method and instrumentation used for collecting data and describing the analytic techniques employed. The study adopted the mixed method approach where aspects of both quantitative and qualitative methodologies were employed. A self-administered questionnaire was used to solicit information

from top, middle, and lower managers from four government departments in KwaZulu-Natal, while a literature review was conducted on social informatics.

With respect to the reliability and validity of the research instrument, the questionnaire was pre-tested for clarity, completeness, relevance and shortcomings in a pilot study. The main lesson learnt from the pilot study was that the initial questionnaire was too long, as respondents had to spend almost an hour trying to fill it. Consequently, the questionnaire was redesigned in order to make it less cumbersome for both the respondents and the researcher.

As indicated in section 6.8.1, necessary steps were followed in order to obtain permission to conduct the study prior to the pilot and main studies. Despite this, only the Departments of Arts and Culture and Education were able to provide the researcher with written permission (see Appendix B). The data collected was analyzed using tables, figures and thematic categorization. Ethical considerations were kept in mind when conducting fieldwork.

The next chapter (Chapter seven) presents and analyzes the data obtained from the field.

CHAPTER SEVEN

DATA PRESENTATION, ANALYSIS AND INTERPRETATION

7.1 INTRODUCTION

According to Aneshensel (2002, 2), data analysis is the systematic arrangement of information into meaningful patterns. The term 'data' means information, or more formally, facts and figures from which conclusions can be inferred (Aneshensel 2002, 2). Data analysis is therefore the practice in which raw data is ordered and organized so that useful information can be extracted from it. Majanja (2004, 162) explains that it involves the tabulation of data in order to determine inherent facts or meanings. This exercise also involves summarizing data and breaking it down into smaller, simpler and more manageable components in order to ensure easy and correct interpretation. At the same time, this exercise should be done in such a way that the results and interpretation thereof respond to the aim and objectives of the study.

This chapter deals with the processing, presentation and general analysis of data. The Statistical Package for the Social Sciences (SPSS), Micro Soft Excel and tabulation were used for data analysis. The main purpose of the study was to examine the design, use, impact, interaction and contextualization of Information and Communication Technologies (ICTs) amongst civil servants and within the civil service work environment in KwaZulu-Natal through social informatics (SI) analysis. The chapter is divided into six sections.

SECTION 1:

7.2 DEMOGRAPHIC PROFILE OF THE RESPONDENTS

Respondents were asked about their job titles, highest qualifications, the departments to which they belonged, age, gender, and their level of management. These structured questions were asked to determine the relationships between demographic characteristics and the adoption and use of ICTs by the civil servants in the sampled government departments.

7.2.1 Responses

Through systematic and purposive sampling techniques, two hundred and sixty (260) managers in government departments in KwaZulu-Natal were targeted. One hundred and fifty two (152; 58 %) completed and returned the questionnaires. The questionnaire (Appendix A), which consisted of both structured and non-structured questions, was distributed to four (4) purposively selected government departments in KwaZulu-Natal, namely the Departments of Education, Health, Arts and Culture, and Home Affairs. Responses were obtained from all of the departments, which translated into a 58.4 % response rate, with departmental distribution as shown in Table 7.1 below.

Table 7.1: Distribution of respondents by government departments (N-152)

DEPARTMENTS	NO. OF QUESTIONNAIRES DISTRIBUTED	NO. OF RESPONSES RECEIVED	
		Frequency	Percentage
Arts & Culture	65	11	7
Health	65	44	29
Home Affairs	65	47	31
Education	65	50	33
Total	**260**	**152**	**100**

The table above shows that the majority (50; 33 %) of the respondents were from the Department of Education, followed by Home Affairs (47; 31 %) and the Department of Health (44; 29 %). Respondents from the Department of Arts and Culture were in the minority (11; 7%). The Department of Education had a high response rate compared to the other two departments, perhaps because it is more ICT intensive.

7.2.2 Distribution of the respondents by job titles

The respondents were required to indicate their positions of employment. Table 7.2 below summarizes their responses.

Table 7.2: Distribution of the respondents by job titles (N=152)

JOB TITLES	FREQUENCY	PERCENTAGE
Assistant Manager	33	22
General Manager	22	14
Managers	21	13
Deputy managers	18	12
Senior administrative Officers	15	10
Directors	12	8
Senior General Manager	10	7
Chief Education Specialists	9	6
Deputy Directors	8	5
District Managers	4	3
Total	**152**	**100**

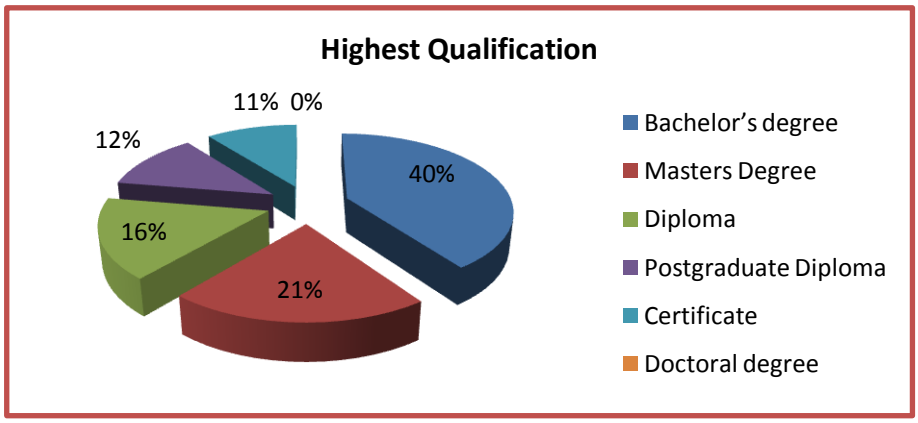
The empirical results of the study illustrate that the job titles of top, middle and lower management ranged from assistant managers to district managers. 33 (22 %) respondents held the positions of assistant managers, 22 (14 %) were general managers, while 21 (13 %) were managers. Deputy managers were represented by 18 (12 %) of the respondents, 15 (10 %) were senior administrative officers, while 12 (8 %) were directors. The findings further reveal that 10

(7 %) of the respondents were senior general managers, 9 (6 %) were chief education specialists, while 8 (5 %) of the respondents were deputy directors and only 4 (3 %) were district managers.

7.2.3 Highest qualification

Six categories of the highest qualifications were used to describe the educational characteristics of the respondents. These were certificate and diploma qualifications, bachelors, Masters and Doctoral degrees. The aim behind this question was to establish whether qualifications had any influence on the use of ICTs in the public sector. A summary of the responses is captured in Figure 7.1 below.

Figure 7.1: Distribution of the respondents by highest qualification (N=152)

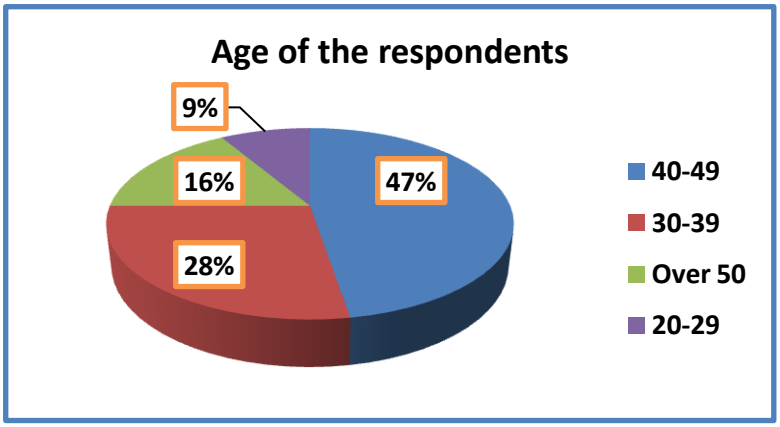


The above figure illustrates that the majority of the respondents (61; 40 %) had obtained a bachelor's degree. 32 (21 %) had diplomas and 25 (16 %) had postgraduate diplomas. The findings further reveal that 18 (12 %) had obtained a Masters, followed by those with certificates (16; 11 %). None of the respondents had a Doctoral degree.

7.2.4 Age groups

In this item, the respondents were asked to indicate their ages. The aim of this question was two-fold, first to understand the distribution of respondents by age, and secondly to establish whether there was any correlation between the respondents' ages and their use of ICTs. The following figure shows the distributions of the respondents according to their ages.

Figure 7.2: Distribution of the respondents by age (N=152)

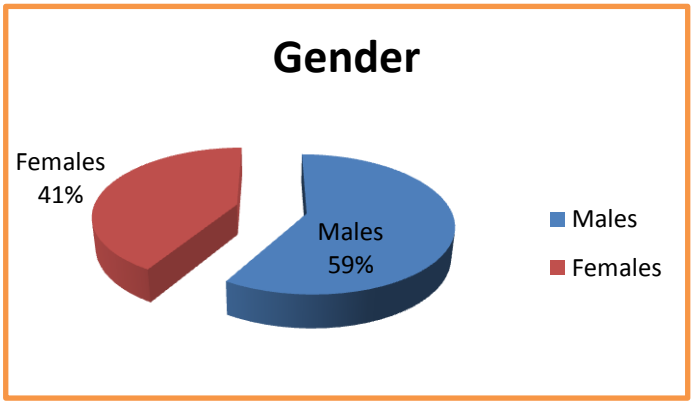


An examination of the data reflects that the highest number of respondents was between the ages of 40 and 49 (47 %), followed by the respondents in the 30 - 39 age group (28%). Respondents over the age of 50 and those between 20 and 29 ranked third and fourth respectively.

7.2.5 Gender

The civil servants were asked to indicate their gender. The aim of this question was to establish whether there was gender equity in the diffusion of ICTs in the government departments under study. Many studies have identified women and girls as disadvantaged in their uptake of ICTs (Hafkin and Odame, 2002; Cullen, 2001; Nielson, 2001; Botha, 2001; and Ngenge, 2003). Cullen (2001) found that disparities are much greater in Africa, with the involvement of women being as low as 5 %. The results of the survey are summarized in Figure 7.3 below.

Figure 7.3: Distribution of the respondents by gender (N=152)

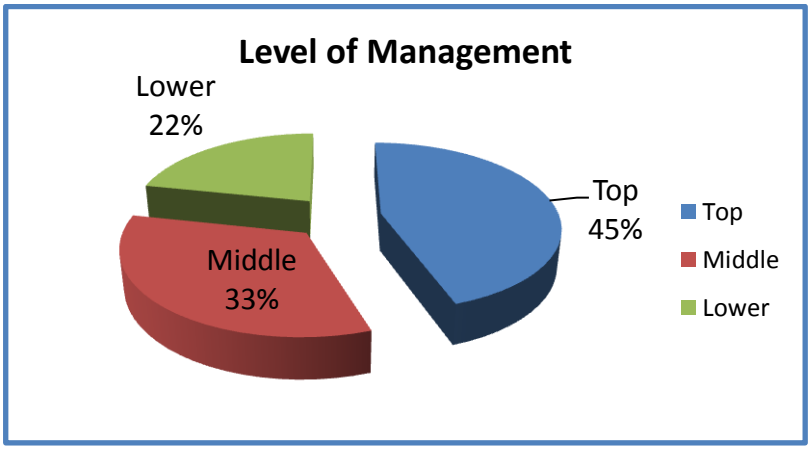


89 (59 %) of the respondents were male while 63 (41 %) were female. Overall, the results suggest that the public sector in KwaZulu-Natal is male dominated.

7.2.6 Distribution of the respondents by level of management

Three categories were used to describe the levels of management of the respondents. These were: top/ strategic management, middle/ tactical management, and lower/ operational management. The aim behind this question was to establish whether levels of management had any influence on the use of ICTs amongst the civil servants. Figure 7.4 below presents the results.

Figure 7.4: Distribution of the respondents by level of management (N=152)



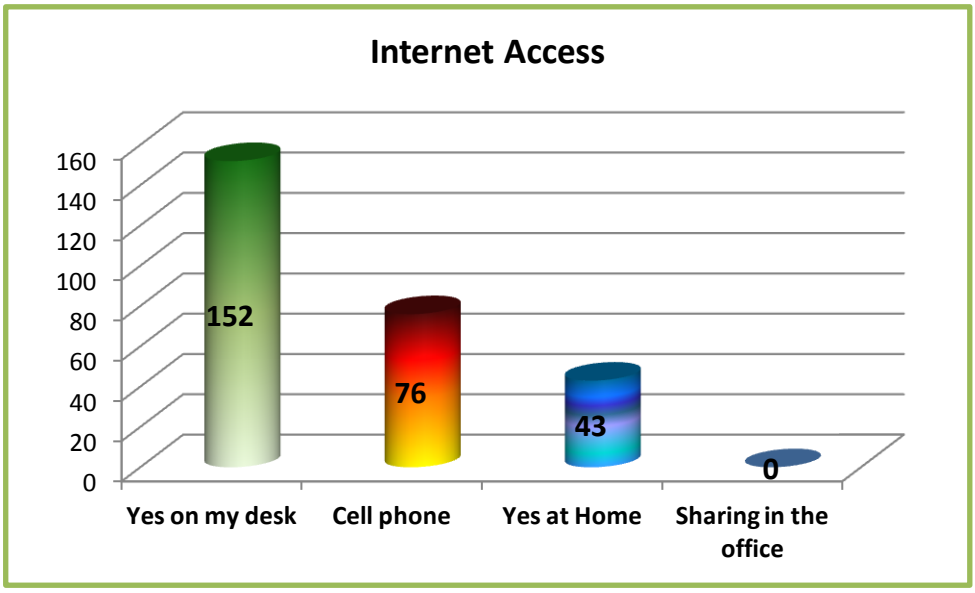
The above figure demonstrates that the majority of respondents (68; 45 %) were top managers, 51 (33 %) were middle managers and 33 (22 %) were lower managers. Overall, the majority of the respondents were top managers.

SECTION TWO: ACCESS TO ICTs

7.3 INTERNET ACCESS

The study sought to establish whether the respondents had Internet access. The respondents were therefore provided with a list of six categories of Internet access to choose from. The respondents were at liberty to state any additional Internet access platform that was not listed as long as it was applicable.

Figure 7.5: Internet access (N=152)



** The figure above represents multiple responses*

All the respondents (152; 100 %) had Internet access on computers in their offices, while an average number (76; 50 %) had Internet access via their mobile phones. Only 43 (28 %) respondents had Internet access in their homes. None of the respondents indicated that they were sharing the Internet with colleagues. It was not surprising to find that none of the respondents

had no access to the Internet on account of the fact that all the respondents were in managerial positions. The overall response rate shows that most respondents had access both at home and in their offices, which is a good reflection of ICT interaction and use in government departments in KwaZulu-Natal.

7.4 KNOWLEDGE OF USING COMPUTERS AND THE INTERNET

It was significant for this study to uncover how the respondents acquired their computing and Internet skills. The respondents were asked questions pertaining to computer and Internet skills. Using a close-ended questionnaire, appropriate multiple answers were selected. The respondents were allowed to choose more than one option and asked to provide any others that were not listed. Multiple responses were generated, as Figure 7.6 below summarizes.

Figure 7.6: Knowledge of using computers and the Internet (N=152)

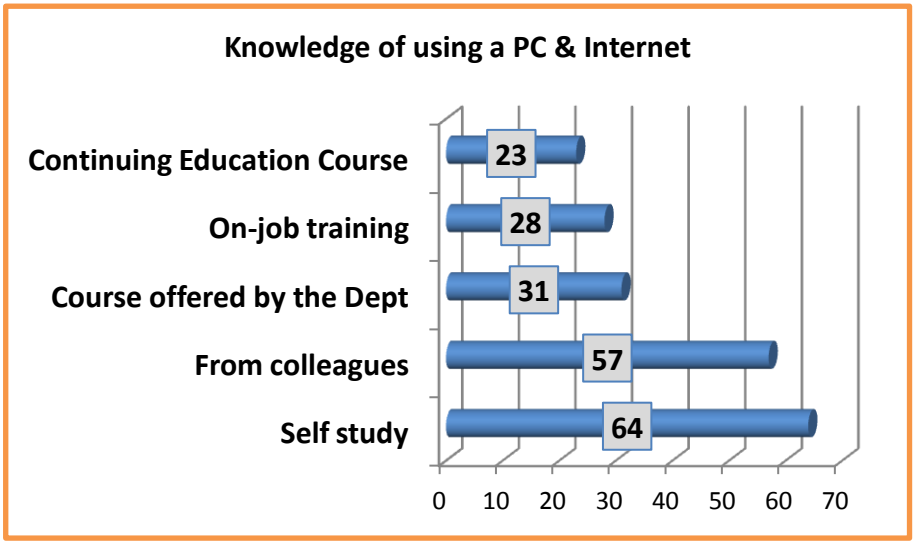


**Figure above represents multiple responses*

When asked to comment on how they acquired their ability to use computers and the Internet, the majority of respondents (64) indicated that they acquired skills through self-study, while 57 revealed that they were taught by their colleagues. 31 acquired computer and Internet skills through in-house courses offered by the department, while 28 acquired computer and Internet

skills through on-the-job experience and/or training. Notably, only 23 of the respondents indicated that they acquired computer and Internet skills through a continuous education course.

