The adoption and challenges of electronic voting technologies within the South African Context

by

Mourine Sarah Achieng

Thesis submitted in fulfilment of the requirements for the degree
Master of Technology: in Information Technology
in the Faculty of Informatics and Design
at the Cape Peninsula University of Technology

Supervisor: Dr Ephias Ruhode

Cape Town campus
December 2013

DECLARATION

I, Mourine Sarah Achieng, declare that the contents of this dissertation/thesis represent my own unaided work, and that the dissertation/thesis has not previously been submitted for academic examination towards any qualification. Furthermore, it represents my own opinions and not necessarily those of the Cape Peninsula University of Technology.

Signed **Date**

ABSTRACT

The use of ICTs such as computers, electronic databases and other technologies have been in use for a number of years within the public sector to organise, manage and disseminate information to the public as well as to facilitate day-to-day communication in government offices. In this context, the value of the use of ICTs has been to assist and streamline government operations. The technological development in South Africa has opened up the possibilities of the use of ICTs in the democratic and governance process. E-democracy has been defined as a tool for abandoning the representative system for one with more direct citizen engagement.

This study sets out to explore the challenges of the current electoral process, and also determine the factors that could influence the adoption and diffusion of e-voting technologies within the South African context. Literature has shown that countries such as Brazil and India have successfully implemented electronic voting systems and other countries are at various piloting stages to address many challenges and problems associated with manual paper based system such as costs of physical ballot paper and other overheads, electoral delays, distribution of electoral materials, and general lack of confidence in the electoral process. It is in this context that the study also seeks to determine whether the South African electoral management body can leverage on the opportunities that e-voting presents. However, with all the benefits that e-voting presents, there are countries such Germany, the Netherlands etc. that have tried and tested e-voting systems and decided to abandon these system to go back to the manual paper ballot voting systems because of various reasons ranging from cost, security and verifiability.

This research is exploratory in nature and adopts qualitative research approach and it is within the interpretivism paradigm. Survey and interview strategies were used to collect data. A purposive sampling method was used to select the participants for the survey. To gain an understanding of the views of voters and electoral management body (IEC) about the current electoral process and e-voting technologies, literature was explored, a questionnaire was distributed online to voters and an in-depth semi-structured interview was conducted with the IEC. The study targeted voters who had access to the internet since the survey questionnaire was distributed online.

The analysis is based on thematic analysis and diffusion of innovation (DoI) theory was also used to provide an analytical framework for the study. Through this framework the aims and objectives of the study were conceptualized around three constructs from the theory (relative advantage, compatibility and complexity). The findings of the study revealed that the three constructs from the DoI framework are important factors that may influence the adoption process of e-voting technologies. The findings also revealed other factors such as availability of ICT enable infrastructure and resources, digital divide, trust in technology, awareness of the technology and environment could that also influence the adoption process.

The contributions of this research are anticipated to be a better understanding of the adoption of e-voting technologies in South Africa. For the electoral management bodies, the contribution of this research is that the research to some extent portrays factors that could influence the adoption of e-voting technologies in South Africa. Therefore, findings such as availability of ICT infrastructure and accessibility of these infrastructures should be taken into consideration before introducing e-voting technologies.

Keywords: DoI (diffusion of Innovation), e-voting (electronic voting) technologies, E-governance, e-participation.

ACKNOWLEDGEMENTS

I wish to thank God for bringing me thus far, for his guidance and strength he gave to write this thesis.

I would also like to acknowledge the following people who contributed immensely to my successful completion of this thesis.

- ✓ My supervisor Dr Ephias Ruhode for guiding me through this journey. I have learnt a lot over past year and a half.
- ✓ To my Mom: Jenipher, for your constant love, support, encouragements and continued prayers throughout this journey.
- ✓ To my dear Auntie Emily, where would I be without your support! I will be forever grateful
- ✓ To my fellow post graduate colleagues and friends, thank you for making this journey memorable
- ✓ The Independent Electoral Commission for agreeing to participate in this research
- ✓ The Survey participants for taking your time to actually fill the questionnaire.

DEDICATION

I dedicate this thesis to Mom and Aunty Emily

TABLE OF CONTENT

ABBREVIATIONS

ACE	**Administrative and Cost of Elections**
DoI	**Diffusion of Innovation theory**
E-democracy	**Electronic democracy**
E-governance	**Electronic governance**
E-participation	**Electronic participation**
EMB	**Electoral Management Bodies**
EISA	**Electoral Institute of South Africa**
E-voting	**Electronic voting**
ICT	**Information and Communication Technology**
IS	**Information System**
IEC	**Independent Electoral Commission**
TRA	**Theory of Reasoned Action**
TAM	**Technology Acceptance Model**
UTAUT	**Unified Theory of Acceptance and Use of Technology**
USA	**United States of America**

LIST OF FIGURES

LIST OF TABLES

1 CHAPTER ONE: INTRODUCTION

1.1 Introduction

Elections form a significant part of a democracy and represent an important field to which the use of ICTs in political arena can be measured. Democracy can be defined as a form of governments in which the power is vest in and exercised by all eligible citizens to participate equally – either directly or through their elected representatives under a free and fair electoral system. Governance according to Lai and Haleem (2002) is the system of directing and controlling the actions, affairs and functions of a political unit, organisation or nation. ICT is being used by Governments across the world to meet up with the challenges of modernisation and globalisation. Misuraca (2006:5) points out that e-governance is generally referred to as the use of ICTs to harness changes, looking not only at the increasing use of ICTs as a technological tool for delivering services online and improving the efficiency of administrations, but as a new model for opening up government services to citizens, thereby increasing transparency and participation and making governments more responsive and centred upon its citizen's needs.

Macintosh (2004) defines e-democracy as "the use of information and communication technologies to engage citizens, support the democratic decision-making processes and strengthen representative democracy." E-democracy consists of two sub-areas; e-voting and e-participation. While e-democracy is the use of technology for strengthening the mechanisms of democratic decision making, e-voting and e-participation focus on the means for achieving this (*ibid*). E-participation is defined as the use of modern ICT supported platform to facilitate participation in democracy and governance (Islam, 2008). E-participation requires governors to pay attention to political opinions of those they govern; it is not just delivery of public services online.

Qadah and Taha (2007) define the term electronic voting as the "use of computers or computerized equipment to cast votes in an election." The authors continue to emphasize that "e-voting aims at increasing participation, lowering costs of running elections and improving the accuracy of the results." According to the ACE Electoral knowledge Network (2010), countries such as the USA, Brazil, and India have successfully implemented e-voting to address various challenges associated with the manual paper based electoral process. It is in light of this that this study explores the challenges and prospects of adopting an e-voting system and how South Africa can leverage the opportunities it presents. It should also be noted that the study does not look into specific

electronic voting systems, but rather the adoption and diffusion of electronic voting technologies in general.

1.2 Background to the Research

Chapter 1 of the constitution in South Africa promotes democracy with every citizen above the age 18 allowed to cast their votes in elections. In South Africa elections take place every five (5) years on National, Provincial and Municipal levels. The Electoral Amendment Act (No 34 of 2003) says a person who is a South African citizen, has a green bar-coded ID book and is 16 years old can apply to register as a voter, if the application is successful, their name can only be added on the voter's role once he or she reaches the age of 18 years. National and Provincial elections were held in 1994, 1999, 2004 and 2009. Local Government elections were held in 1995, 2000, 2006 and 2011. To help manage and run elections, most countries have established independent commissions (often referred to as Electoral Management Body (EMB)) to carry out the responsibilities of conducting elections. According to Lopez-Pintor (2000) the existence of such bodies is thought to ensure the legitimacy of elections. Mesfin (2008: 3) goes further and points out that the electoral commission is the most important institution determining whether an election results in a peaceful handover of power or in conflict and instability.

The Independent Electoral Commission (IEC) of South Africa was provisionally formed in 1994 and permanently established in 1998, in terms of the Electoral Commission Act 51 of 1996. The IEC has played a critical role in securing democracy in post-apartheid South Africa. According to Lopez-Pintor (2000) the work of the IEC extends beyond the administration of local, provincial and national elections. It also works with and mediates between political parties, adjudicates disputes, promotes voter education and reviews electoral legislation. The IEC is accountable to the National Assembly even though it is an independent body. The IEC promotes democracy in South Africa and must ensure free and fair elections at all levels of Government; National, Provincial and Local. This is accomplished through;

- Dividing South Africa into voting districts which ensures equal access to polling stations and avoids problems associated with overcrowding
- Organizing logistics of the election. This includes Information Technology systems, staffing, management of conflicts and the education of voters
- Registering eligible voters onto a voters roll
- Ensuring efficiency of running the voting process
- And counting, verifying and announcing final results of elections (IEC, 2004).

1.2.1 South Africa's Electoral System

There are various ways to elect representatives into government; different countries use different electoral systems and variations or combinations of system exit around the world. According to the constitution, South Africa uses the proportional representation (PR) system. In this system, political parties submit a list of individuals to be elected as members of national or provincial legislatures. Voters do not have power to determine party lists, but vote for political parties. In South Africa, municipal elections use a mixture of constituencies (according to this system, the country is divide up into voting areas called constituencies) and a proportional representation system. The country is divided into wards and the people in each ward select an individual to represent them in the local council. People also vote for a party to represent them in the council (SouthAfrica.info, 2006).

1.2.2 South Africa's Electoral Procedure

In South Africa, eligible voters from the age of 18 are required to register to cast a vote in elections. Voters are required to have identity document (ID) books to vote. Voters are registered to a particular voting district and in local elections, may only vote at voting stations in that district. For National and Provincial elections, voters ought to vote where they are registered but in some cases are allowed to vote outside the voting district if they have proof that they are registered. In 1994, voters were allowed to cast their votes without having to be on a voter's toll because it was the first democratic elections being held post the apartheid era. The current process in South Africa allows the voter to cast a vote on a ballot paper using a pencil selecting a political party (IEC, 2009). Figure 1 illustrates the voting process during elections in South Africa.