SECTION THREE: TYPES OF ICT TOOLS AND SERVICES

7.5 AVAILABILITY OF ICTS IN GOVERNMENT DEPARTMENTS

One of the objectives of the study was to establish the types of ICT tools and services available in government departments. Therefore the respondents were asked to indicate the level of access they had to ICT tools and services in their respective departments. The main aim here was to establish the extent to which the available ICTs were accessible to the civil servants in their respective departments. The respondents were therefore provided with a list of ICT tools and services and asked to rate them accordingly on a Likert scale of 1 (not accessible) to 4 (very accessible). Using a close-ended questionnaire, appropriate multiple answers were selected. The respondents were also asked to indicate any other ICT tools and services that were not listed (see Table 7.3 below).

Table 7.3: Accessibility of ICTs in government departments (N=152)

ICT TOOLS & SERVICES	NOT ACCESSIBLE		LESS ACCESSIBLE		ACCESSIBLE		VERY ACCESSIBLE	
	F	***%***	***F***	***%***	***F***	***%***	***F***	***%***
Television	141	93	11	7	-	-	-	-
Radio	145	95	7	5	-	-	-	-
Video camera	102	67	41	27	9	6	-	-
Video recorders	127	84	22	14	3	2	-	-
Tape recorder	112	74	34	22	6	4	-	-
Data projectors	43	28	41	27	45	30	23	15
Laptop	21	14	25	16	49	32	57	38
Fax machine	-	-	28	18	45	30	79	52
V conferencing	152	100	-	-	-	-	-	-
P computer	-	-	-	-	-	--	152	100
Internet	-	-	-	-	10	7	142	93
Intranet	-	-	-	-	12	8	140	92
Mobile phones	-	-	-	-	7	5	145	95
Databases	33	22	35	23	39	26	45	30
Telephone	-	-	-	-	-	-	152	100
Copy machine	-	-	-	-	-	-	152	100
Printer	-	-	-	-	7	5	145	95
Scanner	19	13	21	14	55	36	57	38
E-mails	-	-	-	-	-	-	152	100

**The table represents multiple responses*

In all cases, 3 and 4 on the Likert scale were combined to calculate high levels of access. The table above shows that computers, e-mail, telephones, copy machines, printers, the Internet and Intranet were very accessible to all the respondents (152; 100 %) in their respective departments. This is possibly because most of the respondents were based in urban areas and had physical access to ICTs and were also all holding managerial positions in their respective departments.

All the respondents indicated that videoconferencing was not accessible, maybe because it was not available. A very large number of the respondents (145; 95 %) indicated that mobile phones were highly accessible, while 68 (45 %) had access to data projectors. 43 (28 %) indicated that they had no access to data projectors. Televisions were not accessible to the majority of the respondents (141 or 93 %); only 11 (7 %) said that televisions were less accessible. 145 (95 %) of the respondents also revealed that radios were not accessible in the departments in question. Video cameras were not accessible to the majority of the respondents (102 or 67 %); only 9 (6 %) had access to video cameras. With respect to video recorders, most of the respondents (127; 84 %) had no access to them, while 22 (14 %) had less access. Only 3 (2 %) of the respondents had access to video recorders.

The study's results revealed that a significant number (112 or 74 %) of the respondents had no access to tape recorders, while 34 (32 %) had less access and only 6 (4 %) had full access. 106 respondents (70 %) had access to laptop computers, while those who had no access to laptops were in the minority (21 or 14 %). Fax machines could be accessed by most of the respondents (124 or 82 %). Only 28 (18 %) ticked off less access to fax machines, and none of the respondents had no access to fax machines. 84 (55 %) had access to databases and 112 (74 %) had access to scanners. 19 (13 %) revealed that they had no access to scanners, while 21 (14 %) indicated less access.

7.6 REASONS FOR USING ICTS

In Table 7.4, the respondents were required to give their personal views to a close-ended question regarding their use of ICTs in their respective departments. The aim of this question was to capture the varying opinions and attitudes of the respondents related to ICT usage in their respective departments. The respondents were provided with possible options to choose from and asked to rate each one on a scale of 1 to 4 (1 = strongly disagree, through 4 = strongly agree). Using a close-ended questionnaire, appropriate multiple answers were selected. The table below shows the number of responses for each rating and the corresponding percentages.

Table 7.4: Reasons for using ICT tools and services (N=152)

Use of ICT tools and services	Strongly agree		Agree		Disagree		Strongly disagree	
	F	***%***	***F***	***%***	***F***	***%***	***F***	***%***
To communicate with colleagues	152	100	-	-	-	-	-	-
To disseminate information.	152	100	-	-	-	-	-	-
For research purposes	89	59	32	21	31	20	-	-
For Information retrieval	34	22	44	29	33	22	41	27
For e-commerce	6	4	47	31	21	14	78	51
For Internet banking	11	7	22	14	33	22	86	57
For e-learning	8	5	13	9	55	36	76	50
For marketing purposes	34	22	41	27	54	36	23	15
For word processing	152	100	-	-	-	-	-	-
For Internet access	152	100	-	-	-	-	-	-
For spread sheet	152	100	-	-	-	-	-	-
For records management	122	80	30	20	-	-	-	-
For presentations	108	71	44	29	-	-	-	-
For database searching	12	8	34	22	65	43	41	27
For printing	152	100	-	-	-	-	-	-
Advertising	33	22	54	36	43	28	22	14
Purchasing	17	11	45	30	48	32	42	28
Information gathering	49	32	38	25	54	36	11	7

** The table above represents multiple responses*

The survey revealed that all the respondents (152; 100 %) used ICTs to communicate with fellow colleagues, to access the Internet, for spreadsheet purposes, for printing, word processing, and to disseminate departmental information. In all cases, 1 and 2 on the Likert scale were combined to calculate all the responses in the affirmative. Most respondents used ICTs for research purposes (121 or 80 %). Those who used ICTs to retrieve information were in the average (78 or 51 %), while 53 (35 %) used ICTs for e-commerce purposes. 33 (22 %) of the respondents revealed that they used ICTs to bank online, while very few used ICTs for electronic learning purposes (21 or 14 %).

An average number of respondents (75; 49 %) used ICTs for marketing purposes. All the respondents used ICTs for records management (152; 100 %). and presentation purposes (152; 100 %). The results show that an average number of respondents used ICTs for database searching (46 or 30 %). and advertising purposes (87; 57 %). 62 (41 %) used ICTs for purchasing purposes, while 87 (57 %) of the respondents used ICTs to gather information.

SECTION FOUR: THE LEVEL OF INTERACTION WITH ICTs

7.7 THE CIVIL SERVANTS' LEVEL OF INTERACTION WITH ICTS

The respondents were asked to indicate their level of interaction with ICT tools and services. The aim of this question was to establish the extent to which the civil servants interacted with ICTs. The respondents were provided with a list of ICT tools and services and asked to rate them accordingly on a Likert scale of 1 (very low) to 5 (very high). Table 7.5 below summarizes the responses.

Table 7.5: The level of interaction with ICTs (N=152)

ICT tools and services	Very low		Low		Satisfactory		High		Very high	
	F	***%***	***F***	***%***	***F***	***%***	***F***	***%***	***F***	***%***
Television	149	98	3	2	-	-	-	-	-	-
Radio	152	100	-	-	-	-	-	-	-	-
Video camera	89	59	22	14	36	24	5	3	-	-
Video recorders	78	51	43	28	28	18	3	2	-	-
Tape recorder	66	43	46	30	29	19	11	7	-	-
Data projectors	76	50	29	19	12	8	22	14	13	9
Laptop	-	-	-	-	2	2	23	15	127	84
Fax machine	-	-	3	2	32	21	54	36	63	41
V conferencing	-	-	-	-	-	-	-	-	-	-
P computer	-	-	-	-	-	-	-	-	152	100
Internet	-	-	-	-	-	-	-	-	152	100
Intranet	-	-	-	-	-	-	-	-	152	100
Mobile phones	-	-	-	-	-	-	-	-	152	100
Databases	18	12	22	14	58	38	31	9	23	15
Telephone	-	-	-	-	-	-	-	-	152	100
Copy machine	11	7	5	3	43	28	32	21	61	40
Printer	-	-	-	-	-	-	-	-	152	100
Scanner	22	14	8	5	91	60	18	12	13	9
E-mails	-	-	-	-	-	-	-	-	152	100

In all cases, 4 and 5 on the Likert scale were combined to calculate all high levels of interaction, and 1 and 2 were combined for all low levels of interaction. The respondents' level of interaction

with ICT tools and services such as e-mail, personal computers, the Internet, intranet, printers, telephones, and mobile phones was very high (152; 100 %). All the respondents (152; 100 %) revealed that their interaction with the radio was very low. Scanners were used satisfactorily by a large number (91; 60 %) of the civil servants. Many civil servants (93; 61 %) interacted with copy machines. The survey results show that all the respondents (152; 100 %) had very low interaction levels with the television. 111 respondents (73 %) had low interaction levels with video cameras, 5 (3 %) revealed a high level of interaction with video cameras, 121 (80 %) had a very low level of interaction with video recorders, and only 3 (2 %) had high levels of interaction with video recorders.

Most respondents had very low levels of interaction with tape recorders (112; 74 %), while 105 (69 %) had a very low level of interaction with data projectors. The general level of interaction with laptops was very high (150; 99 %). 117 (77 %) respondents suggested a very high level of interaction with fax machines. None of the respondents used video conferencing. The majority (58; 31 %) had a satisfactory level of interaction with databases, 40 (26 %) a very low level of interaction with databases, and 54 (36 %) a very high level of interaction with databases.

7.8 TIME SPENT PER DAY USING ICTS FOR WORK PURPOSES

The respondents were asked how much time they spent per day using ICTs for work purposes. The respondents were provided with a list of ICT tools and services and asked to rate them accordingly on a Likert scale of 1 (less than an hour) to 5 (more than 16 hours). The respondents were also allowed to choose more than one option, as Table 7.6 below summarizes.

Table 7.6: Time spent per day on ICTs for work purposes (N=152)

ICT TOOLS AND SERVICES	LESS THAN 1 HOUR		1-5 HOURS		6-10 HOURS		11-15		MORE THAN 16 HOURS	
	F	***%***	***F***	***%***	***F***	***%***	***F***	***%***	***F***	***%***
Television	6	4	10	7	-	-	-	-	-	-
Radio	2	1	3	2	-		-		-	-
Video camera	149	98	3	2	-	-	-	-	-	-
Video recorders	145	95	7	5	-	-	-	-	-	-
Tape recorder	148	97	4	3	-	-	-	-	-	-
Data projectors	11	7	58	38	83	55	-	-	-	-
Laptop	-	-	16	11	136	89	-	-	-	-
Fax machine	2	1	144	95	6	4	-	-	-	-
V conferencing	-	-	-	-	-	-	-	-	-	-
P computer	-	-	-	-	152	100	-	-	-	-
Internet					152	100	-	-	-	-
Intranet	-	-	-	-	152	100	-	-	-	-
Mobile phones	-	-	-	-	152	100	-	-	-	-
Databases	65	43	77	51	10	7	-	-	-	-
Telephone	7	5	8	5	137	90	-	-	-	-
Copy machine	146	96	6	4	-	-	-	-	-	-
Printer	4	3	7	5	141	93	-	-	-	-
Scanner	151	99	1	1	-	-	-	-	-	-
E-mails	-	-	3	2	149	98	-	-	-	-

**The table represents multiple responses*

All the respondents (152; 100 %) indicated that they spent 6-10 hours per day interacting with ICTs such as the Internet, intranet, personal computers and mobile phones. All the respondents (152; 100 %) also revealed that they did not have access to video conferencing. The results indicate that copy machines, scanners, video cameras, video recorders, and tape recorders were used by a significant number of the respondents less than an hour per day (whenever they used them). Notably, the results reflect that only 2 respondents (1.3 %) used the radio for less than one hour for work-related purposes and this is whenever they used it.

The numbers of those who indicated that they used fax machines (144; 95 %) and databases (77; 51 %) for 1 to 5 hours were also significant. The results show that none of the respondents used ICTs for more than 11 hours a day. Only 10 respondents (7 %) used the television for 6-10 hours per day. Data projectors were used by 83 respondents (55%) from 6-10 hours per day. With respect to laptop computers, the majority (136; 89 %) used them for 6-10 hours per day. Only 16 (11 %) used laptop computers for 1-5 hours per day.

7.9 PERIOD OF ICT USAGE

Table 7.7 shows responses to the question, "How long have you used the following ICTs tools and services for work purposes?" The respondents were provided with a list of ICTs and asked to rate them accordingly on a Likert scale of 1 (less than a year) to 5 (over 10 years). The table below summarizes the responses.

Table 7.7: Period of ICT usage (N=152)

ICT tools and services	Less than a year		1-2 years		2-5 years		5-10 years		Over 10 years	
	F	*%*	*F*	*%*	*F*	*%*	*F*	*%*	*F*	*%*
Television	-	-	-	-	-	-	7	5	12	8
Radio	-	-	-	-	3	2	3	2	-	-
Video camera	-	-	-	-	32	21	12	8	14	9
Video recorders	-	-	-	-	2	1	33	22	7	5
Tape recorder	-	-	-	-	-	-	17	11	21	14
Data projectors	-	-	-	-	21	14	124	82	7	5
Laptop	-	-	-	-	39	26	87	57	26	17
Fax machine	-	-	-	-	21	14	77	51	54	36
V conferencing	-	-	-	-	-	-	-	-	-	-
P computer	-	-	-	-	-	-	-	-	152	100
Internet	-	-	-	-	-	-	45	30	107	70
Intranet	-	-	-	-	-	-	39	26	113	74
Mobile phones	-	-	-	-	-	-	-	-	152	100
Databases	-	-	-	-	96	63	32	21	24	16
Telephone	-	-	-	-	-	-	-	-	152	100
Copy machine	-	-	-	-	-	-	-	-	152	100
Printer	-	-	-	-	-	-	-	-	152	100
Scanner	-	-	-	-	-	-	-	-	152	100
E-mails	-	-	-	--		-	-	-	152	100

The results, as illustrated in Table 7.7 above, show that all the respondents (152; 100 %) had spent over 10 years using ICT tools and services such as electronic mail, scanners, printers, copy machines, telephones, mobile phones, and personal computers. Notably, none of the respondents indicated having used any ICTs for less than 2 years. The numbers of those who had used data projectors (124; 82 %), fax machines (77; 51 %), and laptops (87; 57 %) for 5 to 10 years were also significant. Databases had been used by a significant number of the respondents (96; 63 %) for 2 to 5 years. Most of the respondents (107; 70 %) had used the Internet for more than 10 years, while a significant number (113, 74 %) of the respondents had used an intranet for more than 10 years. Only 12 (8 %) of the respondents had used televisions in their jobs for more than 10 years. Radios had been used by only 3 (2 %) of the respondents for 5-10 years, while 3 (2 %) had used radios for 2-5 years.

With respect to video cameras, the table above illustrates that 32 (21 %) of the respondents had used them for 2-5 years, while only 14 (9 %) had used video cameras for more than 10 years. The table above further shows that 33 (22 %) of the respondents had used video recorders for 5-10 years, while only 7 (5 %) had used them for over 10 years. 21 (14 %) of the respondents had used tape recorders for over 10 years, while those who have had used them for 5-10 years were in the minority (17; 11 %).

7.10 FREQUENCY OF USING ICTS

The respondents were required to respond to how frequently they used certain ICT tools and services for their work purposes. A list of ICT tools and services was provided, and they were asked to rate each one of them on a Likert scale of 5 (daily) to 1 (never). The table below provides the responses.

Table 7.8: Frequency of using ICTs (N=152)

ICTS	DAILY		WEEKLY		MONTHLY		SOMETIMES		NEVER	
	F	***%***	***F***	***%***	***F***	***%***	***F***	***%***	***F***	***%***
Television					5	2	14	3	133	88
Radio							7	5	145	95
Video camera	-	-	-	-	2	1	72	47	77	51
Video recorders	-	-	-	-	7	5	91	60	36	24
Tape recorder	-	-	-	-	-	-	49	32	103	68
Data projectors	-	-	11	7	98	64	43	28	-	-
Laptop	152	100	-	-	-	-	-	-	-	-
Fax machine	67	44	85	56	-	-	-	-	-	-
V conferencing	-	-	-	-	-	-	-	-	-	-
PC	152	100	-	-	-	-	-	-	-	-
Internet	152	100	-	-	-	-	-	-	-	-
Intranet	152	100	-	-	-	-	-	-	-	-
Mobile phones	152	100								
Databases	21	14	22	14	10	7	99	65	-	-
Telephone	152	100	-	-	-	-	-	-	-	-
Copy machine	26	17	33	22	22	14	71	47	-	-
Printer	152	100							-	-
Scanner	-	-	-	-	57	38	95	63	-	-
E-mails	152	100	-	-	-	-	-	-	-	-

Most of the respondents (133; 88 %) indicated that they had never used the television for work purposes. It was also not surprising to find that many respondents (145; 95 %) had never used the

radio for work purposes; neither one can really be found in government departments. ICT tools such as video cameras (72; 47 %) and video recorders (91; 60 %) were sometimes used by the respondents. 103 respondents (68 %) revealed that they had never used tape recorders. The number of those who said that they used data projectors monthly was average (98; 64 %).

All the respondents (152; 100 %) used laptops, personal computers, printers, Internet, Intranet, telephones, e-mail and mobile phones on a daily basis. All the respondents (152; 100 %) indicated that they had never used videoconferencing in their departments because it was not accessible. When asked to comment on the use of databases, a significant number (99; 65 %) also revealed that they sometimes used databases for work purposes. With respect to the use of scanners, most respondents (95; 63 %) said they sometimes used them. The results made it known that copy machines were sometimes used in government departments (71; 47 %), while 85 respondents (56 %) revealed that they used fax machines daily.