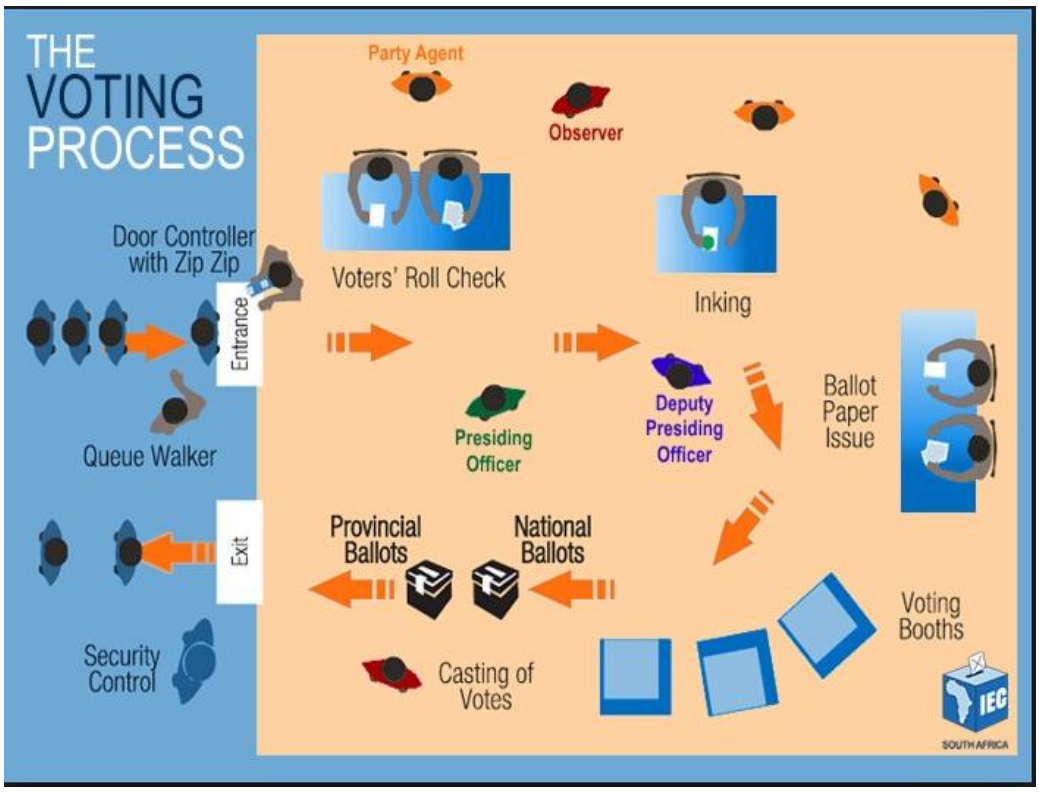

Figure 1: South Africa's voting process (Source: www.elections.org.za)

On the Election Day voters queue outside the voting station entrance, and their names are checked against the voters' roll as they enter the station. A voter's thumb is examined under a ultra-violet scanner for traces of the indelible ink that is applied on to everyone who has voted to prevent voters from voting multiple times. Voters are then issued with two ballot papers, one to elect members of the National Assembly, the other to elect members of the relevant Provincial Legislature. Each ballot paper has a list of all registered political parties contesting the elections. Alongside each party name, is a photograph of its leader, the party's logo and a block in which voters can make their mark. Voters then enter a private cubicle to cast their vote. A voter is allowed to make only one mark on each ballot paper for a party of choice. Only a tick or a cross is acceptable in the appropriate box to the next to the chosen party. A mark made anywhere else will spoil the ballot paper and so nullify the vote. After making their choice, voters deposit their ballot papers in a sealed ballot box and leave the station.

Having looked at the voting process, it can clearly be seen that South Africa has a very low uptake of technology within the voting system. There are various countries around the world that are using technology to improve their electoral system. Brazil and India are two examples of countries that have adopted e-voting technologies successfully to improve their electoral process.

1.2.3 Challenges in the current Electoral process

There are various challenges that are associated with the paper based manual voting system and the current system used in South Africa is no exception. According to the SouthAfrica.info (2006), possible drawback to the South Africa electoral system is that there are a large number of illiterate adults. Unicef.org South Africa (2009) reported that there were nearly 5 million South Africans who were illiterate. Citing the Minister of Education, Unicef.org South Africa reported that about 54% of the population have not completed an adequate level of education. This presents challenges when casting votes using a ballot form. It might sound simple for an educated person, but for an illiterate person this can be a challenging task. In addition, the Electoral Institute of South Africa recognized that during the 2004 elections, some of the ballot papers were not clear and this confused voters and may have played part in the 1.58% spoilt ballots. In the 2009 election there were 239,237 spoilt ballots during National elections and 223,462 in the Provincial elections (EISA Election update Report, 2009). E-voting systems are capable of supporting a diversity of interfaces to the illiterate voter. A good example is the Electronic voting system in Brazil, it makes use of visual aids and colour coding to help the country's illiterate voters taking part of the democratic process.

Cost of physical ballot paper is the first identified negative impact. In the 2004 elections 56 million ballot papers were printed in colour in 11 official languages on ballot papers. As per EISA research report no. 12, the total costs of 2004 elections was R790 million- that is R50.59 per national vote. The 1999 election cost 713.5 million or R44.65 per national vote; and 1994 cost 960 million or R49.15 per national vote (Piper, 2004).

Another concern is the process challenge in the ballot form. According to a survey done by Citizen Surveys in October and November 2008, South African citizens were concerned that the secrecy of their ballot form could be compromised. A sample study was conducted on 2400 South African citizens revealed that 58% had confidence in the secrecy of their ballots forms. In a report delivered by the Electoral Institute of South Africa, the 2009 elections showed that a large number of election officials did not have a clear understanding of the counting process this in itself led to delays. They observed that some polling stations used one ballot box for both the National Assembly and Provincial Legislatures. Also the seals on some ballot boxes were not applied using the correct procedures (EISA, 2009).

According to World Bank (2009), a further contributing drawback is the fact that poverty is one of South Africa's biggest challenges, wherein- 50% of the population live in under privileged conditions. Transport from rural areas to polling stations can decrease voting registration and participation. People may not have the necessary funds to travel to an election polling station, this can lead to low voter turnout during South African elections. The IEC are also faced with logistical problems when distributing ballot papers to some rural areas, accessing these areas are often challenging. Kersting (2009), reports on the voter turnout a cross the elections in 1994, where 84% of eligible voters casted their vote, in the 1999 election this figure declined to 63% and in 2004, the election had a 61% turnout.

The IEC could ease the burden on the voters especially those in the rural areas and cannot reach the voting stations with the use mobile voting stations. The introduction of ICT may not solve the issue of poverty but if used effectively it could increase the voter turnout especially in the rural areas by bringing the voting stations closer to the voters.

People with disabilities face some challenges when it comes to casting votes, depending on their disability. For example, when a blind person or someone else with a disability has to rely on assistance when casting his/her vote by making use of presiding officer at the voting station, the integrity of the vote might be influenced (IEC, 2009a). Large percentages of South Africans who live abroad were eligible to take part in the 2009 elections. The Constitutional court delivered this decision on the 12th of March 2009 allowing South Africans living abroad to vote (IEC, 2009b). This is good for democracy in South Africa, but can lead to challenges such as voters having problems accessing an embassy to register and cast their vote. South Africans should not only be able to vote, but should also have a system that can be trusted. The protection of information in an election from threats is very important. The risks that threaten the confidentiality, integrity and availability of information must be mitigated or fully eliminated (Solms & Solms, 2008). This will contribute to having a free and fair election where voters will have confidence in their country's electoral system.

According to Schulz-Herzenberg, (2011), despite the appearance of stability in election results in South Africa, a longitudinal study of trends in voter registration and voter turnout between 1994 and 2009 suggests that there has been a general decline in electoral participation in terms of both voter registration and turnout(*ibid*).

1.3 Statement of the research problem

Some countries around the world are successfully implementing e-voting to address many challenges associated with costs of physical ballot paper and other overheads, electoral delays, distribution of electoral materials, and general lack of confidence in the electoral process. South Africa however, has not leveraged the opportunities that e-voting presents. Manual voting is often tedious, non-secure, and time consuming, which leads us to think about using electronic facilities to make the process more efficient.

1.4 Research question

The main research question is:
How can the South African government leverage on the opportunities of e-voting?

1.4.1 Sub-questions

1. What are the challenges of the current manual paper based voting process?
2. What are the factors that could influence the adoption of e-voting technologies in South Africa?
3. What recommendations can be made to improve the current electoral process in South Africa?

1.5 Aim of the study

The study aims to explore how South Africa can leverage on the opportunities the electronic voting presents.

1.6 Objectives of the study

The study's main objective is to determine the opportunities and challenges of adopting electronic voting technologies.
The secondary objectives of the studies are:

1. To determine factors that could influence the adoption of e-voting technologies in South Africa.
2. Recommend e-voting technologies as a possible solution to the challenges facing the current electoral system.

1.7 Limitations of the study

The study is limited to voters in Cape Town who had access to the internet and the IEC in Cape Town. The sample size limits the generalizability of the findings of this study to the entire South Africa. It should also be noted that the study does not look into specific electronic voting systems, but rather the adoption and diffusion of electronic voting technologies in general.

1.8 Structure of the Thesis

This study is organised into six chapters with appendices.

Chapter 1 begins with introductions to the research and also includes the background to research problem. There are also the research questions, aims and objectives of the research.

Chapter 2 provides a literature review on e-democracy, e-governance, e-participation, and the prospects and challenges of e-voting technologies. The chapter also discusses the technology adoption theories used in the Information System field and looks more into depth diffusion of innovation theory (DoI) the chosen theoretical frame work.

Chapter 3 covers the research approaches and methodologies used in Information Systems (IS) research. It further discusses the approach used for this study and why it is appropriate. This leads to an explanation of the research methods, sampling methods, data collection method and analysis used as well as the ethical considerations of the study.

Chapter 4 presents the results from the questionnaire and the semi-structured interview. The chapter also represents the analysis process for the research using thematic analysis and DoI as theoretical lens of analysis.

Chapter 5 presents the discussions of the findings of the factors that could influence the adoption process of e-voting technologies. The findings on the challenges of the current electoral process are also presented.

Chapter 6 concludes the study and presents a set of recommendation according to the findings.

1.9 Conclusion

This chapter outlined the area of study under exploration and provided an overview of the research aim and objectives. It also highlights the background of the research problem and the problem statement. The chapter also presents the research questions. The next chapter outlines the literature that provides a background for the study. The chapter discussed the electoral process of South Africa, the background to and the statement of the research problem, the research question, the aim and objectives, as well as the limitations of the study.

2 CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter begins with an in-depth look on democracy, which also covers the South African democracy since the first elections were held in 1994. The chapter thereafter discusses e-democracy and how ICTs have influenced how modern democracies are governed; this leads up to the general discussions on e-governance. The study then narrows down to e- governance initiatives that are currently in existence in South African. E-participation and e-voting are introduced as two main components of e-democracy.

2.2 Democracy

Democracy is considered to be the political system in which citizens exercise their authority through interventions in Government aimed at improving their own conditions (Curran & Nichols, 2005). The authors point out that the underlying core of democracy is an informed and engage citizenry. Although there are political researchers who may disagree on whether an informed citizen is necessary for democracy, it is generally acceptable that informed citizens can improve the effectiveness of a democracy. Watson and Mundy (2001), cites Jefferson (1789) as stating that “when citizens are well informed, they can be trusted with their own government.” Thus, information creates trust and helps to ensure that politicians serve the electorate. Most Governments get praised for “informing” citizens via digital communication. But the majority has a long way to go to “actively engage” citizens or to effectively exert global influence using digital media. Democracy is most effective when there is an uninterrupted flow of information between citizens and Government, as well as high level of citizen participation in the political process (Watson & Mundy, 2001).

The U.S. department of state (2008a) describes democracy as a set of evolving ideas and principles that institutionalizes freedom. The department identifies two categories of democracies, direct and representative. In the direct democracy, citizens can participate in making decisions without relying on elected or appointed officials as intercessors. However, most Governmental process and entities are too large and complex to allow direct democracy to effectively take place. Hence, the most common form of democracy in existence today is representative in nature.

Under this type of democracy, citizens elect officials to make decisions, develop laws and regulations and implement and administer programs of the good of the public. Public officials, as a result are accountable to citizens for their actions and decisions. Another aspect of our democratic society is that political decisions are made based on majority rule combined with an awareness of individual human rights that protect the rights of the minorities (U.S. Department of State, 2008a).

2.2.1 Democracy in South Africa

South Africa uses a representative democracy which purports to be representative, participative and deliberative democracy (Republic of South Africa, 1996)**.** South Africa celebrates 20 years into democracy in 2014 and has laid the foundation for the design and implementation of policies to ensure democratic consolidation, competitive multi-party engagement and citizen participation. The framework created for political representation is laid out in the founding provisions Chapter 1 of the constitution which states that South Africa is one sovereign democratic state founded on:

- Human dignity, the achievement of equality and the advancement of human rights and freedoms
- Non-racialism and non-sexism
- Supremacy of the constitution and the rule of law
- Universal adult suffrage, a national voters' roll, regular elections and a multiparty system of democratic Government, to ensure accountability, responsiveness and openness.

South Africa has held four national and provincial elections, and four nation-wide local government elections on the basis of these founding provisions. The IEC is responsible for organizing and managing elections. In order to give legitimacy to elections the constitution guarantees the institutional independence of the IEC, and restrains other Government bodies from interfering with its functions. In addition, no person or organ of state may interfere with the functioning of the IEC. The IEC is also constitutionally accountable to the National Assembly, and must report on its activities and the performance of its functions to the Assembly at least once a year.

The IEC is one of six institutions established in terms of Chapter 9 of the constitution to strengthen South Africa's constitutional democracy. These institutions are: Public protector; the Human Right Commission; the Commission for the Promotion and Protection of the Rights of Cultural, Religious and Linguistic Communities; the Auditor-General; and the Commission for Gender Equality.

2.3 E-democracy

E-democracy is about cultivating the political and technological literacies necessary to critically engage democratic ideas and processes across both electronically mediated and face-to-face environments. Citizens must be able to access the technological resources to participate both online and through conventional means such as polling booths. According to Walsh (2004), much interest in e-democracy is largely to do with saving time, increasing accuracy and accessibility in the administration and provision of Government services. The author continues to mention that while an informed citizen is a positive step to revitalising democracy, an informed and participating citizen is a far better measure of democracy well-being (Walsh 2004).

E-democracy has become a necessity in this era of computers and information technology, with electronic elections being one of the most important applications of e-democracy. Macintosh (2004) defines e-democracy as "the use of information and communication technologies to engage citizens, support the democratic decision-making processes and strengthen representative democracy."

According Garson (2006), e-democracy is an umbrella term that covers many democratic activities carried out through electronic means and broadly defines e-democracy as the "use of ICT by governments to improve the efficiency, equity, and quality of democratic participation." Some of the major applications of e-democracy include mechanisms to inform, consult, and broadly engage citizens through ICT use in the political process. These mechanisms are usually called "e-participation" or "e-engagement". Yildiz (2007) recognizes that ICTs have a tremendous administrative "potential" and according to McClure and Bertor (2000) ICT could help create a networked structure for interconnectivity, service delivery Bekkers and Zouridis 1999, efficiency and effectiveness (Heeks, 2002), interactivity (DiCaterino & Pardo, 1996), decentralization, transparency and accountability.

E-democracy consists of two sub-areas; e-voting and e-participation. While scholars define e-democracy as the use of technology to strengthen the mechanisms of democratic decision making, e-voting and e-participation focus on the means for doing this. In e-participation, involvement between citizens in the policy process may give rise to two different sets of relationships between citizens and policy makers. According to Hye, Jong and Hale (2008), e-democracy is the use of cyberspace and mobile technologies to enhance effective governance. Shirazi (2009) highlights the potential of e-democracy to create a new space for engagement, deliberation and collaboration in the political process that can make democratic process more inclusive and transparent. E-democracy is, however not, only about technological improvements and direct democratic technologies such as e-voting, e-registering, and online government's forums, but also refers to long term transformations of politics.

The democratic process are divided into three sub processes (Parycek, 2003)

- Information acquisition
- Formation of an opinion and
- The decision itself

E-democracy contains two aims which derive from the above statement (Alexander Prosser, 2004): The field of e-participation (information acquisition and formation of an opinion) and the field of e-voting (decision making process). The next section discusses e-governance and some of the e-governance initiatives that has been implemented to enhance good governance in South African democracy.

2.4 E-governance

Clift (2003) states that "E-democracy builds on e-governance and focuses on the actions and innovations enabled by ICTs combined with higher levels of democratic motivation intent." Governance according to Lai and Haleem (2002) is the system of directing and controlling the actions, affairs, policies and functions of a political unit, organization or nation. According to Rose (2005), the extent at which e-governance develops in a country is a function of the collective national and local capital capacity supplying IT services and of informal social and human capital creating a demand for e-governance. He continues to explain that the differences in the capacity of countries to supply standard e-governance services are a consequence of its degree of modern resources and to supply e-participation facilities reflects its political openness.

E-governance brings information closer to the people and information required can be obtained almost immediately and this increases the willingness of citizens to proactively get involved in government matters, beyond just being recipients of services. According to Clift (2003), the increase of the use of internet by citizens and its application towards political and community purposes is an indication of the growth of the potential benefits of ICT in participatory democracy around the world.

Rose (2005) is of the view that e-governance depends not only on the supply of infrastructure enabling individuals to access the internet but also on growth in the percentage of internet user within a society. Democratic governance requires 'inclusive participation' in which all people take part in the governing of their country. To be effective, they will need access to information and modern technology.

The 4th African Development Forum (held in Addis Ababa in October 2004) produced a consensus statement declaring that:

E-governance… is an important innovation for enhancing good governance and strengthening the democratic process and can also facilitate access to information, freedom of expression, greater equity, efficiency, productivity growth and social inclusion. Successful e-government initiatives can have demonstrable and tangible impact on improving citizen participation and quality life as a result of effective multi-stakeholder partnerships. African governments need to develop appropriate policy frameworks, supported by legislation for e-governance, that are linked to strategic development objectives; enlist high-ranking political e-government champions; focus awareness, outreach and training efforts on the less privileged segment of target users, particularly women and neglected rural communities; and promote local content and support local language development.

In the light of such agreed policy intentions, there are many examples of successful African e-governance projects, often implemented in isolation from broader strategies for sustainable e-governance. Strategic programs for e-governance have been established recently in countries like Egypt, Kenya, Senegal, Mozambique and South Africa. The next section discusses e-governance in South Africa.

2.4.1 E-governance in South Africa

The South African Government has launched a number of e-governance initiatives since its inception in 1994. These initiatives are outlined in a project dubbed information communication year 2005. Kroukamp (2005) lists some of the basic steps taken, including the installation of public information terminals for Internet and email access in certain rural centres as part of the joint public/private sector initiatives and the funding of computer centres in rural communities by companies such as Microsoft.

Other initiatives that have been launched by various government departments in an effort to implement e-governance to provide services range from the South Africa Revenue (SARS's) providing an e-filing system to facilitate the electronic submission of tax returns, the National Automated Archival Information Retrieval System (NAAIRS), provides extensive information and documentation about the national archive services to the public and to governments bodies,

The State Agency for Information Technology (SITA) is also an e-government initiative, SITA was established in 1999 to consolidate and coordinate the State's information technology resources in order to achieve cost savings through scale, increase delivery capabilities and enhance interoperability. SITA is committed to leveraging Information Technology as a strategic resource for Government, managing the IT procurement and delivery process to ensure that the Government gets value for money, and using IT to support the delivery of e-government services to all citizens (www.sita.co.za). The Department of Home Affairs' National Identification System (HANIS) project, has initiated an automated identification database of fingerprints to combat crime and supply information for the purposes of policing (Kroukamp, 2005).

The department of Transport's Electronic National Traffic Information System (eNaTIS) is another e-government initiative which was developed as a replacement for the previous NATIS system. The system manages functionalities such as: (I) Allowing vehicle licensing, (ii) vehicle registration, (iii) driving licences, (IV) contravention, (v) accident and infrastructure transactions (National Traffic Information System, 2008).

The IEC successfully developed an e-procurement system that allows for open and transparent bidding of government tenders aimed at preventing corruption. Moreover the IEC leverages tools of multi-access to promote free and fair elections. In 2004 for example the IEC in partnership with cell phone service providers enabled voters to short message service (sms) their ID Number and in return receive a message back indicating their eligibility to vote and details of voting station.

Batho Pele Gateway Portal launched in 2004 is a Government policy that sets out the belief set and functional approach to make service delivery in South Africa people oriented [1](Republic of South Africa, 2010a). Batho Pele is a Se-setho term meaning "People first", it is grounded on three important policies and legislative themes. Batho Pele has a motto that guides government officials when engaging with citizens that is: "*we belong, we care, we serve*" it has eight principles that are listed below:

- ✓ Consulting users of services,
- ✓ Setting services standards,
- ✓ Increasing access to information,
- ✓ Ensuring courtesy,
- ✓ Providing more and better information,
- ✓ Increasing openness and transparency,
- ✓ Remedying mistakes and failures and
- ✓ Getting the best possible value for money.

According to Twinomurizi *et al.* (2012*)*, Batho Pele has a developmental and emancipatory perspective similar to the United Nations Development Program (UNDP) human development philosophy whose reports are entitled "People First: The Human Development Reports" [2](UNDP, 2007). Booz Allen Hamilton (2002:96) pointed out that when e-governance is used to its full potential, it can provide the convenience of electronic voting and encourages e-participation in public forums by all citizens.

---

[1] www.dpsa.gov.za/batho-pele/index.asp

[2] What is HD (Human Development)? http://hdr.undp.org/hd/

2.4.1.1 E-governance in Cape Town

E-governance can be used as a tool for networking among government departments and institutions. One of the most prominent examples of online government networking is the South African Cities Network (SACN), a partnership of nine cities in South Africa. The SACN has encouraged its members to pursue e-governance to assist municipalities with providing services. The Cape Town metropolitan municipality claimed that e-governance has increased the efficiency and effectiveness of the municipality in the provision of public services to the city's residents (www.westerncapegov.co.za).

The Cape Town's Smart City Initiative and e-Governance Incorporated has been able to provide Cape Town residents with online access to Government services in a seamless and integrated manner. Through the Smart City Initiative and the City's e-Government Incorporated, a network of contact centres and citizen service centres was set up to ensure that residents have access to Government services. The initial phase of the project was aimed at giving information about Government services identifying the respective point where these services could be accessed.

The second phase was to offer online services such as applying for various licences, as well as paying utility bills. In addition, a customer care service was introduced as part of the initiative through which citizens could be able to call and enquire about services they needed from the Government in their language of preference.

Currently, the city of Cape Town's website has been expanded to become a comprehensive directory of some of the city's main public services. Residents can query and pay for the most basic service online. This promotes efficiency and effectiveness. The number of interactive Government to citizens (G2C) e-governance services offered, such as discussion forums, are limited and do not facilitate any significant interaction between the Government and the public, which means that participation is insignificant. Political parties such as the Democratic Alliance (DA), tend to be more interactive and have a number of blogs and online public forums.

2.5 Public participation

South Africa is a multi-party, representative democracy, under a constitution which is sovereign and entrenches human rights. Despite being a representative democratic system, South African constitution and some legislation complements the power of elected politicians with forms of public participation.

According to Beierle and Cayford (2002), public participation involves several "mechanisms" intentionally instituted to involve the lay public or their representatives in administrative decision making. Davids (2005:19-29) defines public participation as "an inclusive process aimed at deepening democracy through formal participatory mechanisms…" The author advocates that for public participation to be labelled authentic, it should entail participation in decision making, implementation, monitoring and evaluation as well as sharing benefits of governance and development out puts and outcomes. Calland (1999:62) mentions that public participation processes strengthen institutions of representative democracy, democratising those institution. The author further points out that it is important not to underestimate the growing crisis in other pluralist, liberal democracies throughout the past century when declining voting levels, lack of real political choice, rise of shadow security governments and decay in popular trust in the electoral process have prompted the need for renewing public participation (*ibid*). Public participation can be seen as a means of enhancing development and services delivery, improve governance and deepen democracy.

In South Africa as of 2005 drafted a National Policy Framework for public Participation which states that "public participation could be promoted in order to make development plans and services more relevant to local needs and condition, in order to hand over responsibility for services and promote community action and to empower local communities to have over their own lives and livelihood." The next section looks at how ICTs have been used to aid public participation.