SECTION FIVE: IMPACT AND VALUE OF ICTs

7.11 EFFECTIVE ICTS IN WORK CREATIVITY AND PRODUCTIVITY

The study sought to establish ICT tools and services that assist with improving work creativity and productivity. Respondents were provided with a list of ICT tools and services and asked to rate them on a Likert scale of 1 to 4 (1 = very effective; 2 = effective; 3 = less effective; and 4 = not effective). Using a close-ended questionnaire, appropriate multiple answers were selected by the respondents.

Table 7.9: Effective ICTs in work creativity and productivity (N=152)

ICTs	Very effective		Effective		Less effective		Not effective	
	F	***%***	***F***	***%***	***F***	***%***	***F***	***%***
Television					23	15	129	85
Radio	-	-	-	-	2	1	150	99
Video camera	-	-	-	-	18	12	134	88
Video recorders	-	-	14	9	35	23	103	68
Tape recorder	-	-	34	22	29	19	89	59
Data projectors	76	50	44	29	32	21	-	-
Laptop	152	100	-	-	-	-	-	-
Fax machine	152	100	-	-	-	-	-	-
V conferencing	-	-	-	-	-	-	-	-
PC	152	100	-	-	-	-	-	-
Internet	152	100	-	-	-	-	-	-
Intranet	152	100	-	-	-	-	-	-
Mobile phones	152	100	-	-	-	-	-	-
Databases	31	20	87	57	32	21	2	1
Telephone	152	100	-	-	-	-	-	-
Copy machine	103	68	49	32	-	-	-	-
Printer	152	100	-	-	-	-	-	-
Scanner	99	65	43	28	10	7	-	-
E-mails	152	100	-	-	-	-	-	-

In all cases, 1 and 2 on the Likert scale were combined to calculate effective ICTs. All the respondents (152; 100 %) were of the view that ICT tools and services such as e-mail, printers, telephones, mobile phones, intranet, Internet, personal computers, fax machines, and laptops were very effective in work creativity and productivity. The respondents also revealed that ICTs such as televisions (129, 85 %), video cameras (134, 88 %), tape recorders (89, 59 %), video recorders (103, 68 %), and radios (150, 99 %) were not effective in improving work creativity and productivity in the public sector (a total rating of 100 % when 3 and 4 on the Likert scale are combined).

Those who revealed that databases are effective were in the majority (118; 78 %). All the respondents signified that copy machines were very effective in improving work creativity and productivity amongst the civil servants in government departments (152; 100 %). When asked to comment on scanners, most respondents (142; 93 %, levels 1 & 2 combined) indicated that scanners were effective in improving work creativity and productivity. With regard to data projectors, (120; 79 %) at the combined levels 1 & 2 revealed that data projectors were effective.

SECTION SIX: TRAINING NEEDS

7.12 TRAINING NEEDS OF THE CIVIL SERVANTS

In the table below, the respondents were required to answer a question based on the type of training they would require in order to help them use ICTs more often and effectively. In this question, a scale of 1 denoted a favourable response, i.e. very essential, followed by 2 (i.e. essential), 3 (i.e. quite essential), and 4 (not very essential). The respondents were therefore provided with a list of possible training needs and asked to rate each one of them on the Likert scale. The respondents were at liberty to provide any other training needs that were not listed on the questionnaire. Thus some of the training needs got a few ratings, as the table below illustrates.

Table 7.10: Training needs of the civil servants (N=152)

Training needs	Very essential		Essential		Quite essential		Not very essential	
	F	***%***	***F***	***%***	***F***	***%***	***F***	***%***
Word processing	-	-	-	-	22	14	130	86
Surfing the Internet	30	20	23	15	12	8	87	57
Spread sheet	118	78	29	19	5	3	-	-
File management	103	68	41	27	8	5	-	-
Power point	107	70	33	22	12	8	-	-
Database searching	134	88	18	12	-	-	-	-
Information retrieval	148	97	4	3	-	-	-	-
e-mails	-	-	-	-	-		152	100
e-government	52	34	-	-	-	-	-	-
e-commerce	31	20	-	-	-	-	-	-
e-banking	43	28	-	-	-	-	-	-
Cell phone banking	12	8	-	-	-	-	-	-
e-learning	45	30	-	-	-	-	-	-
Information security	9	6	-	-	-	-	-	-

In all cases, 1 and 2 on the Likert scale were combined to calculate essential ICTs training needs. The survey results indicate that training on word processing was not very essential (130; 86 %). 87 (57 %) of the respondents also indicated that training on Internet surfing was not very essential. The number of those who needed training on spreadsheets was significant (147; 97 %). 144 respondents (95 %) indicated that training on file management was essential. 140 respondents (92 %) also revealed that training on Power Point presentation was very essential.

All the respondents (152; 100 %) indicated that database searching and information retrieval was very essential, and equally all the respondents (152; 100 %) felt that training on e-mail was not very essential. 52 (34 %) felt that training on e-government was very essential, 31 (20 %) indicated that training on electronic commerce (e-commerce) was very essential, while 43 (28 %) indicated that training on electronic banking (e-banking) was very essential. Only 12 (8 %) felt that training on cell phone banking was very essential to them. 45 (30 %) revealed that training on electronic learning (e-learning) was very essential, and only 9 (6 %) respondents indicated that training on information security was very essential.

7.13 THE LEVEL OF ICT COMPETENCE

The study sought to gauge the respondents' competencies in using ICT tools and services. Section seven of the questionnaire asked the respondents to rate their ICT skills on a Likert scale of 1 (very poor) to 5 (excellent). Table 7.11 summarises the responses; data was cross tabulated and presented according to frequency.

Table 7.11: The level of ICT competence (N= 152)

ICTs	Excellent		Good		Satisfactory		Poor		Very poor	
	F	***%***	***F***	***%***	***F***	***%***	***F***	***%***	***F***	***%***
Television	152	100	-	-	-	-	-	-	-	-
Radio	152	100	-	-	-	-	-	-	-	-
Video camera	88	58	56	37	8	5	-	-	-	-
Video recorders	93	61	59	39	-	-	-	-	-	-
Tape recorder	152	100	-	-	-	-	-	-	-	-
Data projectors	26	17	31	20	56	37	39	26	-	-
Laptop	152	100	-	-	-	-	-	-	-	-
Fax machine	152	100	-	-	-	-	-	-	-	-
V conferencing	9	6	25	16	14	9	41	27	63	41
PC	152	100	-	-	-	-	-	-	-	-
Internet	42	28	31	20	52	34	27	18	-	-
Intranet	23	15	54	36	57	38	18	12	-	-
Mobile phones	152	100								
Databases	19	13	37	24	53	35	43	28	-	-
Telephone	152	100	-	-	-	-	-	-	-	-
Copy machine	152	100	-	-	-	-	-	-	-	-
Printer	152	100	-	-	-	-	-	-	-	-
Scanner	94	62	27	18	31	20	-	-	-	-
E-mails	152	100	-	-	-	-	-	-	-	-

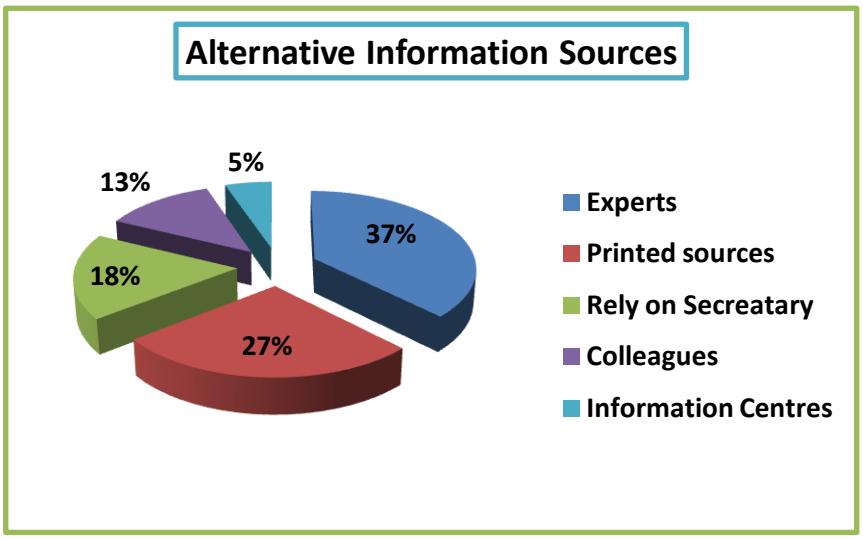
When asked to rate their ICT skills, all the respondents (152; 100 %) suggested that their skills were excellent when using ICTs such as the television, radio, laptops, personal computers, fax machines, mobile phones, printers, telephones, tape recorders, e-mail, and copy machines. Most of the respondents (88; 58 %) indicated that their video camera skills were excellent. 4 and 5 on the Likert scale suggest that all the respondents had excellent skills with respect to video recorders. Those who revealed that their data projector skills were satisfactory were in the majority at 56 (37 %). With respect to databases, the majority (53; 35 %) of the respondents revealed that their skills were satisfactory.

104 respondents (68 %) marked off 1 and 2 for videoconferencing on the Likert scale, revealing that their videoconferencing skills were very poor. By combining 5, 4 and 3 on the Likert scale, which translates to 125 (82 %), it would be fair to assert that the respondents possessed good Internet competencies. An average number (77; 51 %) of the respondents (4 and 5 on the Likert scale) indicated that their intranet competences were good. 121 respondents (80 %) marked off 4 and 5 for scanners on the Likert scale, suggesting that most of the respondents could use scanners.

7.14 ALTERNATIVE SOURCES OF INFORMATION FOR WORK PURPOSES

In this item, the respondents were required to mention all or any other sources of information that they used in their quest for information aside from ICTs. This question aimed to determine the effectiveness and efficiency of information systems in government departments. Figure 7.7 below summarizes the responses.

Figure 7.7: Respondents' alternative sources of information for work purposes (N=152)



With respect to alternative sources of information, most of the respondents (57; 37 %) indicated that they relied on experts, while 41 (27 %) said they consulted printed information sources. 27 (18 %) relied on secretarial services, while 19 (13 %) relied on colleagues. Those who relied on information centres were in the minority (8; 5 %).

7.15 ADDRESSING RESPONDENTS' ICT EDUCATION AND TRAINING NEEDS

Respondents were expected to indicate the type of ICT education and training needs they would need met in order to help them use ICTs more often. The respondents generally noted the following:

I. *More encouragement for the staff to study;*

II. *More training on ICTs;*

III. *Provide bursaries for staff to equip themselves with new ICT skills;*

IV. *There must be a reward in every ICT qualification obtained; and*

V. *More incentives for staff.*

7.16 HINDRANCES FACING THE USE OF ICTS

The respondents were asked questions pertaining to the impediments to ICT usage in their respective departments. Using an open-ended questionnaire, appropriate multiple answers were requested. The respondents were of the view that:

I. *There is a lack of sufficient coherent government policies regulating the training of civil servants with respect to the use of ICTs in the public sector;*

II. *There is no adequate and well structured planning on the use of ICTs in the sector;*

III. *There is a shortage in the funds needed to implement existing policies;*

IV. *There is a general lack of access to ICTs;*

V. *The cost of ICTs is high;*

VI. *There is a lack of ICT infrastructure;*

VII. *There is a lack of professional competence among the civil servants;*

VIII. *Employees' attitude towards technology is negative;*

IX. *There is a lack of technical expertise;*

X. *There is a lack of useful information on ICT usage;*

XI. *There is resistance amongst the civil servants to the use of ICTs; and*

XII. *There are no clear objectives regarding the use of ICTs.*

The most common hindrances cited by the respondents were the lack of adequate and well structured planning, lack of funds to purchase all the necessary ICT facilities and resources, and lack of ICT skills.

7.17 RECOMMENDATIONS FOR IMPROVING THE USE OF ICTS IN THE PUBLIC SECTOR

The respondents were required to discuss and indicate contextual conditions that need to be adapted in order to enhance the positive consequences of ICTs in government departments. The respondents generally felt that:

- *Resources should be provided to ensure that all equipment, including Internet access, functions properly and that administrative functions are performed effectively;*
- *All equipment and electronic resources should be available and in working order at all times;*
- *Money should be set aside to increase bandwidth and provide a speedy, reliable and consistent Internet connection;*
- *Faster modems should be made available in order to improve web access;*
- *Network facilities and computers need to be upgraded;*
- *There must be sufficient and coherent government policies regulating the training of staff with respect to the use of ICTs in the sector;*
- *ICT training of staff is essential;*
- *All members of staff should have access to ICT;*
- *There should be an increased budget for ICTs;*
- *More infrastructure should be provided for the effective use of ICTs;*
- *ICT professional competence in the departments should be increased;*

- *There must be a clear focus and objectives regarding the use of ICTs:*
- *There is a need for adequate and well structured planning; and*
- *There is a need for more ICT awareness in the sector.*

The most popular recommendation was the need for sufficient and coherent government policies regulating the training of staff with respect to the use of ICTs in the sector. Another was the need for resources to be provided to ensure that all equipment, including Internet access, functions properly and that administrative functions are performed effectively.

7.18 SUMMARY

The chapter organized and presented the analyzed data. The main aim of the study was to examine the design, use, impact, interaction and contextualization of ICTs among civil servants and within the civil service work environment in KwaZulu-Natal through social informatics analysis. Data was obtained from 152 respondents or 58 % of the sample of the study from four government departments in KwaZulu-Natal, namely: the Departments of Arts and Culture, Home Affairs, Education, and Health.

The findings reveal that ICT tools such as computers, e-mail, telephones, copy machines, printers, Internet and intranet were very accessible to all the respondents (152; 100 %) in their respective departments. This is not surprising as most of the respondents were based in urban areas and had physical access to ICT tools and services, and were also all holding management positions in their respective departments. It was also not surprising to find that radios and televisions were used relatively less given the nature of the public sector in South Africa. All the respondents indicated that video conferencing was not accessible to them. In contrast, a large number of the respondents (95 %) indicated that they had access to mobile phones, while printers, scanners, databases and fax machines were also accessible to an average number of respondents.

The survey further revealed that all the respondents (152; 100 %) mostly used ICTs to communicate and access the Internet, for spreadsheet purposes, for word processing, for printing, and to disseminate departmental information. ICT applications and services such as electronic commerce, electronic banking, electronic learning, database searching, and information retrieval were used relatively less. Civil servants appear to be reaping many benefits from ICT tools and services such as electronic mail, computers, intranet, and the Internet. For example, the results suggest that all the respondents (152; 100 %) constantly used e-mail to communicate amongst themselves. The study also revealed that there are those ICTs that have no relative advantage in the public sector, such as video conferencing. The respondents' level of interaction with ICT tools and services such as e-mail, personal computers, the Internet, intranet, printers, telephones, and mobile phones was very high. Conversely, a significant number of the respondents indicated that their level of interaction with ICT tools and services such as the television, video recorders, projectors, video cameras, and tape recorders was very low.

Most of the respondents indicated that they spent 6 - 10 hours per day using ICTs. All the respondents (152; 100%) had spent over 10 years using ICT tools and services such as e-mail, scanners, printers, copy machines, telephones, mobile phones, and personal computers. None of the respondents had used ICTs for less than 2 years. ICTs such as e-mail, scanners, printers, and copy machines were probably used because civil servants found these ICTs very useful and knew how to use them.

The respondents suggested that training on word processing was not very essential (152 or 100%). A significant number (107; 70%) revealed that training on PowerPoint presentation was very essential. In terms of acquiring computer skills, the majority of respondents (64; 42%) indicated that they acquired skills through self-study, while 57 (38 %) revealed that they were taught by their colleagues. Most of the civil servants said that they needed to be encouraged to use ICTs, training on ICTs, and financial assistance (bursaries) in order to equip themselves with ICT skills.

The results show that there is a lack of planning and sufficient coherent government policies regulating the training of staff in the utilization of ICTs in government departments, a shortage in the funding needed to implement existing policies, lack of access to ICTs, a lack of infrastructure for the effective the implementation of ICTs, poor professional competence and negative attitudes towards technology, and a lack of technical expertise. Furthermore, there were no clear objectives regarding the use of ICTs, ICT skills and expertise shortages among staff, there was resistance by staff to the use of ICTs, and there were problems related to predicting the true costs of ICT-related activities.

The next chapter, Chapter eight, interprets the data and discusses the conclusions drawn from the results of the study.

CHAPTER EIGHT

DISCUSSION OF FINDINGS

8.1 INTRODUCTION

The preceding chapter presented the results of this study. This chapter serves to provide perspectives and an insight into the results, bearing in mind the aim of this study, which was to examine the types, use, availability and contextualisation of ICTs through social informatics analysis amongst civil servants and within the civil service work environment in KZN. The results that are discussed here were obtained through a questionnaire which was used to solicit information from top, middle, and lower managers in all the selected government departments in KZN. An attempt has been made to collate the results obtained from the questionnaire and draw some correlation and comparison in line with the objectives of the study.

8.2 SCOPE OF DISCUSSIONS

The various issues discussed here embody the specific research questions of the study, i.e. establishing the civil servants' level of Internet access, types of ICT tools and services, reasons for using ICTs, civil servants' level of interaction with ICTs, time spent per day using ICTs for work purposes, period of ICT usage, frequency of using ICTs, effective and useful ICTs for improving work creativity and productivity, training needs of the civil servants, level of ICT competencies, alternative sources of information for work purposes, addressing the ICT education and training needs of the civil servants, problems encountered in the availability and use of ICTs, and recommendations for improving the use of ICTs in government departments.