2.5.1 E-participation

The process of using ICT to engage the public in democratic process is widely known as E-participation. E-participation can be understood as technology mediated interaction, between the civil society sphere and the formal politics sphere and between the civil society sphere and the administration sphere. Participation can be generally understood as joining in, either in the sense of taking part in some communal discussion or activity, or in the sense of taking some role in decision making. E-participation can take place within the formal political process e.g. voting , or outside it e.g. political activism (Sanford & Rose 2007).

E-participation empowers people with ICT so as to be able to act in bottom –up decision making processes. Therefore, e-participation is a means of empowering the political, socio-technological, and cultural capabilities of individuals and affording people the opportunity to involve and organize them in the information society (Fuchs *et al.,* 2006).

E-participation describes efforts to broaden and deepen political participation by enabling citizens to connect with one another and with their elected representatives and governments using Information and Communication Technologies (Tambouris, 2007). E-participation involves from simple information provision to mediation and from consultation and campaigning to voting. Tambouris *et al*. (2007) defined five levels of e-participation as: e-involve, e-consult, e-inform, e-collaborate and e-empower.

A number of software applications, products, tools and components can be regarded as e-participation tools. These are e-participation chat rooms, e-participation discussions forum/board, Decision making games virtual communities, e-panels, e-petitioning, e-deliberative polling, e-consultation, e-voting, suggestion tools for (formal) planning procedures, webcast, podcasts, RSS feeds wikis, blogs quick polls surveys, GIS-tools Search engines Alerts services, online newsletters, FAQ web portals and LIST SERVS (Tambouris, 2007). Blogs are becoming one of the most popular media of communication and interaction.

According to Coleman and Norris, (2005:31) if the aim of e-participation is to promote democratization, then it must be a bottom-up as well as top-down and it must be as much about the fluid arrangements of networks as the institutional processes of hierarchies. Electronic voting can be seen as a form of citizens' involvement in e-participation. The research discusses how other scholars have defined electronic voting, other countries with e-voting and what the benefits and challenges are associated with electronic voting technologies.

2.6 Electronic voting (E-voting) Technologies

Electronic voting is another important application within the domain of e-democracy. Smith and Macintosh (2003) emphasize that a modern e-enabled system of democratic governance seems to require some sort of modernisation of the voting process, whether through e-counting methods or an e-voting system. According to Macintosh (2004), a powerful symbol of a democracy is the participation of citizens in the free and fair elections of representatives to govern them. Macintosh continues to mention that voting is seen as the act that currently defines the relationships between citizens, governments and democracy. As such e-voting takes on an influential symbolic role in e-democracy.

Qadah and Taha (2007) define the term electronic voting as the "use of computers or computerized equipment to cast votes in an election." The authors continue to point out that "e-voting aims at increasing participation, lowering the costs of running elections and improving the accuracy of the results." According to Sæbø, Rose, and Skiftenes Flak (2008), electronic voting is an activity within the e-participation field where e-participation actors (citizens, politicians, government institutions, voluntary organisations) conduct such an activity in the context of some factors (information availability, infrastructure, underlying technologies accessibility, etc.) which then result to certain effects like civic engagement, deliberative and democratic.

Xenakis and Macintosh (2005) are of the view that e-voting can play an important role in enhancing the voting process by increasing the low turnout among youths who may not be content with the traditional paper-based voting process. According to Barker and Moon (2005), e-voting can help in improving the participation of disabled people who are usually less likely to vote than individuals who have similar demographic characteristics. This help comes through providing conveniences in areas such as different text sizes, colour and audio voting; also e-voting can solve the mother tongue problem by allowing voting in different languages.

All these benefits are in addition to the rapid and more accurate process of counting the votes that e-voting allows (CoE, 2004). Although these benefits are attractive and can solve many problems of the paper-based voting system, the implementation of e-voting could present number of issues and challenges, including social, technical, political, legal and economic aspects. These aspects should be considered thoroughly before any decisions are made to unravel the hidden details that could affect the choice of suitable solutions and the overall success of the system (*ibid*).

Electronic voting is very broad, referring to several distinct possible stages of electronic usage during the course of elections. For the purpose of this paper, distinctions are made between the following terms:

- ✓ *Electronic voting*: which refers to any system where a voter casts his/her ballot using an electronic system, rather than a paper ballot (or mechanical machine to punch a paper ballot).This includes having voting machine at polling stations. Once recorded, an electronic vote is stored digitally and transferred from each electronic voting machine to a counting system (Everett *et al.*, 2008).
- ✓ *Electronic vote counting:* refers to the system that is used to tabulate ballots and award seats. It would be possible to vote using a non-electronic medium and then convert these votes to an electronic system and award seats through an electronic vote counting system (Everett *et al.,* 2008).
- ✓ *Internet voting/ remote voting:* refers to the process where voters are able to vote remotely via the internet (Everett *et al.,* 2008).

2.6.1 E-voting: Other countries experience

E-voting systems are gradually replacing the traditional paper-based electoral process in many democracies around the world. Brazil and India are the two most populous democracies in the world are among the forerunners in the use of automated voting systems according to (Rodrigues-Filho, Alexander, Cynthia & Batista, 2006; Kumar, 2008). Tula (2005) and Thompson Jimenez (2009) mention that the main motivation for the introduction of e-voting is usually its potential for boosting confidence in the election process. Other countries using e-voting systems include the Philippines and Belgium. Countries like Estonia, Norway, Pakistan, and the USA are at various stages of piloting partially using e-voting and counting technologies, including the use of internet voting.

There are countries that are however moving away from e-voting technologies, for example the Netherlands in 2008 after several years of using e-voting machines, decertified all its machines and moved back to paper balloting. Likewise, Germany recently banned the use of e-voting machines it had been using. Ireland spent thousands of Euros on e-voting machines that were only used in small pilot projects. In the United States, the use of e-voting systems have always been controversial (the 2000 Florida elections) and has generated fierce debate between advocates and opponents of this technology. The worldwide experience of implementing e-voting is mixed with respect to adoption, non-adoption or adoption followed by abandonment (Goldsmith, 2011). Table 1 shows the status quo of e-voting in various countries as of December 2011.

Kenya's Electoral and Boundaries Commission (IEBC) during the 2013 March elections had to switch to a manual vote tallying after defects in the counting systems slowed the real-time transmission of results to voters. The failure occurred when two; the voter identification kits used to verify the identity of voters failed to work in many parts of the country while the electronic transmission system meant to relay the poll results from the constituencies in real-time crashed www.nation.co.ke.

Status quo	**Country**
Twelve countries with legally binding polling site electronic voting	Belgium, Brazil, France India, Japan, Kazakhstan, Russia, United States of America, United Arab Emirates, Philippines, Paraguay, Venezuela.
Six countries with legal binding internet voting	Austria, Canada, Estonia, France, Japan, Switzerland.
Twenty countries planning, trials and non- legally binding e-voting	Argentina, Azerbaijan, Belarus, Chile, Czech Republic, Costa Rica, Finland, Greece, Italy, Indonesia, Lithuania, Mexico, Nepal, Norway, Poland, Portugal, Romania, Slovenia, South Korea, Sweden.
Four countries with pilots	Peru, Ecuador, Slovenia and Spain.
Other country with a trial suspended and one country with pilot suspended	Bulgaria (pilot) and Latvia (Trial)
Five countries with e-voting projects stopped	Australia (Cost, 2009); Germany (Security and Verifiability of vote, 2009); Ireland (non-certification and lack of public trust, 2004); Netherlands (security and verifiability, 2008) and England (Cost and Security, 2008)

Table 1: Status quo of e-voting technologies around the world Thakur (2013)

According to Thakur (2013), the adoption and use of e-voting technologies is not a sudden or immediate switchover technology; rather the vision is one of a phased move to multi-channel elections in which voters are offered an increasing range of means to register their vote. Countries that have successfully adopted e-voting did so through phased transparent trials, pilots, followed by full implementations (Thakur, 2013).

There are various factors according to Goldsmith (2011) that may lead one nation towards adopting and using e-voting and counting technologies which may not be present for another nation or may indicate a different solution. For example the challenges of moving paper ballots around large countries like Russia and Kazakhstan make the use of electronic voting technologies potentially beneficial on logistic grounds. The existence of a smart ID card with digital signature for the majority of the population in Estonia makes the use of Internet voting more feasible in Estonia. The Philippines adopted an electronic counting solution to deal with issues related to fraud during the counting process. Factors that argue for or against the use of electronic voting or counting technologies in a particular country are unique to that country and may come from different sources including legal, cultural, political, logistical, environmental etc. (*ibid*).

For successful consideration and implementation of electronic voting and counting technologies transparency and openness are very essential. Change can be unsettling and it is crucial that stakeholders trust the electoral process. Thad Hall argued in a presentation at the EVOTE 2012 Conference that “it is not the technology that is used that matters, but the way in which the technology is implemented that ultimately determines the success of an election technology project.”

The technological developments in South Africa have opened up the possibility of adopting e-voting and counting technologies and this clearly provides some opportunities and challenges. Svensson and Leenes (2003) argue that on one hand, the electronic voting technology may help make voting more cost effective and convenient for voters, which may in turn increase voter turnout. However, on the other hand, e-voting may introduce new risks that may affect the electoral values such as secrecy of the vote and placing of voting as an observable institution in modern democracies (Svensson & Leenes, 2003).

2.6.2 E-voting Opportunities

E-voting provides a macroeconomic, cost efficient method of increasing election accuracy and efficiency. Additionally, by escalating usability and accessibility, these Information Systems aims at increasing transparency and openness in a democracy. There is recognition that such technologies have benefits, even amongst opponents. Although benefits vary among solutions, the following are possible:

- ✓ ***Reduced Logistical Arrangements***- E-voting technologies can reduce or eliminate these ballots logistical arrangements. There are, of course, logistical arrangements associated with e-voting technologies which need to be taken in to consideration such as configuration and preparation arrangements for the technology and appropriate storage and security for the hardware between elections (Goldsmith, 2011).
- ✓ ***Accessibility*** – where remote electronic voting technology is used, there is a significant increase in accessibility to the electoral process. It may make the process more engaging to groups which are computer literate (e.g., young voters), but also make access to the ballot more feasible for voting groups which currently struggle to participate in the process. Such groups may include persons with disabilities, out of country voters (e.g., military and diplomatic personnel) and residents of remote communities with no polling station in proximity (Goldsmith, 2011).
- ✓ ***Increase in Turnout***- Electronic voting and counting technologies may increase turnout if these technologies help improve trust in the electoral process; if the technology makes people more interested in participating or increases access for certain communities (Goldsmith, 2011).
- ✓ ***Cost*** – Electronic voting and counting technologies remove the need for expensive ballot printing, distribution, storage, etc. However, these technologies also incur different costs which need to be assessed over the life cycle of the technology(Goldsmith, 2011).

2.6.3 E-voting Challenges

According to Gupta (2011), the biggest challenge of deploying e-voting system is not technology but change management. Gupta says that change management is important not only in terms of cultural change, but also in terms of changing operations and processes that this automated e-voting system may introduce. Gupta (2011) divides the challenges into two broad categories; technology challenges and organisational / human factor challenges.

Technological challenges: Gupta (2011) stresses the fact that poor infrastructure has been a major challenge towards speedy implementation of many e-governance projects across the world. Similarly, there are technical challenges involved in implementation of e-voting systems. Another technological challenge is the connectivity in remote areas. Cetinkaya and Centinkaya (2007) stated that "from a technological view accepting e-elections is not a problem as a significant part of the population are using technology in different aspects of their daily life. Therefore, the challenge comes from the high sensitivity of e-voting systems towards some subjects such as security, privacy and trusting …suppliers of e-voting systems." Pieter (2006) emphasizes that the required trust must develop from the dependability of the system, not because people are required to rely on it; consequently the public choose to use the system even though they are aware of its potential risks and problems. Therefore, before introducing the e-voting system as a reality to citizens, an environment of trust should be created to assure people that this system can be adopted.