8.2.1 Demographic profile of the respondents

The respondents ranged from assistant managers to district managers, with the majority (33; 22 %) holding the position of assistant manager. Most of the respondents (66; 43 %) had bachelor degrees. Ayoo (2001) found that most professionals above the age of 40 years in developing countries were often conservative and slow in keeping up with ICT advancements. As indicated in Chapter 7, a large number of respondents were between the ages of 40 to 49 (47 %), followed by respondents in the 30 - 39 year age group (28 %). Respondents in the age group of over 50 years and those between 20 and 29 ranked third and fourth respectively. It was also vital to assess gender proportionality in the study, as it is a widely held view that males dominate use and access to ICTs.

Earlier studies have identified women and girls as disadvantaged in their uptake of ICTs (Hafkin and Odame 2002; Botha *et al*. 2001; Ngenge 2003). Cullen (2001) found that disparities are much greater in Africa, with the involvement of women being as low as 5 %. Majanja and Kiplang'at (2003) have also suggested that gender disparity among professionals in Africa can be attributed partly to the educational system and partly to factors inherent in society at large. This issue is revised by Shaw and Gant (2002), who argued that it has been empirically proven that women and men differ in their attitudes towards, and comfort and anxiety with respect to computer technology. The results of the study indicate that there was clear male dominance (89; 59 %) in the sample population. With respect to the level of management, most of the respondents (68; 45 %) were top managers (see Figure 8.4).

8.2.2 How and where do the civil servants access the Internet?

The diffusion of Internet use over the last decade has been heavily influenced by one major force: personal computer use. Internet use is a good indicator of the information revolution. Internet technologies have been adopted by most organizations for business process reengineering (Xu, Yen, and Chon 2000; Lendor 2009). Major benefits of the Internet include reducing cost, saving time, the rich format, collaboration, and an integrated and distributed computing environment. Thus it was important to establish whether the respondents had Internet

access. Figure 8.5 in the preceding chapter indicates that all the respondents (152; 100 %) had Internet access in their offices. This did not come as a surprise given that all the respondents held managerial positions in their respective departments. It was also not unanticipated to establish that the number of those with Internet access in their homes was also significant.

Again, this could be attributed to the fact that the Internet has proved to be highly effective in improving work creativity and productivity. This concurs with the Diffusion of Innovations Theory, which suggests that those innovations that are perceived to have relative advantage will be adopted faster (see Section 3.4.1 in Chapter 4 – the Diffusion of Innovations Theory). The Data Protection Staff Handbook (2003, 1) notes that the Internet can deliver important business opportunities and advantages when utilized properly and responsibly. For example, the government can improve the way it services the public by using e-mails to communicate with those who can access them and with computer literate citizens who cannot physically go to their nearest offices because of their age, for example. Such services provide citizens with the opportunity to download useful government information directly from the Internet without even visiting a government office.

ICTs have also proved to be vital tools for individuals, corporate institutions or organizations, and even countries in their ability to not only create, store, disseminate and use information, but also market their services and products. The Internet, being a modern ICT tool, offers opportunities and services such as electronic commerce, web-based education and electronic governance, to name a few. The level of Internet access in government departments is a good indicator of the information revolution of a particular country. According to Jeremy and Kenny (2001), the Internet has already proven itself useful in less developed countries (LDCs) by increasing both the incomes and quality of the services received by their citizens. The Africa Internet Forum (1998); Economides (2004) both note that the Internet is a very powerful tool for information transfer. For example, switching from fax to e-mail can reduce the costs of sending 10,000 pages of text from Mozambique to the US over the course of a year by 83 percent. These are some of the factors that explain the civil servants' use of the Internet. 43 (28 %) of the respondents had Internet access in their homes. This shows that civil servants were aware of the benefits of the Internet. The SA Yearbook (2009/10) confirms this trend, noting that African

Internet usage has trebled to more than 12 million since 2000, and South Africa remains the continent's dominant Internet hub with a quarter of Africa's users.

8.2.3 How did civil servants acquire their abilities to use the computer and the Internet?

Sometimes organisations have unfair expectations that all their staff can use ICTs effectively. In many organisations, employees are provided with their own organisational ICTs to use, but the question is, who equips them with the skills they need to use these ICTs? Figure 8.6 in the previous chapter shows that most of the civil servants (64; 42 %) had acquired their skills through self-study/ self training, while a significant number (57) were taught by their colleagues. Still, it is generally very unusual to see a manager being taught to use a computer and/or the Internet by his or her colleague. Notably, only 31 of the respondents acquired computer and Internet skills through in-house courses offered by their respective departments. All this shows that the government is unfair in its expectation that all its civil servants possess the necessary ability to use ICTs. The results confirm that there is no ICT policy in government departments, because if there was, there would be a clear and proper planning and ICT policy on training and the use of ICTs in the sector. Evidently not enough is being done to equip its civil servants with the ICT skills that they require in order to improve service delivery.

8.2.4 What types of ICTs are available in government departments?

For civil servants to be able to deliver services quickly and efficiently, they need to have access to ICT tools and services. The study established that a variety of ICT tools and services are available and have been adopted in government departments with the intention of improving work productivity and creativity in the sector (see Table 7.3 in Chapter 7). The most available ICT tools and services in government departments included telephones, computers, e-mail, fax machines, mobile phones, the Internet, intranets, copy machines and printers, in that order.

A large number of the respondents (95 %) indicated a high reliance on mobile phones. This did not come as a surprise: South Africa is the fourth-fastest growing mobile communications

market in the world (Paul Budde Communication 2010). These results are in line with the current statistics, i.e. South Africa's telecom sector boasts the continent's most advanced networks in terms of the technology deployed and services provided (Paul Budde Communication 2010). The country has a vibrant mobile market that has seen rapid uptake since competition was introduced 15 years ago. With market penetration at over 100 % and with the availability of number portability, the network operators – Vodacom, MTN, Cell C and Telkom SA – are increasingly forced to find innovative ways of distinguishing themselves from the competition in order to gain and retain customers (see section 2.7.3 in Chapter 2). These results concur with a study by Mutula and Mostert (2008), who narrate that in the last decade, the South African government has invested heavily in the provision of ICT tools to its departments in order to elevate and improve the standard of service delivery to the society. This can be seen in the number and variety of ICT tools made available to the respective departments, as Table 8.3 illustrates.

Sandler (2010, 23) explains that when personal computers were first introduced in about 1980, they were only a few things one could do with them: word processing, basic mathematics and accounting, and a handful of simple games. Likewise, when cell phones became the next 'great thing' later in that decade, they were pretty good at one thing, which was to make and receive calls without a landline. Sandler observes that with each of these devices, it was hard to imagine at the time that they would become essential tools that can now allow people to go shopping for just about anything, anywhere, anytime. Today, however, this is one of the most common and useful tasks people perform with their computers and cell-phones. The study was not interested in unravelling what the civil servants used their mobile phones for, or any other ICT tool for that matter; however, the researcher did indicate during the pre-visit to the targeted departments and on the questionnaire that the survey was about the use of ICTs by civil servants for work-related purposes (see Table 7.4 where the respondents were required to indicate their reasons for using ICTs). The respondents were provided with possible reasons to choose from and asked to rate each one on a scale of 1 to 4 depending on how it applied to their situations. The respondents were at liberty to provide any other reasons that were not listed in the questionnaire, and none of them provided reasons for using ICTs other than work-related purposes. This shows that the respondents understood that the study was about their interaction with ICTs only for work-related purposes. Thus the researcher believes that even in government

departments, personal items such as mobile phones can facilitate and improve the way civil servants communicate amongst themselves. They can also be used where there is no landline or in remote areas to improve service delivery.

Everett Roger's (1995), in his now famous "Diffusion of Innovations Theory", argued that one of the greatest pains accorded to human nature is the pain of a new idea (see Chapter 5). Some inventions, like the cell phone, "take the world by storm", while others (e.g. video conferencing) take time or even fail. Others (like the fax machine) may lie dormant for decades, but when their "time comes" their use spreads rapidly, even explosively. Conversely, most new innovations (depending on their purpose, need and acceptance) often achieve slow penetration at first, but then grow quickly as their adoption and rate of use increases. Others may grow fast in the beginning but slow down as their use is exceeded by newer, simpler and cheaper technology. A good example here is the use of broadband Internet access. Its adoption and utilization is directly related to its availability, speed and affordability, both to government departments and the general public.

As indicated in Chapter four, Roger's Diffusion of Innovations Theory also states that innovations are more readily adopted when they provide a relative advantage compared to older ideas, and even more so if they are compatible with the existing value system of the adopter. Roger (1995) further postulates that there are certain characteristics that determine the rate at which an innovation is adopted by a social system, and that these characteristics include relative advantage, compatibility, complexity, trial-ability and the observability of the innovation (see section 5.3.1 in Chapter 5).

Table 7.5 further shows that ICT tools such as radios and cameras were used relatively less or not used at all in the government departments surveyed. These results confirm Roger's theory, in that those innovations that are perceived by individuals as having greater relative advantage, compatibility, trial-ability and observability will be adopted more rapidly than those that are perceived to be more complex (see Chapter 4). This is not unusual, as limited use could be attributed to a number of reasons, such as the irrelevance of the tools in job execution. It would have been interesting to identify the main reasons for the civil servants' use of ICTs such as radios and televisions. Unfortunately, the survey only required the civil servants to indicate

whether radios and televisions were available in their respective departments. However, the researcher was under impression that a radio or television, other than being used in government departments during demonstrations and the training of staff, can be used during live broadcasts or live interviews.

8.2.5 What are the reasons for using ICTs in government departments?

One of the key areas of social informatics is the use of ICTs in both organizational and societal contexts. Table 7.4 in the preceding chapter shows that civil servants mainly used ICTs for communication and to disseminate departmental information. Other than for communication purposes, civil servants mostly used ICTs for spreadsheets, word processing and printing, all very common in an organizational context. Table 7.3 indicates that a wide range of ICT tools and services have been adopted, while Table 7.4 shows that all the respondents used ICTs to facilitate the sharing and exchange of information in the sector, which is what social informatics is all about – interaction between people and technology. These ICTs have been adopted in the public sector because they are relevant in job execution and are thus advantageous to the civil servants (see the Diffusion of Innovations Theory in Chapter 4).

Table 7.4 and Table 7.5 show that some of the ICTs available in government departments have a relative advantage over others. This is evident with a significant number of the civil servants using ICTs such as e-mails, intranet, telephones, Internet, and mobile phones for job execution. However, Table 7.9 shows that there are ICTs that have no relative advantage, such as video conferencing, television, video recorders, data projectors, video cameras, and tape recorders. This could be attributed to a number of reasons, such as the irrelevance of these tools in job execution (see more of these reasons in section 7.2.15).

Most of the ICTs mentioned in the preceding paragraph are available in the government departments surveyed (see Table 7.3). However, many of them are used considerably less or not at all. While one understands the nature of government departments, it should be noted that these ICTs are some of the best innovations civil servants may adopt in order to improve work productivity and creativity in the sector. As Roger's theory lucidly put it, some of the

innovations lie dormant for decades not because they are useless, but because of the users' perceptions towards that particular innovation (see section 4.2 in Chapter 4).

Looking in particular at the radio, Jeremy and Kenny (2001) assert that in addition to being the most accessible mass medium, it is a trusted source of information. The radio has historically proved to be a powerful tool for development, and since the government of a country is responsible for the development of society, it would be wise to use an innovation such as the radio, especially when the government wishes to address masses of people simultaneously. This medium is more relevant and useful in developing countries, and South Africa is no exception.

Undeniably, most managers in government departments rarely use ICT tools such as radios and televisions. Also, such ICT tools can be used by managers to update themselves on burning issues, e.g. during Election Day, or if there is a big event taking place in the country. This way, civil servants would not have to leave their offices in order to watch TV or listen to the radio to find out what is happening. These results concur with numerous researchers such as Entorf and Kramarz (1998); Kling (1999); Forestier, Jeremy and Kenny (2001) and Kenny (2002) who pointed out that in recent years, the escalation of ICTs has had a considerable impact on the way governments function. Also in support of these views, West (2005) observed that the use of ICTs in government, popularly known as e-government, was on the rise, with 19 % of all government organizations worldwide offering online services**.**

Looking closely at an ICT tool such as the telephone, Kenny (2002) asserts that telephones have accrued a long history of evidence as to their utility in government departments. A study by ITU (1998) on "Rural telecommunications in Colombia" established that in Columbia, for example, community telephone access in Tumaco in 1994 increased trade, employment and government service delivery. Forestier, Jeremy and Kenny (2001), in their study on "The impact of ICTs", established that a strong link between telephone roll-out and income growth has also been found in numerous cross-country studies. The latter authors add that cross-country evidence further suggests that limited access to telephony within a country is a powerful force behind the growth in income inequality – those with access benefit, whilst the incomes of those who are unconnected to the telephone network stagnate. This justifies the civil servants (152; 100 %) use of telephones in their respective departments.

ICTs can play a catalysing role in the functioning of all economic and social sectors. More specifically, ICTs can speed up, and even be an alternative to the extension of services in areas such as health care, education, agriculture, business and government. As Mbeki (1995, 183; Matsepe-Casaburri 1999) stated:

> "We believe that the modern communication technology we are all talking about must help us educate our children, particularly in the rural and other underdeveloped areas of our country, teach our medical workers and parents how to care for babies, train our youth, and eliminate distance and infrastructure imbalances which act as a barrier in providing these social services".

Governments are besotted with ICTs and e-business. Some (governments) see them as keys to the knowledge-based economy and the assured competitive advantage of their economies. Greenan, Mairesse and Topiol-bensaid (2001), Websense Inc. (2001), Anandarajan (2002), and Oliver, Lynn and Sanders (2004) all state that ICTs have changed the process of governing in the world. Yong and Hiap Koon (2005, 11), and Curtin, Sommer and Vis-Sommer (2003), have observed that power relations between governments and the governed have been transformed from being mainly vertical and hierarchical and structured along rigid and well-defined departmental boundaries, to being horizontal, networked and participatory. According to Castells (2001), ICTs have actually gone further by bringing about an epoch in history that has been described using labels such as the network age, information society and knowledge economy. Governments in the developed world have responded to the opportunities offered by the information society to offer value-added services to their citizens through electronic government (e-government). However, when zooming into social informatics in sub-Saharan Africa (SSA), Ngulube (2007) argues that countries in SSA have not adequately restructured public bureaucracies in response to the demands of the information society.

The author cautions that many governments are still hierarchical and lacking in accountability and transparency. He adds that public bureaucracies still enjoy the monopoly of

power and authority. He is of the view that that elected officials rarely relate closely with the electorate, and only consult with them when they need their votes after every four or five years. Ngulube further observes that government information systems are still mainly manually operated and paper-based. An earlier study by Wilson III (2004) on this issue indicated that the situation in sub-Saharan Africa is compounded by the fact that some bureaucrats and politicians view the ICT revolution as a "highly political affair and not a technical challenge". The author highlighted the need for change management and the change of the mindsets of many in governments in sub-Saharan Africa if e-government initiatives were to succeed. According to Wilson (2004), governments in many developed countries shifted from being bureaucratic-oriented and unrepresentative to being citizen-oriented as a result of the challenges and opportunities posed to government processes by the information revolution. Thus they took advantage of the information revolution to make government processes, services and information available online in an interactive and open manner. That response has been referred to since as e-government.

ICTs are meant to fulfill the following goals: improve the internal organizational processes of governments; provide better information and service delivery; increase government transparency in order to reduce corruption; reinforce political credibility and accountability; and promote democratic practices through public participation and consultation (Jones 1999; Lenihan 2002; Chisenga 2004). An audit of the technological developments in Africa indicates that most governments in the continent are vigorously promoting the use of ICTs in the provision of their services to their respective citizens. According to Chisenga (2004), the majority of the African governments are finding their way into cyberspace through the construction of their own websites. It has been observed, however, that the mere ownership of a website does not mean effective e-governance (Waiswa 2006). Waiswa (2006) agrees that ICTs only support and stimulate good governance. Websites, nevertheless, are essential tools (and sometimes pre-requisites) for governments to realize or attain any effective e-governance.

According to Chisenga (2004), the following benefits can be realized if governments can distribute their information through ICT tools such as the Internet/ web: lower cost than print distribution; broad distribution at relatively lower cost; speedy distribution at lower cost; and

more information can be made accessible at lower cost. The government is therefore able to: provide more information to the public than it would have before; provide or distribute different but important types of information, e.g. list of staff members of departments, contact details, etc.; provide access to information in remote/rural areas; allow people to respond and/or put their views across; and show its commitment to transparency, accountability, and democratization.

However e-government can also be used for more nefarious purposes. Kluver (2005, 76), for example, argues that e-government initiatives in China have had as their purpose not the empowerment of citizens, nor even to attract external investment, but rather to add stability and order to a chaotic governing process and social change, and to reestablish the control of the governing authorities, including improving the quality of surveillance and data gathering, and hence and ultimately, re-legitimazing the Communist Party of China.

Taking a step back, when the respondents were asked to rate the availability and use of copy machines in their respective departments, all of them (152; 100%) indicated that they are highly accessible (see Tables 7.3 and 7.5 respectively). In line with these findings, Alterman (2000, 25) observes that an ICT tool such as the photocopier has become so mundane in Western societies that people no longer think of it as a high-tech device. However, the author narrates that in the Middle East, for example, no single invention has so democratized the wide dissemination of a message at such a low cost. This is because photocopying machines are very cheap and easy to use. The author explains that photocopiers also interact with the Internet and serve to disseminate web pages and messages that are available only to a few. The author also suggests that ICT tools such as fax machines fulfil an important independent mobilizing function. Videocassette players, which were a rarity in the Middle East ten years ago, now carry powerful messages to local populations.

Likewise, de Alcántara (2001, 19) is of the opinion that ICT tools such as televisions, radios, and even photocopiers and faxes, are the principal means through which civil societies are being formed and reinforced in the majority of all Third World countries. However, Tables 7.3 and 7.5 respectively depict that this is not the case in the South African government. The results suggest that civil servants most likely lack awareness about the benefits of using such ‘old technology’.

8.2.6 What are the civil servants' levels of interaction with ICTs?

It was assumed at the beginning of this study that if the level of interaction with ICTs is high, the level of work productivity and creativity would also improve, and civil service success would be achieved. Table 7.5 shows that the respondents' level of interaction with ICT tools and services such as e-mail, personal computers, the Internet, intranet, printers, telephones, and mobile phones was very high (152; 100 %). These findings tie in well with the studies conducted by Wakari and Ocholla (2010) and Shongwe (2010), who note that mobile phones are by far the most popular ICTs in Africa, citing very well known reasons such as access, functions, availability, easy usage and ownership. Mobile phones are easy to operate and provide immediate opportunities for communication with others with no limits on time and space.

Mobile phones have proved to be more effective in e-government. As a way of improving service delivery, the government is now communicating with South Africans by sending information to their mobile phones. For example, if a person has applied for an identify document, the Department of Home Affairs notifies the applicant of the status of his or her application by sending information to his or her mobile phone. Some ICTs (i.e. television, radios, tape recorders, data projectors etc) had very low levels of interaction for a variety of reasons (see section 8.2.15).

Roger (1995) explains why some innovations are adopted and others are not. As indicated in Chapter 4, Rogers describes an innovation as an idea, practice or object that is perceived as new by an individual or other unit of adoption. He found that the rate of adoption of an innovation is influenced more by an individual's perception of the newness of an innovation than by the actual time it has been around. Moreover, he observes that newness can also mean new knowledge of the innovation or a new decision to adopt it. In essence, what Rogers means here is that computers may be considered as innovations even though they have been available to the public for almost 25 years whenever someone makes a new decision to purchase one. Therefore, one can still expect to see civil servants making use of ICTs such as video conferencing, radios, televisions etc.

8.2.7 How much time do the civil servants spend per day using ICTs for work purposes?

The time spent per day using ICTs is a strong measure of interaction. In fact the daily time people spend on ICTs is a partial measure of the success of ICT tools. Anderson, Brynin, Gershung and Raban (2007, 79), in their study on ICTs in society, underscore that positive attitudes towards ICTs have a positive impact on both usage time and the depth of use. A positive attitude towards ICTs is promoted by the usefulness of the technology being used. A positive attitude towards ICTs is also promoted by possessing the relevant skills to use the technology and by an understanding of ICTs and their capabilities. The study thus sought to gain an insight into the amount of time civil servants spend per day using the different ICTs at their disposal. Table 7.6 shows that all the respondents (152; 100 %) spent six to ten (6 - 10) hours per day using ICTs. This measure, however, does not apply equally to all types of ICTs but varies from technology to technology.

Table 7.6 demonstrates that there was a very small number of civil servants who used radios in their respective departments for less than 1 hour (2; 1 %) and 3 (2 %) respondents who spent 1-5 hours using the radio. There were also a few civil servants (10; 7 %) who spent 1-5 hours per day using televisions for work related purposes. This is despite previously cited indications that the radio is a very important ICT tool that can be utilised by government of any country and more especially in developing countries to disseminate important information to the public. The results also revealed that ICT tools such as video cameras, video recorders, copy machines, databases, and tape recorders were used by the majority of the respondents for less than 1 hour. With respect to copy machines, it is believed that managers hardly use them as they have secretaries who can do the photocopying for them.

The main reasons civil servants spend more time using ICTs such as computers, the Internet, intranet, mobile phones, e-mail, telephones, printers, and laptop computers is because these ICTs are the most available in government departments. These ICTs are also not complex to use and therefore provide the civil servants with relative advantage (see the Diffusion of Innovations Theory in Chapter 5). The other contributing factor could be that the civil servants were satisfied with these ICTs because of their ability to improve work productivity and creativity in the sector.

Although the survey was not interested in uncovering why civil servants did not use some ICTs, the literature painted some light in this regard. Anderson *et al*. (2007, 79) note that ICT usage time is mainly driven by attitudes and not by age. Positive attitudes towards ICTs are affected by past successful usage and tend to increase current usage intensity. The depth of use, on the other hand, depends on age, as well as on attitudes towards ICTs and on ICT experience. Anderson *et al*. further observe that naturally, the two intensity measures (time and the amount of ICT usage) positively reinforce each other.

8.2.8 Which ICTs are effective for improving work creativity and productivity in the public sector?

Table 7.9 shows that all the respondents (152; 100 %) believed that ICT tools and services such as e-mail, printers, telephones, mobile phones, intranet, the Internet, desktop computers, fax machines, and laptops were among the most effective ICT tools and services they used to improve work productivity and creativity. The less effective ICT tools were found to include, among others, televisions, video cameras and the radio. An earlier study conducted by Kling (2000) on the use of ICTs in organizational and societal contexts established that there is a correlation between the use of ICTs and the increase in work productivity and creativity. A similar study by Kling (2000) concurs with the results of this study by noting that ICTs enable people and organizations to extend their abilities in accessing data and in communicating, and in enabling people and organizations to overcome some of the communicational restrictions of space and time. ICT tools have brought about a dramatic reduction in the cost and time involved in storing, processing and transmitting information, leading to a fundamental reshaping of the public sector and society as a whole, and are generating changes in markets, private and public sectors, and economies in the more and less developed world (Castells 2000; Kling 2000; OECD 2003).

According to Paliouras *et al*. (2004), ICTs can be regarded as sources of information that can be turned into valuable knowledge for individuals and organizations. Hubbartt (1999) asserts that ICTs can be useful in helping employees perform their jobs better, while Stanton (2002)

provides a good example of this while researching a sample of professional engineers, finding that employees that used ICTs more frequently than their counterparts contributed higher to the organization because they had access to information that helped them perform their jobs better. Pilat (2004) observes that an empirical analysis of economic growth and productivity typically distinguishes three effects of ICTs. First, investment in ICT contributes to capital deepening and therefore helps raise labour productivity. Second, rapid technological progress in the production of ICT goods and services may contribute to growth in the efficiency of capital and labour, or multifactor productivity (MFP) in the ICT-producing sector. And third, greater use of ICT throughout the economy may help firms increase their overall efficiency, thus raising MFP. Moreover, greater use of ICT may contribute to network effects, such as lower transaction costs and more rapid innovation, which should also improve MFP. According to Pilat (2004), ICTs have been changing the labour market like never before. For example, in the United States and Australia, the labour market experienced an increase in labour and multi-factor productivity growth in the second half of the 1990s which seems partially tied to their use of ICT tools and services.

A study conducted by OECD (2004) on the issue of ICTs and productivity and creativity confirms that ICTs can have a positive impact on firm performance. Some findings of the study indicate that firms that use ICTs tend to have higher productivity performance. By and large, it shows that firms that used either one or more ICT technologies had a higher level of labour productivity than firms that did not use these technologies (OECD 2004). One of the most important findings of the study by OECD (2004) was that the gap between technology-using firms and other firms increased between 1988 and 1997 as technology-using firms increased their relative productivity compared to non-users. The OECD's (2004) study, supported by Dutta, Lanvin, and Paua (2004), suggest that some ICT technologies are more important in enhancing labour productivity than other technologies, communication network technologies being particularly important.

The OECD (2003) reiterates that the use of ICT may help efficient firms gain greater market share at the expense of less productive firms, raising overall productivity. Generally, the use of ICTs may help firms expand their product range, customize their services, or respond

better to demand; in short, to innovate. Moreover, ICTs may help reduce inventories or help firms integrate activities throughout the value chain. Studies in the United Kingdom, for example, have shown that purchasing through electronic networks can make particularly important contributions to improved productivity (OECD, 2003). ICTs are integrating the world's information economy, and in so doing, have opened up new avenues for increased productivity, greater flexibility, and new applications for work (Hubbartt 1999; Stanton 2002; Paliouras *et al*. 2004; Greenfield and Davis 2002). However, this study established that civil servants do not use electronic commerce for work-related purposes.

8.2.9 How long have civil servants been using ICTs?

The Diffusion of Innovations Theory mostly uses time as a measure of the intensity of use of a new technology. The more time people are willing to spend using a new technology, the more it will be considered as a success during the adoption process. According to Heeks (2002), African governments have been using information technology for more than 40 years. Table 7.7 demonstrates that all the respondents (152; 100 %) had spent over 10 years using ICT tools and services such as e-mail, scanners, printers, copy machines, telephones, mobile phones, and personal computers. Notably, none of the respondents indicated having used ICT tools and services for less than 2 years. This confirms what Kim, Yeon and Park (2002, 11) note in their study: that satisfaction is an important aspect of product or service marketing as it determines whether a customer will continue using a product or service or not. They note that if a customer is satisfied with the service on offer by an organization or a company, the client may continue using that particular company's product or service. However, if a client is dissatisfied with the service on offer, he or she may decide to discontinue using that particular product or service. Satisfaction refers to a customer's "cognitive state of being adequately or inadequately rewarded for the sacrifice they have undergone" (Kim, Yeon and Park 2002, 11).

Thus civil servants used e-mail services, scanners, printers, copy machines because they were satisfied with the services these ICTs provide. It can be concluded that civil servants were dissatisfied with the ICT tools and services that they used less (in cases where they had access to them). There are many factors that can contribute to dissatisfaction, such as the complexity of the technology – the technology is not user friendly and other factors have already been mentioned

in this chapter (i.e. lack of technical knowhow, etc.).

8.2.10 How frequently do civil servants use ICTs for work purposes?

While a variety of ICT tools and services have been adopted in the government departments surveyed (see Table 7.3), Table 7.5 shows that not all of the available ICTs were being used. This could be attributed to a number of factors, such as lack of skills and the users' attitudes towards technology, as indicated in item 7.16 in the analysis. Table 7.8 shows that most respondents (133; 88 %) never used the television for their work purposes. It was also not surprising to find that all the respondents (152; 100 %) had never used the radio in their work. Despite the fact that the radio is an ICT tool that can be used to improve service delivery, its diffusion and adoption in the South African government is very low. Table 7.8 further indicates that all the respondents (152; 100 %) used laptops, personal computers, printers, the Internet, Intranet, telephones, e-mail and mobile phones on a daily basis.

As already mentioned in other items, this is possibly because all the respondents held managerial positions in their respective departments. Generally, a manager in any organisation would be the first to have physical access to a technology. Many of the respondents also quite possibly had personal assistants, given their levels of seniority in their respective departments. Thus the majority did not need to use ICT tools such as fax machines and scanners because they relied on their secretaries. The ICT tools that were not used or used relatively less by the civil servants assumedly had no relative advantage, e.g. televisions, radios, and video cameras, as stipulated in Roger's Diffusion of Innovations Theory. Rogers (1995) purports that the rate of adoption of an innovation is influenced more by an individual's perception of the newness of an innovation than by the actual time it has been around. For example, although video conferencing, video recorders, video cameras, tape recorders, data projectors, databases, scanners, copy machines, radios and television have been around for a long time, their rate adoption in government departments is very low, but this does not necessarily mean that their rate of adoption will always be low. It may change when civil servants decide to adopt them.

8.2.11 What alternative information sources do civil servants use for their work purposes?

ICTs have revolutionalised the working environment and are continuing to be key catalysts in economic development. Having said this, poor ICT skills have seen quite a number of the respondents opting for other means of getting information over ICTs (see Figure 7.7 in the analysis). In some cases, negative attitudes towards ICTs could also be contributing factors. Figure 7.7 depicts that with respect to alternative sources of information, most of the respondents (57; 37 %) relied on experts. The unavailability and inaccessibility of some ICT tools and services could also contribute to the wide use of printed sources of Information..

8.2.12 What are the civil servants' levels of ICT competence?

Table 7.11 illustrates that all the respondents (152; 100 %) claimed to possess the skills necessary to effectively use ICTs such as telephones, copy machines, computers, fax machines, televisions and radios. However, the respondents' levels of competence when it came to using ICTs such as data projectors, video conferencing, and databases were poor. Although most of the civil servants did not use televisions and radios for work purposes, they could operate them in their homes. In order for ICTs to improve work productivity and creativity in government departments, civil servants should be equipped with the skills to use less popular ICTs as well. For instance, time and again, managers use data projectors to do presentations in their respective departments. There is also the option of a new ICT tool to cut down travelling costs in Skype; video conferencing could be used for this purpose in the sector. Managers always need to be informed in order to make sound decisions, and databases can be used for this purpose because they provide access to a lot of information. Managers could also use databases to benchmark and establish what and how other governments around the world are doing things.

In his study on the use of ICTs in government departments, Nwasike (2007, 11) suggests that training should be made compulsory for civil servants, especially when there is a choice and access to training. As technology changes, so does the need for training with respect to emerging technologies. Nwasike further observes that there are certain general training programmes like: Public Service Orientation Training, Ethics and Values, Customer Service, and Guides for Public

Policy Development that public servants can choose in order to be able to service the public effectively. This issue is revised by the Ghana Resource Centre (2008), which states that it is vital for every government employee to equip himself or herself with the latest ICT technology in order to reap the benefits of technology and improve productivity and creativity, which are intrinsic to a government's success. Overall, the results demonstrate that civil servants require training in the utilization of ICT tools and services in the sector. However, it remains unclear as to what extent the civil servants could use an ICT tool such as the Internet because when they were asked to indicate their ICT training needs in Table 7.10, almost all of them indicated that they required training on quite a number of Internet services such as e-commerce, information retrieval, and searching databases.

8.2.13 What ICT training needs do civil servants have?

In order to be able to use any technology effectively, a person must be well equipped with the skills essential to using that technology. In Table 7.10, civil servants indicated different areas of training that they required in order to help them interact with ICTs more often and more effectively. The results of the survey indicate that training on word processing and e-mail (152; 100 %) and information processing (87; 57 %) was not necessary, as most of the civil servants used them on a daily basis. However, 134 (88 %) of the respondents indicated that they required training on how to use databases to search for information. All the civil servants surveyed were found to have complete access to ICTs - their computers were connected to the Internet and they also had e-mail access (see Table 7.3 and Figure 7.5 in Chapter 7). E-mails in particular have changed the way government employees operate. Clearly civil servants are taking full advantage of this technology and use e-mails to facilitate the sharing of information and communication amongst themselves.

Because all the respondents were managers, one would be tempted to say they had to lead by example and be the first to adopt ‘newer’ ICTs in the sector. The greatest training needs appeared to be database searching and information retrieval. Database searching and information retrieval are essential to business success. One would expect to see all the civil servants properly

trained with respect to such computer applications. Civil servants also need computer training to ensure that they keep up with the information society. This view is shared by the Ghana Resource Centre (2008), which argues that training sessions for civil servants should be conducted so that they can use the acquired ICT knowledge and skills in their daily work and activities. Earlier, this issue was raised by Petty (2007), who observes that due to the government's continuous strive towards the e-government culture, civil servants have to be involved in the ICDL (International Computer Driving Licence) programs that will help them acquire the IT skills required to assist the public.

8.2.14 How can civil servants' training needs be addressed?

If civil servants lack the necessary skills to use ICTs, these tools would not be effective as far as work creativity and productivity are concerned. When civil servants were asked to list the type of ICT education and training needs they would require in order to be able to use ICTs more often, most of them generally felt that staff should be encouraged to use ICTs and training should be provided to all civil servants (see Theme 7.15). Civil servants' training can be addressed by ensuring that the government speeds up the introduction of ICT policy in the country.

8.2.15 What challenges do civil servants face with respect to ICTs?

Table 7.5 shows that the civil servants' interaction with some of ICTs was very poor. If the South African government wishes to diffuse and adopt the use of ICTs, a number of important issues need to be addressed first. Section 7.16 in Chapter 7 discusses these important issues. The most common obstacles cited by the civil servants include: the need for adequate and well structured planning; the need to make funds available in order to purchase all the necessary ICT facilities and resources; and the lack of the necessary skills' set. The issue of planning revealed here is crucial as embarking on any new innovation requires adequate planning. Tella (2007) believes that adequate and proper planning usually results in success. The author suggests that institutions that fail to plan before embarking on a particular programme usually end up in a

deadlock. In other words, "failure to plan is to plan to fail" (Tella 2007). A significant number of the respondents indicated that poor computer skills were hampering their interaction with ICTs. Without the right human capacity, ICTs would lack someone to operate them, use them, or make minor repairs. Civil servants, more especially those operating in managerial positions, are required to have a fairly broad and extensive knowledge of ICTs. As leaders, they should be effective users of these technologies.