Lack of Transparency: Transparency according to Goldsmith (2011) is a key determinant in building and maintaining trust in the electoral process. The paper balloting system is very transparent. Observers can watch ballots being issued, voters placing their marked ballots in the ballot box and ballots being counted. With electronic voting technology, it is not possible to observe the way in which the selected choices of voters are totaled to produce the results announced. The voters simply have to trust that these results accurately reflect the choices they made (*ibid*).

Audit of Results*:* a great strength of the paper balloting system is that if the results of an election are challenged then the ballots can be recounted to check the result. Many electronic voting machines have no such possibility for auditing and checking the results of an election. The ability to audit and check is an important feature of building trust in the electoral process and increasing acceptance of the results (Goldsmith, 2011).

Voter Education: a considerable amount of voter education would be required to educate and prepare voters for a move to electronic voting technology; this voter education exercise would likely be costly (Goldsmith, 2011).

Security — Different security challenges are presented by electronic voting and counting technologies compared to paper balloting systems. For example, electronic transmission of results for tabulation presents the possibility for the system to be hacked and false results inserted. Secure systems of protection and verification for electronic data need to be ensured (Gupta, 2011).

According to (Goldsmith, 2011) the relevance of these advantages and disadvantages vary significantly between electoral situations. Different electronic voting and counting technologies will be more likely to realize different possible advantages and be faced with different challenges. No solution is likely to realize all possible advantages listed above or to suffer from all of the disadvantages. The electoral environment also determines, to some extent, the advantages and disadvantages that may be experienced.

2.7 Technology Adoption Theories

Burton-Jone and Hubona (2005) in their study pointed out that the prediction of the adoption and use of Information Technology has been a key interest for many scholars since the start of research in information systems. A theory is a term used to describe possible ways to explain a natural phenomenon. This study makes use of a theoretical analytical framework to understand factors of technology adoption. The theoretical framework therefore provides a lens through which this research phenomenon is viewed.

Straub (2009) is of the view that adoption theories examine an individual and the choices an individual makes to accept or reject a particular innovation. The author then defines adoption theory as a "micro-perspective on change, focusing not on the whole but rather the pieces that make up the whole." He continues to discuss that in contrast, diffusion theories describe how an innovation spreads through a population. Diffusion theories may consider factors like time and social pressures to explain the process of how a population adopts, adapts to, or rejects a particular innovation. Thus, diffusion theory takes a macro-perspective on the spread of an innovation across time (ibid).

The current study recognizes the existence of several technology adoption theories in them Information Systems (IS) field. The study however discuses just a few of the theories used frequently in technology adoption field such as TAM, UTAUT, TRA and DoI.

2.7.1 TRA (Theory of Reasoned Action)

The Theory of Reasoned Action was formulated by Fishbein and Ajzen (1980) and posits that behavioural intentions are influenced by attitudes and subjective norms. The behavioural intentions ultimately lead to the actual behaviour. A limitation of TRA perhaps is its inability to account for non-controllable variables affecting behaviour.

From a theoretical point of view, the TRA is intuitive, parsimonious, and insightful in its ability to explain behaviour (Bagozzi, 1982). The TRA assumes that individuals are usually rational and will consider the implications of their actions prior to deciding whether to perform a given behaviour (Ajzen & Fishbein, 1980).

According to Foxall (2007), The TRA deals with predictions rather than outcome of behaviours. In the TRA, behaviour is determined by behavioural intentions, thus limiting the predictability of the model to situations in which intentions and behaviour are highly correlated (Yousafzai *et al.,* 2010).

2.7.2 TAM (Technology Acceptance Model)

Davis' (1989) technology acceptance model is widely used to study user acceptance of technology. TAM is based on the theory of reasoned action (TRA) which states that beliefs influence intentions and intentions influence one's actions. According to TAM, perceived usefulness (PU) and Perceived ease of use (PEOU) influence one's attitude toward system usage, which influence one's attitude toward system usage, which influences one's behavioural intention to use a system, which in turn determines actual system usage.

Mathieson *et al.* (2001) in their extensive comparison between TPB and TAM found that in most cases TAM is easier to apply when predicting IS usage. TAM was developed to predict individual adoption and use of new ITs and furthermore, it was developed after the introduction of information systems into organization therefore it would be beneficial for researchers looking at technology in organizations. This study is looking at the adoption of e-voting technologies.

2.7.2.1 Limitations of TAM

According to Ii, Nasco, and Clark (2007) TAM theorized that an individual's behavioural intentions to adopt a particular piece of technology are determined by the person's attitude toward the use of the technology. TAM was developed to understand employee acceptance of new technology and most research using the model has focused on cognition rather than affect. The emphasis on cognition might be appropriate for an organizational context where adoption is mandated and users have little choice regarding the decision. But it is an insufficient explanation for consumer contexts in which potential users are free to adopt or reject new technology based on how they feel as well as how they think (*Ibid*). TAM has its dominant focus on business to business (B2B) research in the working environments (Asare *et al.,* 2011:194).

Other criticisms are that the model fails to explain how adoption or usage can be improved using the variables and that apart from the perceived ease of use and perceived usefulness; it fails to incorporate other factors which have an influence on technology acceptance (Venkatesh *et al.,* 2003; Al-Qeisi, 2009). According to Brown *et al.* (2010, 11), researchers have raised doubts over TAM and UTAUT model's ability to give useful explanations that can be used in improving adoption model that is not able to catch all technology and context-specific antecedent of adoption. TAM has difficulties in explaining the gap between predicted adoption and actual adoption. In other words the links between

attitude and behaviour and between intention and behaviour are not convincingly dictated or the research results have been contradictory (Juntumaa, 2011:7-9).

2.7.3 UTAUT (Unified theory of acceptance and use of technology)

Due to technology adoption research diversity and complexity, and the failure of TAM to consider organization's external factors that influence adoption (Wells *et al.,* 2010:814), Venkatesh *et al.*(2003) launched a merged information technology model; namely the Unified theory of acceptance and use of technology (UTAUT). The original UTAUT framework focused on the mandatory use of technology in a work environment, but it has also been utilized in voluntary settings (Chiu *et al.,* 2010:449).

The purpose of UTAUT-model therefore is to understand system usage (Carter *et al*., 2011:305) and to provide constructs which are meant to be independent of any particular theoretical perspective (Venkatesh *et al.,* 2003:447). Furthermore, the model posits that adoption intention has significant positive influence on technology usage in every research settings (Venkatesh *et al.,* 2003:456). In other words, UTAUT is inherently a general adoption theory which is not context-dependent.

The study however, adopts DoI theory taking into consideration only three of its attributes (relative advantage, compatibility and complexity). The focus of DoI is predominantly on the pre-adoption phase not the actual use of the innovation or new applications (Ozdemir *et al.,* 2008:216). The three constructs used have the most consistent significance relationship to innovation adoption. The reason is that because e-voting is yet to be adopted in South Africa, the other two constructs; triability and observability cannot be measured. Relative advantage was relevant for the context of this research as the study aimed at knowing participants (voters and the Electoral Management Body) perception of the relative advantage/benefits of e-voting technologies compared to the current paper-based electoral process.

According to Taylor and Todd (1995a), compatibility is an important construct that can positively influence adoption. They give an example stating that "if the use of an innovation violates a cultural or social norm it is less likely to be adopted." (Taylor and Todd, 1995a: 141). For this study, the researcher sought to explore if the participants had the perception that e-voting would be compatible to their way of lives. The third and last construct to be examined in this study was complexity which is equivalent to TAM's construct perceived ease of use (Agarwal & Karhanna, 1998:3; Moore & Benbast, 1999;

Carter & Bélanger, 2005). This study tries to measure participant's perception of the complexity of e-voting technologies.

2.7.4 Diffusion of Innovation (DoI)

The DoI theory according to Rogers (2003) seeks to explain the process and factors that influence the adoption of new innovations. One of the objectives of the current study was to understand factors and challenges that could influence the adoption of an e-voting technology within the South African context. The DoI theory also according to Bhattacherjee (2012) explains how innovations are adopted within a population of potential adopters and the innovation decision process, factors determining the rate of adoption and categories of adopters.

Brown (1999) pointed out that the purpose of DoI theory is to "provide individuals from disciplines interested in the diffusion of an innovation with a conceptual paradigm for understanding the process of diffusion and social change." Diffusion of innovation theory provides well developed concepts and a large body of empirical results applicable to the study of technology evaluation, adoption and implementation, as well as tools, both quantitative and qualitative, for assessing the likely rate of diffusion of a technology, and identifies numerous factors that facilitate or hinder technology adoption and implementation (Fichman,1992). These factors include the innovation-decision process, attributions of the innovation and innovators' characteristics.

Rogers (2003:5) defines diffusion as "the process by which an innovation is communicated through certain channels over time among the members of a social society." The author further differentiates the adoption process from the diffusion process in that the diffusion process occurs within society, as a group process; whereas, the adoption process pertains to an individual. Rogers (2003:12) defines the adoption process as "the mental process through which an individual passes from first hearing an innovation to finally adopting the innovation."

Rogers (2003) definition also contains four elements that are present in the diffusion of innovation process this includes the:

- ✓ Innovation – an idea or object that is perceived to be new.
- ✓ Communication channels- the means by which messages get from one individual to another
- ✓ Time- the three factors are: innovation's decision process, relative time with which an innovation is adopted by an individual or group and innovation's rate of adoption.
- ✓ Social system- a set of interrelated units that are engaged in joint problem solving to accomplish a common goal.

2.7.4.1 Innovation Decision Process

The innovation-decision process is the process through which an individual (or other decision-making unit) passes from first knowledge about the innovation to formulating an attitude towards it, to a decision regarding adoption or rejection, to implementation of the new idea, and to confirmation of this decision. This process consists of five phases.

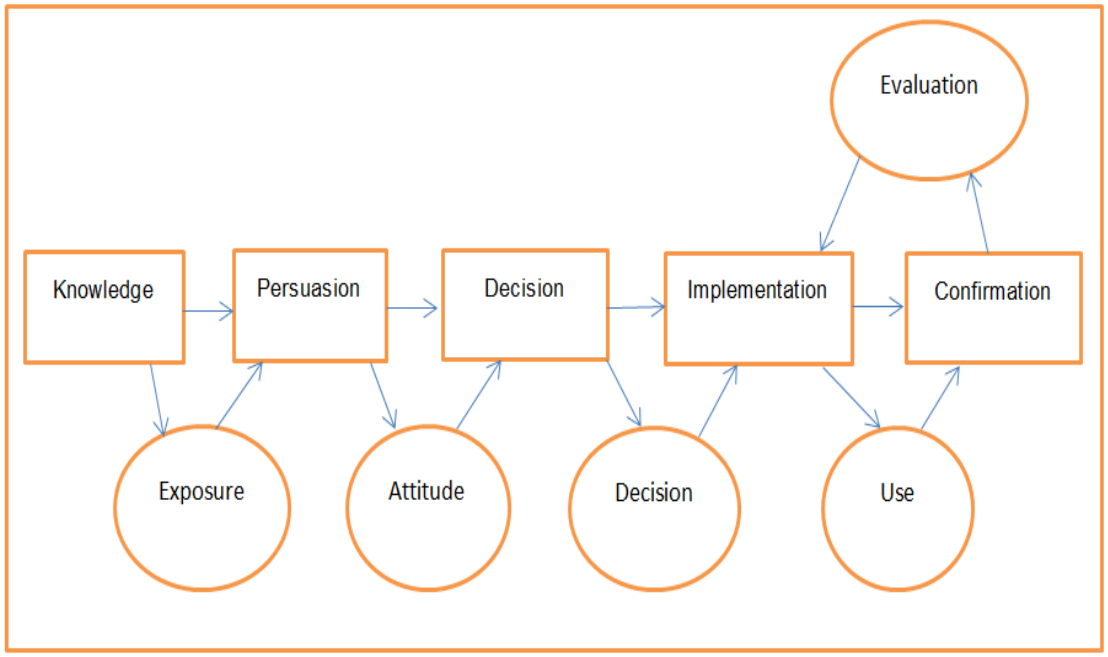

Figure 2: Phases in the innovation–decision process (Source: Rogers, 2003)

Figure 2 shows five phases of innovation-decision process; in the ***Knowledge phase****,* an individual is exposed to an innovation. An attitude about the innovation which can be favourable or unfavourable is formed in the ***Persuasion phase****.* The individual engages in activities that lead to a decision to adopt or reject the innovation in the *decision phase*. The innovation is put to use in the ***implementation phase*****.** Even after deciding to adopt, an individual may in the ***confirmation phase*** evaluate the decision to continue or discontinue use of the innovation.