Many studies have examined barriers to the adoption and diffusion of e-government. Ebrahim and Irani (2005) provide a review of the barriers to e-government adoption using five dimensions, namely: IT infrastructure, security and privacy, IT skills, and organizational and operational costs. Lam (2005) also identified these barriers and organised them into four categories, namely strategy, technology, policy and organisation. Vassilakis, Lepouras, Fraser, Haston and Georgiadis' (2005) study of stakeholders in G2E and G2C e-government categories documented five categories of barriers to e-government adoption and use (in order of perceived importance) as follows: legislative, user-related, administrative, technological and social barriers. Likewise, Gilbert, Balestrini, and Littleboy (2004) reported e-government adoption barriers to be end users' attitudes towards online trust relationship establishment, the security of financial data and quality of the information provided, skills, and time and money as adoption benefit factors in predicting the potential uses of e-government.

A study conducted by Enakrire and Onyenania (2007) on ICT infrastructure in Africa established that the main problem in the development of technological networking in Africa is its weak ICT infrastructure. Mutula and Mostert (2008) are of the view that the ICT infrastructure of a country forms the backbone of its ability to provide utilities and services conducive to the utilization of ICT tools by the government and the general public. South Africa has relatively well developed ICT infrastructure that provides both government and the public with potential access to many ICT tools and services. But besides having ICTs that are irrelevant in job execution, the major problems in SA government departments seem to be the lack of ICT skills among civil servants, civil servants' attitude towards ICTs, lack of technical expertise, lack of clear focus and objectives regarding the use of ICTs in the sector, resistance of staff to the use of ICTs, and lack of information about, and perceived benefits of ICTs.

8.2.16 What are the civil servants' recommendations for improving ICT utilization in the public sector?

When asked to comment on contextual conditions that need to be adopted in order to improve the use of ICT tools and services in government departments, theme 7.17 indicates that the most popular recommendations offered by the respondents include, among others, the need for adequate and well structured planning; the introduction of a good ICT policy that would provide sufficient frameworks for ICT development and/or use in the public sector and in South Africa as a whole; provision of proper and sufficient ICT infrastructure; the need to make funds available for the purchase of all necessary ICT facilities and resources; and teaching staff how to use ICTs, particularly new or lesser used services and technologies. Government initiatives targeting popular participation in the information society will also need to consider carrying out vigorous campaigns to illustrate the benefits of using ICTs to improve work productivity and creativity.

The issue of policy revealed here is also a serious one because if the government is serious about improving work productivity and creativity in the public sector, an ICT policy is essential. Several studies have underscored the importance of ICT policies as an empowering instrument at both micro and macro level investment (Mandela 1995; Mandela 1998; World Development Report 1999/2000; Alemie 1998; Raseroka 1997; Van Audenhove 2003; Kwake 2007; Department of Communications 2010).

A good policy provides sufficient frameworks for ICT development and/or use in an organization or country, for example in areas of strategizing, implementation, staff development and communication. Odedra (1992) observes that ICT policies and/or strategic buying plans should clearly identify the needs that are likely to bring overall benefit to a nation or institution, and establish what may be achieved with the available resources. In addition, he narrates that although some regulatory policies covering procedures for the acquisition of hardware and software exist in a few institutions, the aim of these policies is to typically mandate the centralized acquisition of ICT products in the public sector, and tax private companies and non-government organisations in order to either discourage imports or to raise the convertible currency for the state. These, therefore, only partly and indirectly address this issue. ICT implementation without policy, especially for a country or entire institution, is poor planning

because it often leads to wastage through haphazard implementation and misplaced priorities. In her study, Majanja (2004, 89) argues that policy issues at organizational level do not often attract much attention, yet the implementation of ICT use without proper policy is often haphazard, leading to the duplication of efforts and increased costs.

8.3 SUMMARY

This chapter has detailed the issues that arose from the results of the data that was presented in Chapter seven.

One word that perhaps succinctly encapsulates the changes ICTs have brought to the way people do their work is 'speed'. The way people do things - obtain or provide information, communicate with people, buy things, use services - is done or achieved faster than ever before. Perhaps, in the case of new ICTs, speed generates a qualitative change in that more can be done, more intensively, and perhaps more freely and knowingly than ever before. ICTs have the potential ability to make government processes transparent and accountable. However, the South African government has to overcome obstacles such as poor computer skills, infrastructure and info-structure before it can have fully functional e-government programmes. ICTs will improve work productivity and creativity only if civil servants know how to use them. The education system should be sensitive to the challenges ushered in by the use of ICTs and come up with strategies to equip students with the skills required in the e-government environment.

OECD (2003) argues that considering the ongoing spread of ICTs and their continued importance for growth, policy makers should foster an environment that helps governments seize the benefits of ICTs. However, policies to foster the uptake of ICTs are insufficient. Policy action is necessary to help the government make more effective use of ICTs and address the barriers affecting diffusion and adoption. Moreover, policies specific to ICT diffusion and use will not, on their own, lead to stronger performance; rather they should be part of a comprehensive set of actions to create the right conditions for growth and innovation. The diffusion and adoption of ICTs in government departments requires expertise at various levels. Because civil servants service masses of people, they are required to have a fairly broad and

extensive knowledge of ICTs as well as be effective users of technology. Obviously, due to a lack of ICT policy and skills in the public sector, one cannot expect all the civil servants being able to operate all sorts of ICT tools and services just because they are managers. However, being able to use common ICT tools and services that are widely used and available, such as computers and the Internet, is absolutely essential - one would expect a manager in a government department to be able to operate such ICTs. The issue of technical know-how is also important because without the right human capacity, underutilization might occur for lack of someone to operate and use the ICTs or make minor repairs.

The use of ICTs has already led to better productivity performance in countries where appropriate policies to seize the benefits of ICTs have been put in place. Since these technologies are continuing to improve in functionality, speed and capacity, it is important for countries to improve their policy frameworks in order to benefit from ICTs. All governments can do more to exploit this technology by fostering a business environment that encourages its diffusion and use and by building confidence and trust. However, further diffusion of ICTs will not, on its own, lead to stronger economic performance. Indeed, economic performance is not the result of a single technology, policy or institutional arrangement, but of a comprehensive and co-ordinated set of actions to create the right conditions for growth and innovation. Policies to strengthen economic and social fundamentals, in particular, are of great importance in reaping the benefits of ICTs. Many countries, including many in Africa, are therefore now establishing national ICT policies**.**

The issue of sufficient ICT infrastructure is also a cause for concern in South African government departments. Sufficient infrastructure should consist of equipment that may include stand alone and/or networked computers, modems, local area networks, intranets, and/or campus wide backbone connecting LANs and multi-campus networks. The infrastructure should additionally include carrier technology such as satellite technology which includes VSATs and wireless radio/television, fibre-optic technology, unshielded twisted pair, coaxial technology, as well as functionality structures such as e-mail, Internet access, conferencing tools and multimedia tools (Association of African Universities 2000, section 2.6). In his study, Jensen (2002) observed that the existing computer resources in Africa were commonly underutilized

because of the preponderance of many standalone PCs in the same office with no implementation of Local Area Networks (LANs). Thus a department may have many machines, but only one with a modem connected to the Internet, often inciting competition for such a machine. Compounded by the problem of having to share an e-mail account, such a situation would obviously not be conducive to the effective use of the Internet.

There is also a need for frequent ICT training because new software and services are always coming up in the market, and civil servants need to acquaint themselves with these trends and developments in addition to bettering their day-to-day ICT utilization. ICTs can dramatically increase the flow and value of information within government departments. With the help of ICTs, civil servants can perform their duties in a timely and efficient manner, with access to a wide variety of government information resources. More and more organisations realize the benefits of ICTs and invest in them. Although it is still mediocre, South Africa's government does appear to have invested a lot in ICTs as a way of improving work productivity and creativity in the public sector.

The next chapter (nine) presents the summary, conclusion and recommendations of the study.

CHAPTER NINE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

9.1 INTRODUCTION

This chapter summarizes the salient outcomes of the study, offers conclusions, recommends how the government can harness and improve the efficiency of ICTs, and suggests areas of further study. The study set out to examine the types, use, availability and contextualisation of ICTs through social informatics analysis amongst civil servants and within the civil service work environment in KZN.

In order to achieve this aim, the following specific objectives were formulated:

(a) To establish the types of ICTs and products (systems/ software) currently in use (e.g. the Internet, intranets, databases, etc.)

(b) To explore the civil servants' level of interaction with ICTs

(c) To determine how ICTs can add value to the public sector

(d) To establish the training needs of the civil servants in order for them to use ICTs more often and effectively

(e) To explore the impact ICTs have on organizations

(f) To describe the uses and values of ICTs in an organizational context

(g) To explore and examine the general strategy for ICT development and degree of ICT awareness in government departments

(h) To examine the infrastructure needed to ensure the effective implementation of ICTs

9.2 SUMMARY OF RESULTS

This chapter is summarized according to the respective research objectives.

9.2.1 Types of ICT tools and services currently in use

A variety of ICT tools and services have been adopted in government departments with the intention to improve work productivity and creativity in the sector. These include desktop computers, telephones, copy machines, printers, the Internet and intranets. The most available ICT tools and services were telephones, computers, e-mail, fax machines, mobile phones, the Internet, intranets, copy machines and printers (in that order). Most of the respondents were based in urban areas and had physical access to ICTs, and all of them held managerial positions in their respective departments, which would explain the high levels of access and availability. Some ICT tools, such as the radio, television and videoconferencing, were not accessible in some of the surveyed government departments.

9.2.2 Ability to use computers and the Internet

Sometimes organizations just assume that their staff members possess the relevant skills only to realize later that this is not the case. When asked to comment on how they acquired their computer skills, most respondents (64; 42 %) indicated that they were self taught, and 57 (38 %) revealed that they were taught by their colleagues. 31 (20 %) acquired computer and Internet skills through in-house courses offered by the department, while 28 (18 %) acquired their computer and Internet skills through on-the-job experience and/or training. However, only 23 (15 %) of the respondents indicated that they acquired computer and Internet skills through a continuous education course.

9.2.3 Reasons for using ICT tools and services

People use ICTs for different purposes. The main reasons the civil servants cited were for communication through e-mail and to disseminate departmental information; all the respondents (152; 100 %) indicated that they used ICTs to communicate with fellow colleagues, for spreadsheet purposes, word processing, printing, and to disseminate departmental information. A significant number also indicated that they used ICTs for printing, presentation and research purposes.

9.2.4 The level of interaction with ICT tools and services

Social informatics is about the interaction between human beings and technology. The study's findings show that the respondents' level of interaction with ICT tools and services such as emails, personal computers, the Internet, intranets, printers, telephones, and mobile phones was very high. In contrast, a number of the respondents indicated that their level of interaction with ICT tools such as televisions, video conferencing, video recorders, projectors, video cameras, and tape recorders was very low. Some government departments simply do not need these ICT tools.

9.2.5 Time spent per day using ICTs for work purposes

The time one spends using ICT tools and services is the most basic measure of ICT usage intensity. All the respondents (152; 100 %) spent 6 - 10 hours per day using ICTs such as the Internet and mobile phones. A significant number of the respondents (150; 98 %) indicated that they used videoconferencing for less than one hour per day (whenever they used it). Copy machines, scanners, databases, video cameras, video recorders and tape recorders were also used by the respondents for less than an hour per day (whenever they used them).

9.2.6 Period of ICT usage

Unsurprisingly, all the respondents (152; 100 %) had spent over 10 years using ICT tools and services such as e-mail, scanners, printers, copy machines, telephones, mobile phones, and personal computers. Notably, none of the respondents indicated to have used ICT tools and services for less than 2 years. The ICT experience possessed by the civil servants could be attributed to the fact that all the respondents were managers in their respective departments on top of the vast experience they'd acquired in their previous jobs.

9.2.7 Frequency in using ICT tools and services

When it comes to the frequency of ICT usage, it was found that most respondents (133; 88 %) never used the television for work purposes. Video cameras and video recorders were sometimes used by the respondents (90 %). Tape recorders were very rarely used in government departments, as verified by 103 respondents (68 %). Some of the ICT tools, such as data projectors, were used on a monthly basis. As anticipated, all the respondents (152; 100 %) used laptops, desktop computers, printers, the Internet, intranets, telephones, electronic mail and mobile phones on a daily basis. 92 respondents (61 %) indicated that they never used video conferencing for work purposes. When asked to comment on the use of databases, a significant number (99; 65 %) revealed that they sometimes used databases for work purposes. Most respondents (95; 63 %) also said that they sometimes used scanners. Notably, the ICTs that were used every day in government departments were the same ones the respondents felt improved work productivity and creativity.

9.2.8 Effective ICTs for work creativity and productivity

All the respondents (152; 100 %) felt that quite a number of ICT tools and services are effective in improving service delivery in the sector. These include electronic mail (e-mail), printers, telephones, mobile phones, intranets, the Internet, desktop computers, fax machines, and laptops.

Conversely, there are ICTs that were considered to be less effective, such as video conferencing, radio, television, and digital cameras.

9.2.9 Training needs of the civil servants

Keeping up with technology is always a challenge on account of its dynamic and shifting nature. Training on word processing, Internet surfing, and email was not very essential to all the respondents. However, the respondents required training in the following areas: the use of databases to search for information, information retrieval, and how to use computer applications such as Spreadsheet and PowerPoint.

9.2.10 Competencies and the use of ICT tools and services

When the respondents were asked to rate their ICT skills, all of them (152; 100 %) suggested that they were able to effectively use ICTs such as printers, the Internet, intranets, television, radio, laptops, desktop computers, fax machines, mobile phones, telephones, tape recorders, and copy machines. A significant number of the respondents (87; 57 %) did not need training on how to use the Internet. A highly significant number also indicated that training on information retrieval was not very essential (148; 97 %). However, not all the ICT tools could be used by the civil servants as most (104; 68 %) revealed that they were unable to use an ICT tool such as video conferencing. Confusingly, when the respondents were asked to indicate the training they needed in order to use ICTs effectively, some of the respondents indicated that they required training on information retrieval.

9.2.11 Alternative sources of information for work purposes

When the civil servants were asked to reflect on their alternative sources of information, most respondents (57; 37 %) said that they relied on ICT experts, while the minority (8; 5 %) relied on information centers.

9.2.12 Addressing the ICT education and training needs of the civil servants

ICTs were adopted by government departments to improve work productivity and creativity. If civil servants lack the ability to use the technology that is meant to assist them in their work, there would be no improvement in service delivery in the sector. The civil servants were therefore asked to come up with suggestions in order to address the issue of ICT skills shortages in the sector. Most respondents felt that staff should be encouraged to use ICTs, while some felt that training on ICTs should be provided to all civil servants.

9.2.13 Challenges in the use of ICT tools and services

Any problems with any ICT should be addressed because this may affect the functioning of the whole system. The most popular problems cited by the civil servants include the lack of adequate and well structured planning, the lack of funds to purchase all the necessary ICT facilities and resources, and the lack of the skills necessary to use ICT tools and services.

9.2.14 Civil servants' recommendations for improving the use of ICTs

The respondents were asked to comment on contextual conditions that need to be adapted in order to improve the use of ICT tools and services in the sector. The respondents cited the need for adequate and well structured planning; the need for an ICT policy that would provide sufficient frameworks for ICT development and/or use in the public sector that would filter throughout South Africa; the provision of proper and sufficient ICT infrastructure; the need to make funds available for the purchase of all the necessary facilities and resources for ICTs; and the training of staff.

9.3 CONCLUSION

This study has demonstrated the importance of ICTs in government departments and also the various interventions that are necessary to effectively propel civil servants into the emerging ICT economy. For this to be realized, a number of measures are needed that include, among others, the enactment of an enabling policy and legislative framework to cater for skills development, and the improvement of infrastructure such as telecommunications networks, software and hardware, and power supply. ICTs play a pivotal role in speeding up the flow of information and knowledge in government departments as well as transforming the way in which government and citizens directly interact. South Africa's civil servants appear to have been sensitized about the value of ICTs in improving service delivery and planning. ICTs in the public sector definitely have a pivotal role to play with respect to communication and information dissemination.

Despite the constraints and challenges in the application and use of ICTs in government departments, a wide range of ICTs have been adopted to facilitate the sharing and exchange of information in the sector. Interpreted in light of the "Diffusion of Innovation Theory" (Rogers 1995), the findings suggest that ICTs that were perceived to have relative advantage and that were more compatible with their existing values, past experiences and needs, were adopted faster. For example, the Internet, desktop computers and mobile phones had a faster rate of diffusion among the respondents despite the high tariffs. The government of South Africa should be committed to promoting the development and use of ICTs in the direction of realizing the socioeconomic objectives of the country. It should encourage those ICT projects that are designed to have an impact on a greater part of the population, with particular emphasis on applications for education and literacy programs, health programs, and national databases. E-government can deliver more efficient public services and significantly reduce the administrative burden. Offering more services online and organizing services around customer needs will provide improved channels of communication between citizens and all levels of government. This study recognizes the urgent need to harness ICTs to improve work productivity and creativity in government departments. These efforts are significant, not only because they seek to develop strategies and initiate innovative and effective action on the ground, but also because they represent and encourage new forms of collaborative interaction among civil servants.

9.3.1 ICT Infrastructure

In order for ICTs to be effective, relevant resources should be provided to ensure that all the equipment, especially Internet access, function properly and that all administrative functions are performed effectively. All equipment and electronic resources should be available and in working order all the time. Money should be set aside to increase the bandwidth to provide a speedy, reliable and consistent Internet connection. ICTs can dramatically increase the flow and value of information within an organization. Civil servants who have and use ICTs were assumed to provide better service delivery and higher economic standards than those who do not have and/or use ICTs.

This assumption proved correct as the majority of the civil servants agreed that the use of ICTs in their respective departments had improved work productivity and creativity in the sector. ICTs provide civil servants with timely access to a wide variety of corporate information sources. Traditional paper-based information distribution methods can be replaced with web-based applications that lower costs and increase the timelines of information flow. Thus the issue of insufficient ICT infrastructure is also a cause for concern in government departments. Sufficient infrastructure should consist of equipment that may include stand alone and/or networked computers, modems, local area networks, intranets or campus wide backbone connecting LANs and multi-campus networks. Furthermore, if the government is serious about work productivity and creativity in the public sector, the ICT infrastructure to be implemented should have proper connectivity, i.e. sufficient bandwidth and routers to ensure that a wide variety of information products can be accessed efficiently, as well as the use of operating systems that may be freeware or proprietary.

9.3.2 ICT Training/Human resource development

ICTs are capable of making government processes more transparent and accountable. However, South Africa has to first improve computer skills and ICT infrastructure before it can have fully functional e-government programmes. ICTs can only improve the civil servant work environment if they possess the necessary skills to use them. The education system should come

up with strategies to equip students with the skills they need in the e-government environment. The diffusion and adoption of ICTs in government departments requires expertise at various levels. The issue of technical know-how is a cause for concern because in its absence, existing ICTs may fail for lack of someone to operate them, use them, or make minor repairs. Consequently, frequent training on the use of ICTs is essential because new software is constantly being developed and introduced into the market and they need to be acquainted with these trends and developments. If the government wishes to reap the benefits of adopting technologies in the public sector, it should bear in mind the urgent need to address the ICT training needs of its civil servants.

9.3.3 ICT policy

Although a variety of ICT tools and services have been adopted in government departments, a national ICT policy to foster in the uptake of the adopted ICTs is currently nonexistent. An ICT policy is necessary to help government departments effectively use ICTs and address the barriers that affect their diffusion and adoption. Many countries, including many in Africa, have established or are in the process of establishing national ICT policies (see Chapter three). The South African government is still working on formulating an integrated national ICT policy that will guide South Africans on the use of ICTs in the country. South Africa has, however, managed to put in place ICT policies such as the Data Protection Act (1998); Copyright, Designs and Patents Act (1980); Computer Misuse Act (1990); Health and Safety at Work Act (1974); EU Health and Safety Directives; Electronic Communications Act (2000); Cybersecurity Policy (2010); and Broadband Policy (2009). None of the aforementioned policies address the issue of ICT skills in South Africa. Many civil servants cited their concern about the lack of an integrated ICT policy that would address the issue of ICT skills in government departments.

The use of ICTs has already led to better productivity performance in countries where appropriate policies to seize the benefits of ICTs have been put in place (see Chapter three). Since these technologies are continuing to improve in functionality, speed, and capacity, it is important for countries to improve their policy frameworks to benefit from ICTs even further.

Governments can do more to exploit technology by fostering a business environment that encourages its diffusion and use and by building confidence and trust. However, policies specific to ICT diffusion and use will not, on their own, lead to stronger performance; policies should be part of a comprehensive set of actions to create the right conditions for growth and innovation. Indeed, economic performance is not the result of a single technology, policy or institutional arrangement, but of a comprehensive and co-ordinated set of actions to create the right conditions for growth and innovation. Policies to strengthen economic and social fundamentals, in particular, are of great importance in reaping the benefits of ICTs.

9.3.4 Attitudes

Some of the civil servants were found to have negative attitudes towards technology. A competent and well-motivated public administration lies at the core of good government (World Bank 2002). People engaged in the public service need to realize and refresh the inner driving force –the very desire to make a meaningful contribution to the society that brought them to this arena of public administration. When everyone becomes a partner in the enterprise, whatever its mission, the possibilities for quantum leaps in performance are very real. Re-inventing government can have dramatic results, but only if those involved are prepared to use dramatic methods. On the contrary, a stiff or negative attitude usually lays critical resistance against organizational changes, while a positive attitude can become a powerhouse for such changes. Lack of confidence, knowledge or skills among the workforce pushes them to take a negative stance. In many cases, lack of skills and knowledge also leads to the failure of e-government projects.

The constraints and challenges facing the use of ICTs in government departments require the intervention and interaction of all stakeholders in the public sector and also in the ICT sector. The impact of ICTs is already felt, particularly in the dramatic reduction in the cost and time involved in storing, processing and transmitting information, leading to a fundamental reshaping of the labour market and society as a whole. Civil society needs to understand that ICTs are

generating changes and advancing in every area of economic, social, and political activity in markets, private and public sectors, and economies in the more- and less-developed world.

9.4 RECOMMENDATIONS

Based on the findings of the study, a range of general recommendations for improving the use of ICTs in government departments are provided below. These recommendations aim to stimulate thought and discussion about the path that the use of ICTs might take in the future of government departments.

9.4.1 Access to ICTs

Access to ICTs should no longer be viewed as a luxury or privilege where, for example, web access is provided to managers only because they hold high positions. Cases involving civil servants having to share ICTs in their offices are unacceptable. All departments should ensure that all the civil servants have access to at least a computer, the Internet, and the telephone. It is also pertinent for every civil servant to be well versed with different types of ICTs that can be used in the public sector to improve work productivity and creativity. While a variety of ICT tools and services have been adopted in government departments to improve the work environment, a drive to push the most relevant and latest ICTs should be adopted.

In the developing world, the use of ICTs has been identified as an important tool for reform and transformation and for leveraging second world economies up to first world status (Farelo and Morris 2006, 1). Governments should play a critical role in supporting and enabling this process and in the creation of a socially inclusive information society. The government could take advantage of the current high penetration of cellular phones in South Africa to offer e-government services such as news, radio services, and e-mails through these gadgets. There is also the added pressure of becoming more efficient and less costly due to budgetary pressures, as well as the need to respond to the requirements of citizens rather than tie them up in red tape and administration.

9.4.2 Human resource development

The public workforce remains the main driving force behind the 'supply side' of e-government applications. They are also essential to planning, designing and implementing any e-government initiative. Therefore, they have to be equipped with the right aptitude (skill), perception (understanding) and attitude (desire), and be able to move with the times. E-government offers a new platform of social contract that binds three parties: the public at large, government and business (UN 2003). To translate this new social contract into public value, one of the most important requirements is the readiness of the public managers who function as the 'steering force' behind e-government applications. The transformation from traditional government to e-government is also only possible if the public management system and citizens in general are able to control, transmit and properly use the information resources at their disposal. The e-participation of various actors is therefore becoming an important requirement for good governance.

Transformation from traditional governance to e-governance is not a linear process. Success in the area of e-governance requires more than just the deployment of technology and building connectivity. It requires much broader and far-reaching readiness in terms of policy initiatives, infrastructure building and skills development, most of which are not technical in nature (UN 2003). Structural- and human capital-related changes are needed at government level to introduce effective e-government practices (I-Ways 2003). There is a need to increase the supply side's e-readiness through training and development supported by operational plans to execute policies. E-government is a powerful device that is devoid of political meaning; it is an information resource to the community. But public managers, as the suppliers of cost effective and quality services, should be at the right e-readiness level. E-government systems require adequate access to modern technology and the ability to reconstitute the governance mechanism. Adequate human resource capability is necessary to coordinate the internal and external service factors in order to be able to handle the demand for services (Wimmer 2002).

The study established that there was a lack of professional ICT personnel in the surveyed government departments. At national level, using ICTs such as audiovisual and satellite broadcast technology and the Internet would enable more cost-effective training programs using

a limited number of trainers. The importance of developing the necessary ICT skills in order to function in the digital economy cannot be over-emphasized. The World Summit on the Information Society (WSIS) Civil Society Working Group (2004) observes that it is important to ensure the adequate development of human capacity in order to fully exploit the benefits of ICTs. According to McConnell International (2000), shortages are greatest in four areas: managers capable of completing complex technology projects; policy analysts who understand e-government; local content creators; and software, hardware and communication engineers.

9.4.2.1 Education

A sustainable ICT programme that contributes significantly to a country's development stands to be achieved if the workforce is suitably trained and the educational system is able to continually supply skilled, innovative and entrepreneurial professionals. The government should ensure that adequate varieties and levels of ICT competence are offered to civil servants. Where necessary, it should constantly review the ICT training it offers to civil servants, especially considering the rate of developments in the ICT industry. Civil servants need computer training to ensure that they keep up with the rest of the world in the new information society. A strategy that would assist tremendously would be to ensure that everyone in the department, particularly IT personnel, has general skills for simple trouble-shooting and recovery. This can be achieved through regular seminars and workshops. Centres of excellence should also be established within government departments to train and develop expertise as necessary.

Across a range of educational applications, ICTs should be harnessed to improve the efficiency, accessibility and quality of the learning process in South Africa. This can be achieved by using initiatives such as distance education. Distance learning has mainly been applied to tertiary education, but ICTs have been found to have a significant impact on enhancing the learning process at primary and secondary level education. Another rapidly growing area of ICT-mediated learning could be in the delivery of technical and vocational training of civil servants. Because ICTs can facilitate sophisticated and customized performance simulation at low marginal cost, the government should use ICTs to train workers in an array of functional areas,

from healthcare to IT services. For example, Cisco's Networking Academy Program provides a 280-hour technical training course over the Internet. This course can train civil servants on how to design, build, and maintain computer networks. Enhancing education through ICTs, both as a classroom tool and as a subject in its own right, needs to be considered as one of the priorities of the government. In their study, Mutula and Van Brakel (2007, 243) argue that it is important to deploy ICT-related skills through the traditional education system because most government departments provide little or no formal training and largely tend to hire qualified staff.

9.4.2.2 Integrating ICT training in education at all levels

This requires major investment in ICT equipment. The government needs to find ways to gradually include ICT training in curricula at all levels, including primary education. In the early stages of education, the focus could be on sensitizing students in order to show them the possibilities of ICTs and stimulate their interest. They will, after all, be the beneficiary and architects of the future. A national coordinating structure would contribute towards designing the curricula of ICT content.

9.4.3 E-government

There is no doubt that e-government has arrived in Africa, although it is essentially an imported concept based on imported designs. There are growing numbers of e-government projects, some of which are contributing to public sector reform. For example, South Africa has introduced e-government projects such as electronic filing and electronic voting. However, there is still a long way to go, and the government should consider implementing the following e-government services in order to improve service delivery and work creativity and productivity in government departments.

9.4.3.1 E-health

Some of the most promising and clearly demonstrated applications for ICT in development could be in the improvement of health care delivery. ICTs can be used by civil servants to facilitate remote consultation, diagnosis and treatment. For example, nurses in remote villages can now use digital cameras to download images of symptoms onto a computer and transfer them to nearby towns for examination by doctors. The same model can be applied to facilitate collaboration amongst physicians. For example, when an expert opinion is required, doctors in rural towns could send the images captured by the nurses to specialists in other countries for advice via the Internet.

This study established that ICTs such as TV and radio were used relatively less (see Chapter 7), but when applied to disease prevention and epidemic response efforts, the two ICTs can provide considerable benefits and capabilities. For example, public broadcasting media such as radio and television have a long history of effectively facilitating the dissemination of public health messages and disease prevention techniques in developing countries. The Internet can also be used to improve disease prevention by enabling more effective monitoring and response mechanisms. A number of countries have invested in ICTs to improve the administrative efficiency of their public health care systems. ICTs can also be used to improve the efficiency of medical facility administration by, for example, streamlining medical procurement or the creation of patient record databases.

A wide spectrum of services or systems that are at the cutting edge of medicine/ healthcare and information technology can be adopted in order to improve healthcare in South Africa. For example, the following services or systems can be introduced to the Department of Health:

(a) **Electronic health records:** enabling the communication of patient data between different healthcare professionals (GPs, specialists, etc.);

(b) **Telemedicine:** physical and psychological treatments at a distance;

(c) **Consumer health informatics:** use of electronic resources on medical topics by healthy individuals or patients;

(d) **Health knowledge management:** e.g. in an overview of the latest medical journals, best practice guidelines or epidemiological tracking;

(e) **Virtual healthcare teams:** consisting of healthcare professionals who collaborate and share information on patients through digital equipment (for trans-mural care);

(f) **mHealth or m-Health:** includes the use of mobile devices in collecting aggregate and patient level health data, providing healthcare information to practitioners, researchers, and patients, real-time monitoring of patient vitals, and direct provision of care (via mobile telemedicine);

(g) **Medical research using Grids:** powerful computing and data management capabilities to handle large amounts of heterogeneous data.

(h) **Healthcare Information Systems:** also often refer to software solutions for appointment scheduling, patient data management, work schedule management and other administrative tasks surrounding health.

9.4.3.2 The national authentication service for health

Australia has successfully integrated business solutions in its e-health authentication service (Valdez 2011). It is recommended that South Africa follow suit by designing and building the National Authentication Service for Health. The authentication service is an essential building block in the development of personally controlled e-health records for citizenry and is fundamental in the government's determination to equip the health system for the future (Valdez 2011). This service would improve the security of electronic health communication such as referrals, prescriptions and personally controlled electronic health records (PCEHR). The system would provide strong access control mechanisms for PCEHR so that patients would be able to grant access to their information and be able to track which providers have accessed their records. The authentication service should be designed in consultation with both clinicians and consumers to ensure that it meets the needs of the South African health care system and

its patients. The system would need to support the implementation of robust audit and monitoring processes for both local health care systems and national e-health services.

9.4.3.3 Home Affairs

At the start of 2011, the Indonesian Immigration Office officially launched e-passports with enhanced security features (Rufino 2011b). Sri Lanka's Department of Immigration and Emigration is also in the process of introducing a biometric passport system to increase travel document security and personal identity protection. Rufino (2011a) notes that Singapore, Malaysia and Thailand are among the southeast Asian countries that have started issuing e-passports. The South African government should perhaps also consider introducing an electronic travelling system and issuing visas online as a way of improving travel, immigration and emigration. The current crisis of Zimbabweans applying for South African permits should be an eye opener for the SA government, which needs to look into new innovative ways of improving service delivery in the country.

9.4.3.4 E-government: all government departments

The study recommends the following five e-government factors that apply to all the government departments:

(a) The government should ensure that data systems infrastructure is ready. Management systems, data standards, records and work processes should be place to provide the quantity and quality of data to support the move to e-government. In his study, Cain (2001, 135) established that in many African countries, data quality and data security are very poor and there are few mechanisms to address these issues.

(b) The legal infrastructure should be ready. The laws and regulations required to permit and to support the move to e-government have to be in place. In most African countries, for example, digital signatures cannot be accepted (Garfinkel 2001).

(c) The institutional infrastructure has to be ready. E-government can only progress if the institutions exist to act as a focus for awareness and to act as a means for the facilitation of e-government. In most African countries, there are no institutions to co-ordinate and lead and drive e-governance (Korac-Kakabadse *et al*. 2000).

(d) The human infrastructure should be ready. Attitudes, knowledge and skills should be in place, especially within the public sector, that are necessary to initiate, implement and sustain e-government initiatives.

(e) The technological infrastructure should be ready. Although there have been great strides forward, the fact remains that most African countries are a long way short of the computing and telecommunications infrastructure on which many Western e-government initiatives have been based (ITU 2002).

9.4.3.5 Way forward for e-government in SA

The following services should be electronically enabled (e-enabled) in order to improve work productivity and creativity in the public sector:

- Pension payouts
- Housing subsidies
- Birth and death registrations

E-government should see more services becoming available over the Internet, including the ability to transact with government with a focus on self-service and empowerment. E-government should initiate more complex transactions such as:

- Applying for an ID book or passport online
- Providing easier access to small business and educational resources

E-government should become available via mobile services and should include the ability to transact with government, with new technology playing an important role at this level. Interestingly, the Department of Home Affairs has started to use mobile phones to communicate with the public.

9.4.4 ICT policy

A policy document not only acts as a blueprint for expected development and action, but also as a basis and framework for negotiations for collaboration and sharing services with other institutions, ISPs and government departments (Majanja 2004, 235). It is therefore imperative for the government to introduce an integrated ICT policy to manage ICTs in South Africa. Without the right ICT policy, the government cannot improve productivity and creativity in the public sector in an organized manner. The challenges faced with respect to ICTs are easily contained when a policy exists. Various researchers have underscored the importance of ICT policies as an empowering instrument at both micro and macro level (Raseroka 1997; World Development Report 1999/ 2000). A good policy provides a sufficient framework for ICT development and/or use in an organization or country, such as in areas of strategizing implementation, staff development and communication.

Odedra (1992) observes that ICT policies and/or strategic buying plans should clearly identify the needs that are likely to be met or addressed in a nation or institution through their introduction, and establish what may be achieved with the available resources. He explains that although some regulatory policies covering procedures for the acquisition of hardware and software exist in some institutions, the aim of these policies is to typically mandate the centralized acquisition of ICT products in the public sector and tax private companies and non-government organizations in order to either discourage imports or raise the convertible currency for the state. These interventions therefore only partly and indirectly address this. ICT implementation without policy, especially for a country or institution, means poor planning that often leads to wastage because of haphazard implementation and misplaced priorities. In her study, Majanja (2004, 89) argued that policy issues at organizational level do not often attract

much attention, yet the implementation of ICT use without a proper policy is often found to lead to the duplication of efforts and increased costs. South Africa's departments generally lack ICT policy for the development and use of ICTs.