Rogers (2003: 15), points out that an individuals' perception of the attributes of an innovation and not the attributes as classified objectively by experts or change agents, affect the rate of adoption. Rogers (2003: 15-16) defines these attributes as follows: ***relative advantage*** as "the degree to which an innovation is perceived as better than the idea it supersedes." ***Complexity***, which is comparable to TAM's perceived ease of use construct, "as the degree to which an innovation is perceived by the potential adopter as being relatively difficult to use and understand."

Compatibility as "the degree to which an innovation is perceived to be compatible with existing values, beliefs, experiences and needs of potential adopters."; ***Trialability*** as "the degree to which an innovation may be experimented on with a limited basis." ; And ***Observability*** as "the degree to which the results innovation are visible to others."

Figure 3**Error! Reference source not found.** represents perceived attributes of an innovation and how they are crucial to the rate of adoption to that particular innovation.

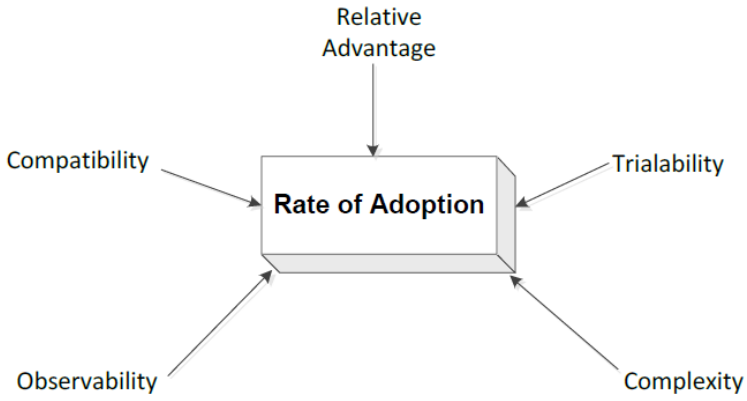

Figure 3: Perceive attributes of innovations (Source: Rogers, 2003: 222).

2.7.4.2 Characteristics of Innovators

Rogers (2003) also explains that an innovation will diffuse through population overtime, and the rate of adoption will vary between those who adopt early, referred to as **"*innovators*"** and **"*early adopter*"** and those who adopt the innovation much later, referred to as **"*laggards*".** The remaining two segments, **"*early majority*"** and **"*late majority*"**, account for the majority of users who adopt innovation overtime. Figure 4 is a representation of a diffusion curve, which is a graphical representation of cumulative frequency of individual adoptions. It illustrates how diffusion overtime is composed of individual making adoption decisions.

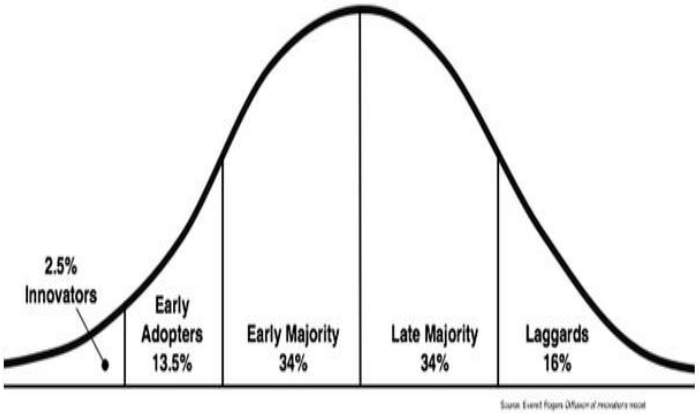

Figure 4: The bell shaped curve (Source: Rogers 1995)

2.7.5 Foundation of the proposed theoretical framework

Shapira (2011) describes a conceptual framework as one that allows researchers to make sense of the field to understand the boundaries, major findings and challenges. Shapira (2011) also suggests that there should be a structure to organise observations; and a description of the structure should be provided in a precise and clear manner. Information Systems Scholars such as Taylor and Todd (1995b: 169) recommended that when forming a framework it "should be evaluated in terms of both parsimony and their contribution to understanding."

Based on the afore-mentioned information, the theoretical framework formed for this research study involved examining literature pertaining to the acceptance and use of ICTs, diffusion and adoption theories, as the aim of this research is to understand the adoption of electronic voting technologies.

Constructs applied in this research from DoI are: Relative Advantage, Compatibility, and Complexity (which can also be viewed as ease of use). These three constructs had the most consistent significance relationship to innovation adoption. Based on previous studies which also included e-government adoption and diffusion studies, led the researcher to consider these three constructs and examine them within this research. The other reason is that because e-voting is yet to be adopted in South Africa, triability and observability are the two construct that cannot be measured.

Relative advantage was relevant for the context of this research as the study was aimed at determining participants (voters and the Electoral Management Body) perception of the relative advantage/benefits of e-voting technologies compared to the current paper-based electoral process. Given the element of qualitative in this research, the study sought their views on the matter. For example the relative advantage examined the study's participants' point of view and the reasons they would be in favour or against electronic voting technologies as opposed to the traditional paper based system. According to Taylor and Todd (1995a), compatibility is an important construct that can positively influence adoption. They give an example stating that "if the use of an innovation violates a cultural or social norm it is less likely to be adopted." (Taylor and Todd, 1995a: 141).

For this study, the researcher sought to explore if participants had the perception that e-voting would be compatible to their way of lives. The third and last construct to be examined in this study was complexity which is equivalent to TAM's construct perceived ease of use (Agarwal & Karhanna, 1998:3; Moore & Benbast, 1999; Carter & Bélanger, 2005). This study tries to measure participant's perception of the complexity of e-voting technologies.

2.7.6 Application of Diffusion of Innovation theory to Technology Adoption

Diffusion of innovation theory has been applied in different information systems research studies. This next section takes a look at the application of DoI to technology adoption by other researchers.

Carter and Bélanger (2005), for example surveyed 140 students in the US to investigate factors that influence citizens' adoption of e-government services. They adopted the DoI and examined what they thought were the most relevant constructs, namely, relative advantage, compatibility, ease of use and image, which affect the intention of citizens to use e-government services. The findings showed that higher levels of relative advantage, compatibility and image are significantly associated with an increased intention to adopt e-government services.

Liptrott (2006), in his study *e-voting: Same pilots, same problems, different agendas*, underpinned Rogers' diffusion of innovation (DoI) theory framework to assess whether or not e-voting will diffuse in accordance with the theory. The study's findings outlines the preliminary findings of the empirical stage of the research to establish the reasons that in 2003 some English authorities decided to trial e-voting and others did not. His findings were derived from comparative semi-structured interviews with election officers from pilot and non-pilot authorities.

Some researchers have written about the use of diffusion theory to analyse the adoption of technology in the field of education or private industry (Bajwa, Lewis, Pervan, & Lai, 2005; Demir, 2006; Sahin & Thompson, 2006; Park & Chen, 2007; Chen, 2009).

2.7.7 Application of other theories to Technology Adoption

Powel *et al.* (2012) in their study examined factors that affect citizen's intent to vote online. Survey subjects came from two different age groups; young adults, 18-25 years of age and senior citizens age 60 plus. Using the Unified theory of Acceptance and Use of Technology (UTAUT), the study found that performance expectancy, effort expectancy, social influence , trust in the internet, and computer anxiety were significantly related to intent to use online voting.

Anne and Suha (2008) in their study used Unified Theory of Acceptance and Use of Technology (UTAUT) model to explore factors that determine the adoption of e-government services in the developing countries, namely Kuwait. 880 students were

surveyed, using an amended version of the UTAUT model. The empirical dated revealed that performance expectancy, effort expectancy and peer influence determined student's behavioural intention.
Moreover, facilitating conditions and behavioural intention determine students' use of e-government services.

2.8 Conclusion

This chapter discusses technology adoption theories in the field of Information System research and in particular the one adopted for this study the DoI theory. The DoI model was chosen because it helps explore the processes and factors that influence the adoption of an innovation in this case electronic voting system. According to DoI, the likelihood that an innovation will be adopted depends partly on its attributes. This study uses the three attribute of the DoI theory to explain what factors would affect the adoption of an electronic voting system in South Africa.

3 CHAPTER THREE: RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

This chapter discusses the theoretical framework and methodology that this study adopts. It also outlines the methodologies adapted to accomplish the objectives of this research. The procedures followed for the collection and selection of the sample of unit of observations have been outlined. The tools and techniques followed for analysing the data for the study are also discussed in this chapter.

3.2 The Research Design

Research Design according to Bhattacherjee (2012) is a comprehensive plan for collection of data in an empirical research aimed at answering specific research questions or testing specific hypotheses. Research design should include research methods, conceptualization, as well appropriate strategies to sampling and data analysis.

3.2.1 Research questions and objectives

Table 2 : Research Questions		
Research problem	South Africa has not leveraged on the opportunities that e-voting presents. Manual voting is often tedious, non-secure, and time consuming, which leads us to think about using electronic facilities to make the process more efficient.	
Main research question	How can the South African government leverage on the opportunities of e-voting?	
Research sub-questions	**Research method(s)**	**Objectives**
What are the challenges of the current manual paper based voting process?	Literature and document review, questionnaire, in-depth Interview	To determine the challenges of the current electoral process.
What are the factors that could influence the adoption of e-voting technologies in South Africa?	Literature and document review, in-depth interviews and focus group	To determine the factors that could influence the adoption of e-voting technologies with the South African context
What recommendations can be made to improve the current electoral process in South Africa	Literature and document review, in-depth interviews and focus group	To determine what recommendations can be made to improve the current electoral process

3.2.2 Research Philosophy

Kroeze (2011:1) states that “the term philosophy is sometimes used in a very wide sense to describe any view point, value or belief”. Saunders *et al.* (2009: 107) mention that research philosophy relates to “the development of knowledge and the nature of that knowledge.” And according to Myers (2009:35), “the most pertinent philosophical assumptions are those that relate to the underlying epistemology which guides the research”.

Bhattacherjee (2012: 20-22) lists four paradigms of social science research as *functionalism*, *interpretivism, radical structuralism* and *radical humanism*. The four categories of research paradigms also known as the four quadrants in research paradigms are based on the work of Burrell and Morgan (1979) regarding sociological paradigms and organizational analysis.

This research therefore, fall under the interpretive paradigm for the purpose that it seeks to gain an understanding of factors that may influence the adoption of e-voting technologies within the South African context. This research is characterised by a concern for the individual and seeks to understand the subjective world of human experience (Cohen, Manion, & Morrison, 2007). According to Bhattacherjee (2012), if a researcher believes that the best way to study social order is through the subjective interpretation of participants involved, then they are employing an interpretivism paradigm. This study is conducted within the interpretive research paradigm.

The aim of interpretivism is to understand the individual experiences of those being studied, how they think and feel and how they act/re-act in their habitual contexts. The core of interpretivism is the assumption that social actors generate meaningful constructs of the social world in which they operate. By using the interpretive approach in this research, the study was able to increase the understanding of the Independent Electoral Commission and the voter’s perspective on the electronic voting technologies and the current electoral process. The interpretation of meanings will be made by both the research participants and the researcher.

3.2.3 Research Approach

Research approach is classified into two groups: inductive and deductive approach. Saunders *et al.* (2009:129) state that with “deductive approach, a theory and hypotheses are developed and research strategy designed to test the hypotheses.” While with inductive approach, “data are collected and a theory developed as a result of the data analysis.” Saunders *et al.* (2009:126), continue to mention that inductive approach helps to “understand the nature of the problem” they have also stated that “if you are particularly interested in understanding why something is happening, rather than being able to describe what is happening, it may be more appropriate to undertake your research inductively rather than deductively.”

Considering the research paradigm, this research adopted an inductive approach in order to determine and understand the factors that could influence the adoption of electronic voting technologies within the South African context. Saunders *et al.*(2009:126) mention that inductive approach helps to “understand the nature of the problem” they have also stated that “if you are particularly interested in understanding why something is happening, rather than being able to describe what is happening, it may be more appropriate to undertake your research inductively rather than deductively.”

The inductive approach is a systematic procedure for analysing qualitative data in which the analysis is likely to be guided by specific evaluation objectives. Inductive analysis refers to approaches that primarily use detailed readings of raw data to derive concepts, themes, or a model through interpretations made from raw data by a researcher. This understanding of inductive analysis is consistent with Strauss and Corbin’s (1998:12) description: “The researcher begins with an area of study and allows the theory to emerge from data.”

3.2.4 Qualitative research

Qualitative research according to Myers (2009) is used to study social and cultural phenomena in depth with a focus on text. This research studies both the IEC and South Africa voters in order to understand their views of the current paper based electoral process and also understand their perceptions on the possible adoption of electronic voting technologies. Strauss and Corbin (1990: 17) described qualitative research as any kind of research that produces findings not arrived by means of statistical procedures or other means of quantification. Furthermore Denzin and Lincoln (2005:3) argued that

qualitative research situated activity that locates the observer in the world. They turn the world into series of representations including field notes, interviews, conservations, photographs, recordings and memos. This study chose qualitative research for the following reasons;

(I) The research questions: How can South African government leverage on the opportunities of electronic voting technologies? What are the problems and challenges of the current electoral voting process? What are the factors that could influence the adoption of electronic voting technologies within the South African context? What recommendations can be made to the current electoral process in South Africa?

(II) This research looks at the human nature and feelings towards an innovation (in this case electronic voting technology) which is how the electronic voting technology in South Africa could diffuse, be adopted and used by South African citizen. This explains why interpretivism philosophy is used. Saunders *et al.,* (2009:119) have argued that interpretivism looks at "subjective meanings and focus upon detail of a situation." This is in line with this research reasoning when saying that it will try to determine and understand complex and subjective issues (Orlikowski & Baroudi, 1991).

Qualitative research is designed to address questions of meaning, interpretation and socially constructed realities (Newman, Ridenour, Newman, & DeMarco Jr., 2003). Qualitative data are a source of "well-rounded, rich descriptions and explanations of processes in identifiable local contexts" from which the researcher can "preserve chronological flow, see precisely which events led to which consequences, and drive fruitful explanations" (Miles & Huberman, 1994: 1).

3.3 Research Strategy

Research strategy according to Marshall and Rossman (2011) helps researchers to achieve goals and objectives of their studies. The strategy used stipulates various steps or phases on how the research should be carried out, how research questions should be answered and how the data should be collected (ibid). The research strategy involves literature review, surveys and interviews.

Given that this research adopts the interpretivism paradigm, the research starts by undertaking a literature review on studies related to the adoption of technology and narrowing it down to technology adoption within e-governance.

3.3.1 Surveys

Surveys are usually used in quantitative research however for this study the survey followed a qualitative approach. Bhattacherjee (2012:75-84) defines a survey research as "a research method that involves the use of standardized questionnaires or interviews to collect data about people and their preferences, thoughts, and behaviours in a systematic manner."

The survey method can be used for descriptive, exploratory, or explanatory research and is best suited for studies that have individual people as the unit of analysis.

The strategy involved in a survey is that the same information is collected about all the cases in a sample. Usually, the cases are individual people and among other things the same question is asked. Variables can be identified into three broad types depending on the type of information they provide:

- ✓ Attributes - that is characteristics such as age, gender, marital status, previous education
- ✓ Behaviour – questions such as what? When? How often? (if at all any)
- ✓ Opinions, beliefs, preferences, attitude – questions on characteristics are probing the respondents point view.

Jansen (2010:3) mentions that surveys in a qualitative approach does not aim at establishing occurrences in a specific situation but aims at the diversity of a specific topic within a given area of study. Neuman (2006:287) discusses three types of survey questions open-ended, closed-ended and partially open questions.

- **Open-ended questions**: - these kinds of questions looks for participant's view based on the subject of the mater.
- **Partially open questions**: - participants are given a selection of answers for the specific question, however if the participants feel that the answer is inappropriate to the selection of answers, they can alternatively answer the questions in the "other" section provided in the list of answers.

- **Closed-ended questions**: - participants have a list of answers which they need to choose from. It can either be multiple choice, numerical, liker-scale and ordinal questions.

3.3.1.1 Questionnaire

The survey was distributed online using www.sogosurveys.com. The study used a structured questionnaire, which was designed in-line with guidelines for questionnaire design recommended by Babbie and Mouton (2008). Based on the research questions, the questionnaire was designed and contained open-ended and closed-ended questions. The open-ended questions allowed participants to express their opinions without being limited by options. The questions asked were clear and simple and void of double meanings. The questionnaire consisted of three sections, the first section gathered demographics information regarding gender, sex, and age of respondents. The second section surveyed the opinion of respondents regarding the current manual paper based electoral system. The third section of the questionnaire involved several questions querying the respondents' perceptions of electronic voting technologies. Questions asked were clear and simple to avoid double meanings. A sample of the questionnaire is included in *Appendix B.*

3.3.1.2 Pre-testing

The questionnaire was then pre-tested with a small group of people before it was administered to the study population. This was done to see if respondents were able to understand questions and also to identify which questions respondents were reluctant to answer (Ham, 2007). Those involved in the pre-test were no longer eligible for inclusion in the final survey sample (Ruane, 2005). Appropriate revision of questions was made and the final draft of questionnaire was administered for the study. A link to the survey was then sent to participants via email.

3.3.1.3 Validity and Reliability

To ensure validity, reliability, and relevance the questionnaire was designed based on reviewing prior, related researches. Both innovation adoption research and information systems research give insights in the dimensions that were chosen to characterise how e-voting would diffuse upon adoption. As discussed in chapter 2 variables and characteristics of innovations that may influence its adoption and questions in the

instruments of the study were carefully constructed after thorough review of the relevant literature on adoption of innovations, including, but not limited to Rogers' (2003) diffusion of innovation theory.

3.3.2 Interviews

Bryman and Bell (2007:570), define an interview as a "collection of questions designed to be asked by an interviewer." According to Kvale (1996), the qualitative research interview attempts "to understand the world from the subjects' point of view, to unfold the meaning of peoples' experiences, to uncover their lived world." Importantly, interviewing is a particularly efficient means of collecting data when the research design involves an analysis of peoples' motivations and opinions (Keats, 2000).

Interviews can be categorised in to broad categories; direct and in-depth and can also be classified as either structured or semi structured (Longfield, 2004). Structured interviews tend to be rigid in that they do not allow diversion from pre-determined set of questions; this could be disadvantageous in cases where the researcher needs to pose follow- on questions on new issues that emerge during the course of the interview from the participant's responses (Strach & Everett, 2008).

Semi- structured interviews on the other hand are more flexible they allow researchers to divert slightly from the pre-arranged structure of the questionnaire, so that they can dig deeper into emergent issues during the interview process (Mack *et al.,* 2005). For this study an in-depth semi-structured interview was conducted with the Independent Electoral Commission officials of the Western Cape Province. The semi-structured interview included questions about the electoral process, challenges with the current electoral process and how the deal with those challenges, the IECs' knowledge of electronic voting and counting technologies, South Africa's readiness for an e-voting or counting system and what factors the IEC thought could hinder the adoption of any of this systems.

For this study an in-depth semi-structured interview was conducted with the Independent Electoral Commission officials of the Western Cape Province. The semi-structured interview included questions about the electoral process, challenges with the current electoral process and how the deal with those challenges, the IECs' knowledge of electronic voting and counting technologies, South Africa's readiness for an e-voting or counting system and what factors the IEC thought could hinder the adoption of any of this systems.

3.4 Population and Sampling

Mouton (1996: 134) defines a population as a collection of objects, events or individuals sharing common characteristics or behaviour that need to be studied by a researcher. Welman *et al.* (2005:53) on the other hand refers to a population as a group of potential participants to whom a researcher wants to generalise the results of a study or make specific conclusions. Welman (2005:55) points out that it is impractical and uneconomical to include all members of the population in a research project; hence the need for a population sampling where a representative portion is selected and used for the study to generalize conclusions. The population covered in this study is Cape Town area within the Western Cape Province.

Sampling is the statistical process of selecting a subset (called a “sample”) of a population of interest for the purposes of making observations and statistical inferences about that population (Bhattacherjee, 2012:67). Babbie and Mouton (2003:166) state that, it is appropriate in qualitative studies to select a sample on the basis of the expertise of the population being studied, elements in the population, the researchers own judgments or the purpose of the study.

Sampling is grouped into two categories; probability and non-probability sampling. With probability sampling, it is possible to ascertain that any member of the population have equal chance of being included in the study. This is only possible if the number of the research population is specifically known. On the other hand, non-probability sampling is based on the selection of unknown or not readily identifiable research participants for a given population (Singleton & Straits, 2005).

3.4.1 Probability Sampling

Babbie and Mouton (2001), define probability sampling as a method of selecting a workable number of participants from a population whereby the exact number and location of the population elements is known to and reachable by the researcher. The authors continue to mention that the aim of probability sampling is to select a set of characteristics in a way that portrays the actual parameters that exist within the overall population represented (ibid). According to Maree (2007), probability sampling uses random selection where each member of the population has an equal chance of being selected to be part of the sample. This study is more concerned about the in-depth understanding of the perception of e-voting technologies and how it would diffuse within the South African

context. Therefore, probability sampling will not be fitting. The type of sampling that is concerned with in-depth analysis is non-probability sampling.

3.4.2 Non-Probability Sampling

Non-probability sampling refers to the method of selecting participants from a population whereby the number and location of the population elements is not known to the researcher (Babbie & Mouton, 2001). This sampling, method is normally used in instances when the probability samples used in large-scale social surveys are not appropriate (ibid). Maree (2007) argues that in contrast to probability sampling, in non-probability sampling individual members do not have equal chances of being selected into the sample. Because selection is non-random, nonprobability sampling does not allow the estimation of sampling errors, and may be subjected to a sampling bias. Therefore, information from a sample cannot be generalized back to the population. A researcher may choose any one of the four types of non-probability sampling techniques such as convenience, quota, snowball and purposive sampling.