The South African government should speed up the process of implementing an integrated ICT policy that would, amongst other things, address issues of critical skills shortages in the country. It is hoped that once an integrated ICT policy is promulgated, it will address issues of skills shortage that have been raised in this study. However, a lot still needs to be done in order to equip civil servants with the ICT capacity for them to play a competitive role in improving work productivity and creativity in the sector. Thus it is strongly suggested that the government put in place explicit staff development policies that focus on ICT capacity building in the public sector. Policy is advocated (and observed) for a number of ICT-related issues, including raising awareness of ICT, providing advice and support for ICT use, and supporting infrastructure development (Hawkins and Prencipe 2000). The implications for civil servants are several, but advantages can only be gained if the government is prepared to embrace the possibilities associated with ICT use, and only if the government is prepared to recognize and support the potential for ICT development in the public sector. Rogers (1995) noted that staff inclinations are a critical component of ICT diffusion in organizations.

9.5 RECOMMENDATIONS FOR FURTHER RESEARCH

This social informatics study examined the design, use, impact, interaction and contextualization of ICTs amongst civil servants and within the civil service work environment in KwaZulu-Natal. However, such an inventory does not reveal the entire extent to which ICTs have diffused into government departments. Three areas that are recommended for further research are discussed below.

9.5.1 Standards

No clear standards or guidelines are provided as to what sort of ICT training is provided and should be provided to civil servants in order for them to confidently use ICTs. Research in this area would be useful.

9.5.2 Satisfaction levels of ordinary staff

This study targeted only managers in the selected government departments. It would be interesting and useful to establish the views of ordinary civil servants - those doing all the 'dirty work'. This could have revealed much more about the ICT situation in government departments. The study relied on the views of managers in each government ministry when the actual users of ICTs in any organization are ordinary employees whose views and observations might be far more insightful. Future studies should focus on the perceptions, experiences and views of ordinary civil servants to complete the picture of ICT use in government departments in South Africa.

9.5.3 Area of study

Because of the diversity of the public sector in South Africa, this study narrowed its scope to selected government departments in KZN. Financial and time limitations also made it impossible to include all the government departments in South Africa. Further research should focus on these logistically excluded areas or ensure that they are included in any major studies.

9.5.4 ICT policy

The ICT sector is a dynamic field with new innovations emerging almost daily. National ICT policies should therefore be able to reflect this through regular updates and revisions. A study is necessary to determine the state of national level ICT policies that would guide the diffusion and adoption of ICTs in government departments. To date, the government has failed to introduce an integrated ICT policy that would address the shortage of ICT skills in the country. This lack of an integrated ICT policy in South Africa is the reason why government departments have no ICT policy that will ensure that civil servants have enough access to relevant ICTs in their respective departments.

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APPENDIX A: QUESTIONNAIRE

SECTION ONE: PERSONAL INFORMATION

1. Please indicate the department to which you currently belong

Agriculture and Land Affairs	[ ](1)
Education	[ ](2)
Health	[ ](3)
Home Affairs	[ ](4)
Other, specify……..	

2. Please indicate your current job title (e.g. Manager)

3. Please indicate your highest level of qualification:

Certificate	[ ] (1)
Diploma	[ ] (2)
Bachelor's degree	[ ] (3)
Post-graduate diploma	[ ] (4)
Masters degree	[ ] (5)
Doctoral degree	[ ] (6)
Others,	[ ] (7)

Others, please specify……

4. Please indicate your age group:

20-29 years	[ ](1)
30-39 years	[ ](2)
40-49 years	[ ](3)
50-60 years	[ ](4)
Over 60	[ ](5)

5. Please indicate your gender

Male	[ ](1)
Female	[ ](2)

6. Please indicate your level of management

Top/strategic management	[ ](1)
Middle/tactical management	[ ](2)
Lower/operational management	[ ](3)
None of the above	[ ](4)

SECTION TWO: ACCESS TO ICTs

7. Do you have access to Internet services? (You may tick more than one)

Yes on my desk in my office	
Yes we share in the office	
Yes at home	
Both at home and in the office	
Mobile(e.g. lap top computer and mobile phone)	
No	

Other, please specify.....

8. How did you learn to use computer and the internet? (You may tick more than one)

Self-Study	
From colleagues	
In-house course offered by the department	
On-job experience/training	
Continuing education course	

Other, please specify

SECTION THREE: TYPES OF ICT APPLICATIONS AND SERVICES

9. Kindly rate the accessibility of the following ICTs in your department

ICT tools and services	4. Very accessible	3. Accessible	2. Less accessible	1. Not accessible
Computer PC				
Internet				
Intranets				
Databases				
Telephone				
Mobile phone				
Television				
Radio				
Video cameras				
Video recorder				
Sound/Tape recorders				
Overhead projector				
Laptop computer				
Fax machines				
Video conferencing				
Printer				
Digital camera				
Diskette				
Scanners				
Data projector				
Information systems				
Management info. systems				
Decision support systems				
Copy machines				

Others please specify.....

10. For what purposes do you use the above ICT tools and services? (You may select more than one)

To communicate with friends and relatives [ ](1)

To collaborate with civil servants [ ](2)

To communicate with colleagues world-wide [ ](3)

To disseminate departmental information [ ](4)

For research purposes [ ](5)

For education purposes [ ](6)

For word processing [ ](7)

For Internet access [ ](8)

For spread sheet [ ](9)

For records management [ ]10

For presentations [ ]11

For database searching [ ]12

For Information retrieval [ ]13

For printing [ ]14

Others please specify.....

SECTION FOUR:

THE LEVEL AND RANGE OF USE/INTERACTION WITH ICTs

11. How is your level of use/Interaction with ICT applications? (You may select more than one)

ICT tools and services	**5. V-High**	**4. High**	**3. Satisfactory**	**2. Low**	**1. V-Low**
Computers (PC)					
Internet					
Intranets					
Databases (Online)					
Telephone					
Mobile phone					
Television					
Radio					
Video cameras					
Sound/Tape recorders					
Overhead projector					
Laptop computer					
Fax machines					
Video conferencing					
Diskette					
Printer					
Digital camera					
Scanners					
File management					
Windows / keyboard					
Word processing					
Spreadsheets					
Presentations					
Decision support systems					
Management info. Systems					
E-mail					
Copy machines					
Other specify					

12. How much time per day do you spend with the following ICTs for office/ work purpose?

ICT tools and services	Less than 1 hour	1-5 hours	6-10 hours	11-15 hours	More than 16 hours
Computers (PC)					
Internet					
Intranets					
Databases (Online)					
Telephone					
Television					
Radio					
Video cameras					
Mobile phone					
Sound/Tape recorders					
Overhead projector					
Laptop computer					
Fax machines					
Video conferencing					
Diskette					
Printer					
Digital camera					
Scanners					
File management					
Windows / keyboard					
Word processing					
Spreadsheets					
Presentations					
E-mail					
Copy machines					
Other specify					

13. How long have you used the following ICTs?

ICT tools and services	Less than a year	1-2 years	2-5 years	5-10 years	Over 10 years
Computers (PC)					
Internet					
Intranets					
Databases (Online)					
Telephone					
Television					
Radio					
Video cameras					
Mobile phone					
Sound/Tape recorders					
Overhead projector					

Laptop computer					
Fax machines					
Video conferencing					
Diskette					
Printer					
Digital camera					
Scanners					
File management					
Windows / keyboard					
Word processing					
Spreadsheets					
Presentations					
E-mail					
Copy machines					
Other specify					

14. How frequent do you use the following ICT tools and services?

5=daily, 4=weekly, 3=monthly, 2=sometimes, and 1=never

(5) (4) (3) (2) (1)

ICT tools and services	**Daily**	**Weekly**	**Monthly**	**Sometimes**	**Never**
World Wide Web					
Electronic journals					
Computers					
Internet					
Intranets					
On-line Databases					
Telephone					
Mobile phone					
Television					
Radio					
Video cameras					
Sound/Tape recorders					
Overhead projector					
Laptop computer					
Fax machines					
Video conferencing					
Printer					
Digital camera					
Scanners					
File management					
Windows / keyboard					
Word processing					
Spreadsheets					
Presentations					

E-mail					
Copy machines					
Other specify					

SECTION FIVE:

IMPACT OF ICTs TOOLS AND SERVICES

15. Which of the ICT application/services do you consider effective in your work?

ICT applications & services	4. Very effective	3. Effective	2. Less effective	1. Not effective
Computers (PC)				
World Wide Web				
Internet				
Intranets				
Databases (Online)				
Telephone				
Television				
Radio				
Video cameras				
Mobile phone				
Sound/Tape recorders				
Overhead projector				
Laptop computers				
Fax machines				
Printer				
Digital camera				
Scanners				
Diskette				
Copy machines				
File Management				
E-Mail				
Spreadsheet				
Presentation				
Word processing				
Video conferencing				
Other specify				

SECTION SIX: TRAINING NEEDS

16. In which ICT applications/areas do you require training? (You may select more than one)

Training needs	Very essential		Essential		Quite essential		Not very essential	
Word processing								
Surfing the Internet								
Spread sheet								
File management								
Power point								
Database searching								
Information retrieval								
e-mails								
e-government								
e-commerce								
e-banking								
Cell phone banking								
e-learning								
Information security								

17. How do you rate your computer skills in the following relative to your work?

ICTs	Excellent		Good		Satisfactory		Poor		Very poor	
Television										
Radio										
Video camera										
Video recorders										
Tape recorder										
Data projectors										
Laptop										
Fax machine										
V conferencing										
PC										
Internet										
Intranet										
Mobile phones										
Databases										
Telephone										
Copy machine										
Printer										
Scanner										
E-mails										

18. If you are unable to use ICT applications, what other sources do you consult?

Printed information [ ](1)

Colleagues [ ](2)

Experts [ ](3)

Rely on secretarial services/intermediary [ ](4)

Others please specify.....

19. How can your ICT education and training needs be addressed in your organization? (Please give details)

(i).....

(ii).....

(ii)…….....

20. What are hindrances that prohibit the use of ICTs in your department?

(i)……

(ii)……

(iii)……

21. What would you propose as recommendations in improving the applications and use of ICTs in your institution/organization?

(i).....

(ii).....

(iii).....

THANK YOU VERY MUCH FOR PARTICIPATING AND COMPLETING THE QUESTIONNAIRE

Appendix B: Application Letter to government departments

Department of Library & Information Science

University of Zululand

Private Bag X1001
KWADLANGEZWA
3886
Tel (035) 902-6484
Cell: 082 – 372 46 38
E-mail:docholla@pan.uzulu.ac.za
Web: http://www.lis.uzulu.ac.za

7th July 2005

To WHOM IT MAY CONCERN

This is to inform you that Blessing Mbatha is a PhD student registered with the University of Zululand in the Department of Library and Information Science and currently conducting a study on the diffusion of social informatics within civil services/servants work environment in KwaZulu Natal government. The purpose of the study is to examine the design, use, impact, interaction and contextualization of ICT through social informatics analysis among the civil servants and within the civil service work environment in the KwaZulu Natal Government. The outcome of this study is intended to benefit the civil services in South Africa particularly in KZN by establishing status, trends, levels and problems of interaction with ICT within the civil service and suggesting ways of improving the interaction for the development of a strong and modern civil service in the country. In addition, this study will benefit decision makers and analysts who are researching and framing policies about the ways in which people might do or should utilize ICTs, as this study uses several contemporary examples of ICT policy debates to illustrate the value of a socially and organizationally informed research. Kindly note that this research is a part of the requirement for the award of the degree of Doctor of Philosophy in Library and Information Science to Mr. Mbatha.

Any assistance accorded to him towards this research will be highly appreciated.

Thanks

Prof. Dennis N. Ocholla
Head of the Department of Library and
Information Science

Appendix C1: Approval from the Department of Education

PROVINCE OF KWAZULU-NATAL
ISIFUNDAZWE SAKWAZULU-NATALI
PROVINSIE KWAZULU-NATAL

DEPARTMENT OF EDUCATION
UMNYANGO WEMFUNDO
DEPARTEMENT VAN ONDERWYS

Tel: 033 341 8610
Fax:033 341 8612
Private Bag X9137
Pietermaritzburg
3200

228 Pietermaritz Street
Pietermaritzburg, 3201

INHLOKOHHOVISI **PIETERMARITZBURG** **HEAD OFFICE**

Enquiries: **Imibuzo:** **Sibusiso Alwar** **Navrae:**
Reference: **Inkomba:** **0059/05** **Verwysing:**
Date: **Usuku: 24 October 2005** **Datum:**

To: **Mr Blessing Mbatha**
P. O. Box 538
KwaDlangezwa
3886

RE: APPROVAL TO CONDUCT RESEARCH

Please be informed that your application to conduct research has been approved with the following terms and conditions:

That as a researcher, you must present a copy of the written permission from the Department to the Head of the Institution concerned before any research may be undertaken at a departmental institution bearing in mind that the institution **is not obliged to participate** if the research is not a departmental project.

Research should not be conducted during official contact time, as **education programmes should not be interrupted,** except in exceptional cases with special approval of the KZNDoE.

The research is not to be conducted during the fourth school term, except in cases where the KZNDoE deem it necessary to undertake research at schools during that period.

Should you wish to extend the period of research after approval has been granted, an application for extension must be directed to the Director: Research, Strategy Development and EMIS.

The research will be limited to the schools or institutions for which approval has been granted.

A copy of the completed report, dissertation or thesis must be provided to the RSPDE Directorate.

Lastly, you must sign the attached declaration that, you are aware of the procedures and will abide by the same.

SUPERINTENDENT GENERAL
KwaZulu Natal Department of Education

UHULUMENI WAKWAZULU NATAL
UMNYANGO WEMFUNDO
DEPARTMENT OF EDUCATION
DEPARTEMENT VAN ONDERWYS
2005 -10- 24
ISIKHWAMA SEPOSI
PRIVATE BAG / PRIVAAT SAK X04
ULUNDI 3838
RESEARCH, STRATEGY AND POLICY DEVELOPMENT

Appendix C2: Approval from the Department of Education

PROVINCE OF KWAZULU-NATAL
ISIFUNDAZWE SAKWAZULU-NATALI
PROVINSIE KWAZULU-NATAL

DEPARTMENT OF EDUCATION
UMNYANGO WEMFUNDO
DEPARTEMENT VAN ONDERWYS

Telephone : 035 901 1300
Fax : 035 792 6059
Private Bag X 20104
Empangeni
3880

Cnr. Maxwell Street & Hancock Avenue
EMPANGENI
3880

ISIFUNDA SASEMPANGENI | EMPANGENI DISTRICT | EMPANGENI STREEK

Enquiries: MRS GMP SIDAKI
Imibuzo:
Navrae:

Reference: BT MBATHA
Inkomba:
Verwysing:

Date: 28.11.2008
Usuku:
Datum

Mr B.T. Mbatha
University of Zululand
Private Bag X 1001
KwaDlangezwa
3886

Dear Mr Mbatha

RE: APPLICATION TO CONDUCT RESEARCH

Your undated request to conduct research refers.

I have pleasure in informing you that your application to conduct research among the Manager's in Empangeni District Office has been approved.

All the best with your research.

MRS GMP SIDAKI
DISTRICT DIRECTOR

Appendix C3: Approval from the Department of Arts & Culture

PROVINCE OF KWAZULU NATAL
DEPARTMENT OF ARTS, CULTURE AND TOURISM
UMNYANGO WEZOBUCIKO, AMASIKO NEZOKUVAKASHA

171 BOSHOFF STREET/PRIVATE BAG X9140
PIETERMARITZBURG
3200
TEL: 033-341 3608
FAX: 033-345 1654 **ENQ: MR Z.S. NDIMANDE** **DATE:**

TO WHOM IT CONCERNS

This serves to inform you that Blessing Mbatha has been granted permission to distribute questionnaire in the Department of Arts, Culture & Tourism for research purposes.

GR Linscott
Manager: Communication & IT

Date: 14.7.05

KWAZULU-NATAL
PROVINCIAL GOVERNMENT

14 JUL 2005

DEPARTMENT OF
ARTS, CULTURE & TOURISM

HEAD OFFICE
171 BOSHOFF STREET, PIETERMARITZBURG, 3200

Appendix D: Letter to respondents

QUESTIONNAIRE FOR THE DIFFUSION OF SOCIAL INFORMATICS AMONG CIVIL SERVICES/SERVANTS IN KWAZULU-NATAL GOVERNMENT

Dear Respondent

My name is Blessing Mbatha, a PhD student registered with the University of Zululand in the Department of Library and Information Science. I am carrying out a study on the diffusion of social informatics on civil services/servants work environment in KwaZulu-Natal government. The purpose of the study is to examine the design, use, impact, interaction and contextualization of ICT through social informatics analysis among the civil servants and within the civil service work environment in the KwaZulu-Natal Government. The outcome of this study is intended to benefit the civil services in South Africa particularly in KZN. In addition, this study will benefit analysts who are researching and framing policies about the ways in which people might, do or should utilize ICTs, as this study uses several contemporary examples of ICT policy debates to illustrate the value of a socially and organizationally informed research. This is a part of the requirement for the award of the degree of Doctor of Philosophy in Library and Information Science. Your assistance is therefore highly appreciated.

Most questions require you to tick the answers. Only a few require short answers to be filled. No names should be provided. You are assured of your rights, including right of consent, protection from disclosure of information and respect for your privacy. Anonymity and confidentiality are promised and maintained.

Thank you.

Blessing Mbatha

University of Zululand, P/Bag X 1001, Internal Box 675, Kwa-Dlangezwa 3886, Tel: 035 902 6289, Fax: 035 902 6449, Email: btmbatha@yahoo.com