This study utilised purposive sampling which is a type of nonprobability sampling to obtain participants for this study. Purposive sampling involved the researcher making a conscious decision about which individuals would best provide the desired information required for the study (DeVaus, 2002; Burns & Grove, 2007). There is also a snowballing effect taking place as the participants invited others to the survey. Snowballing sampling is a method of finding participants from the study population (Babbie & Mouton, 2001).

3.4.3 Sampling Process

The sampling process according to Bhattacherjee (2012) consists of several stages; the first is to define the target population, the second step is to choose a sampling frame – this is an accessible section of the target population from where a sample can be drawn, the last step in sampling is choosing a sample from the sampling frame using a well technique.

Two issues are crucial when it comes to sample selection, target population and type of random sample. Target population sample selection is an important issue since the sample needs to reflect the target population. An additional issue with online questionnaire surveys is that they only reach people who use computers and the internet.

These surveys though are certainly useful for researching a population with interest in some specific internet environment.

For instance this study aims to gain the perception of eligible South African voters on the use of electronic voting technologies in the electoral process. Random sample: obtaining a random sample according to Selm and Jankwoski (2006: 435-456) is a difficult task in online surveys. This is due to lack of a central repository of users from which random samples can be generated. Adding to the complexity is the choice of multiple solicitation techniques available for online surveying.

3.5 Data Analysis Approach

For the researcher to be able to make use of the data collected, analysing the data is very crucial. Based on Myers (2009) qualitative research design, data analysis approach comes after data collection. This next section looks more at the analysis phase that was used in this research. Miles and Huberman (1994: 10) explain data analysis as the process that consists of "data reduction, data display and conclusion drawing". There are several analytic techniques that are available in literature. However, after examining various analytic techniques this research analysed its data using thematic analysis.

3.5.1 Thematic Analysis

Thematic analysis "is widely used in qualitative research and is defined as a method for identifying, analysing, and reporting patterns (themes) within data" (Braun & Clarke, 2006: 83). In general thematic analysis involves searching across a data set to find repeated patterns of meaning (ibid). Furthermore according to Fereday and Muir-Cochrane (2006:4), thematic analysis is a form of pattern recognition within the data, where emerging themes become the categories for analysis.

There are other qualitative analysis methods in literature, such as narrative analysis, grounded theory and discourse analysis. However after an intense reading, understanding and going through different analytical methods thematic analysis was seen as the most appropriate for the researcher. Myers (2009: 175) argued that "there is no such thing as one approach that is better than all the others, each analysis approach has its advantages and disadvantages."

The advantage of using codes when describing text according to Miles and Huberman (1994: 57) is to easily “retrieve and organise the data”. Themes capture something important about the data in relation to the research question. A theme might be given considerable space in some data items and little or none in others, or might appear in relatively little of the data set. So researcher judgement is necessary to determine what a theme is (Braun & Clarke, 2006: 87). Across the literature, researchers often use the terms concept, category and theme interchangeably (Bazeley, 2009:6).

According to Braun and Clarke (2006), codes and themes can be identified based on literature and a specific research question (as it is the case in this research, and called theoretical thematic analysis) or data driven (similar to grounded theory, and called inductive thematic analysis). Furthermore, the theoretical thematic analysis will keep the researcher aiming the research question: “identifying and understanding factors that could influence the adoption of electronic voting technologies within the South African concept” therefore focusing on the gathered data and the relation to the theoretical framework.

For this study, thematic analysis will be used to allow the researcher to report the experience of the study participants which will be captured during the interview process. Thematic analysis is a method for “identifying, analysing and reporting patterns (theme) within data” (Braun & Clarke, 2006:79). Thematic analysis is thought by many to be a useful method to analyse qualitative data and provide rich, detailed and complex accounts of data (Cassell *et al.,* 2005; Fereday & Muir-Cochrane, 2006). This data analysis in this research was guided by Braun and Clarke (2006) six stages of thematic analysis as shown in Table 3.

Phases	**Description of the process**
Familiarising yourself with your data	Reading and rereading of the data, noting down initial ideas
Generating initial codes	Coding interesting features of the data
Searching for themes	Collating codes into potential themes, gathering all data relevant to each potential theme.
Reviewing themes	Checking in the themes work in relation to the coded extracts (level 1) and the entire data set (level 2).
Defining and naming themes	On-going analysis to refine the specifics of each theme and overall story the analysis tells; generating clear definitions and names for each theme.
Producing the report	Selection of vivid, compelling extract examples, final analysis of selected extracts, relating back of the analysis to the research question and literature.

Table 3: Phases of thematic analysis (Source: Braun and Clarke 2006)

3.6 Theoretical Framework

The also study makes use of theoretical analytical framework to understand the adoption process of electronic voting technologies. A theoretical framework provides a lens through which a research phenomenon is observed. According to Chigona and Licker (2008), there are four benefits of using a theoretical framework. The first benefit is the ability to make prediction, if the theory is generally true, the predictions from the theory should be true too. The second benefit is purely procedural; it allows researchers as well as those managing or providing the innovation to proceed systematically, observe or measure specific items and not everything. The third benefit is to explain what is happening using the terms of the theory. This leads indirectly to empowerment since the control of the explanatory forces lead to improvement. The final benefit is to put the theory under stress to improve it (*ibid*).

This study uses the DoI theoretical framework to explore and explain factors that could influence the adoption of e-voting technologies in South Africa using these three constructs of the DoI theory; Relative advantage, complexity, and compatibility. An important element of the DoI according to Rogers (2003) is the concept of the consequences of innovation. He suggests that adoption research should not stop at the point of adoption, but rather it should also consider the consequences the innovation has on the society. This study makes use of the third benefit to explain to the voters and IEC, the perception of electronic voting technologies.

3.7 Ethical consideration

This being a qualitative research, there are various ethical considerations that needs to be adhered to. Silverman (2000:201) reminds researchers that they should always remember that while they are doing their research, they are in actual fact entering the private space of their participants. This raises several ethical issues that should be addressed during and after the research has been conducted.

According to Huberman and Miles (1994), there are several issues that researchers should consider when analysing data. They caution researchers to be aware of these issues before, during and after the research has been conducted. Some of these issues involve the following:

- ✓ Informed consent (do participants have full knowledge of what is involved?)
- ✓ Harm and risk (Can the study hurt participants?)
- ✓ Honesty and trust (Is the researcher being truthful in presenting data?)
- ✓ Privacy, confidentiality and anonymity (will the study intrude too much into group behaviours?)
- ✓ Intervention and advocacy (what should researchers do if participants display harmful or illegal behaviours?).

One of the usual unexpected concerns relating to ethical issues is the cultural sensitivity. Silverman (2000) argues that the relationship between the researcher and the subject during an interview needs to be considered in terms of the values of the researcher and cultural aspects.

3.7.1 Informed Consent

The permission to conduct an interview with the Independent Electoral commission in the Western Cape had to be obtained before the interview could progress. The researcher had to obtain a letter from the institution explaining what the research was about; the research aim and objectives had to be explained. Once the interview participants agreed, the interview was scheduled. Participants for the study were informed that the information requested was solely for academic purposes.

3.7.2 Confidentiality and Anonymity

Anonymity and confidentiality are important aspects of ethic in research practices according to Crow and Wiles (2008). The participants of the survey were assured that efforts would be made to ensure that information provided would remain anonymous. Based on the knowledge of information above, the researcher informed the participants of the purpose, nature, data collection methods, and extent of the research prior to commencement. Furthermore, the researcher made it clear to participants that anonymity, privacy and confidentiality of the participants would be protected.

4 CHAPTER FOUR: DATA ANALYSIS AND FINDINGS

4.1 Introduction

This chapter analyses collected data from the interview and survey questionnaire and also discusses the findings in line with the research questions. The first section of the analysis provides descriptive analysis of the demographics, which covers the characteristics of the respondents and other variables considered in the survey. The next section of the analysis covers the thematic analysis of the open-ended part of the questionnaire, and the interview responses. The last part of this chapter looks at the theoretical analysis of the findings.

4.2 The Analysis process

As aforementioned earlier in chapter 3 (3.5.1), thematic analysis process was used in this study. A detailed description of each theoretical construct with respect to the findings of the study was looked at in this section. According to Yin (2009), validation of the analysis process should be based on the theoretical framework and it propositions. The theoretical framework formed for this research is based on the Rogers (2003) diffusion of innovation theory. The three theoretical constructs used in this study are; relative advantage, compatibility, and complexity.

4.2.1 Survey questionnaire analysis

This section brings the analysis derived from the online survey questionnaire. A total of 245 responses were received from a target of 400 potential voters in the Cape Town area which constitutes a 60% response rate for the survey. Out of the 245 responses received only 180 were admissible meaning they completed all of the questions that were required to be answered. The other 65 responses either exited the survey half way or did not attempted to answer some of the question. The survey questionnaire had both open-ended and closed-ended questions. The next section presents the descriptive analysis for the closed ended questions from the questionnaire.

4.2.1.1 Descriptive analysis

Of the 180 admissible survey responses received, 58% of the participants were females and 42% of the participants were males. 76% of the participants reported their age as between 18-39 years old, while 24% reported being 40 years of age or older. The average age of the respondents was estimated to be 25 years. Because ethnicity was not found to be a significant demographic factor, it was not included as a demographic variable in this study. 85% of those surveyed reported that they had voted at one or more levels of elections, 6% had yet to participate in any level because they were still under age during the last election period making them ineligible to vote but expressed their desire to vote in future elections. 9% of those surveyed although eligible to vote, had not taken interest to participate at any levels of election citing various reasons.

Out of the 85% of the participants that had voted, 8% had participated in the Local/Municipal elections, 14% had participated at the Provincial level, 18% at National level, 25% have participated at all levels and 20% only the Provincial and National level. 64% of those who had voted before said they had experienced some kind of challenge during the election process compared to the 21% who said they had not. Of the 64% who had experienced challenges, only 48% thought that the IEC have taken measures to tackle some of the challenges they have experienced during elections, 4% said they were not sure or did not know if the IEC had dealt with this issues/ challenges, 12% were of the opinion that the IEC had not done enough to tackle this challenges or had simply not done anything.

80% of the admissible responses had heard of electronic voting technologies and had some kind of knowledge of what electronic voting was. 8% had not heard of electronic voting before but thought it could be an interesting voting system to have. Asked if they thought South Africa should adopt an e-voting system, 75% were of the view that South Africa should adopt an electronic voting system to help mitigate some of the challenges facing the current paper-based electoral process, while 25% did not think South Africa need an e-voting system citing various challenges that it could potentially bring. Asked if an electronic voting system would appeal more than the current paper based electoral process, 88% of the 180 acceptable survey responses said that an electronic voting system would appeal more to them while 12% said that the e-voting system would not appeal to them more than the current paper.

The age group between 18 to 45 found the electronic voting system more appealing compared to the older age group of 45 and above with most of the respondents within this age group (45 and above) projecting a lack of appeal towards the electronic voting system. Asked if they thought that the electronic voting and counting technologies would reduce the amount of time it took to count the votes, 92% of the participant reported that an electronic voting system would significantly reduce the time for counting the votes while 8% either thought that an e-voting system would not reduce the counting time or were not sure if it would make any difference. 70% of the participants were of the perception that an electronic voting system could lead to a free and fair election while 30% did not think it would lead to free and fair elections.

Figure 5 represents the percentage of responses to the comparison between electronic voting technologies and the manual paper based electoral system.

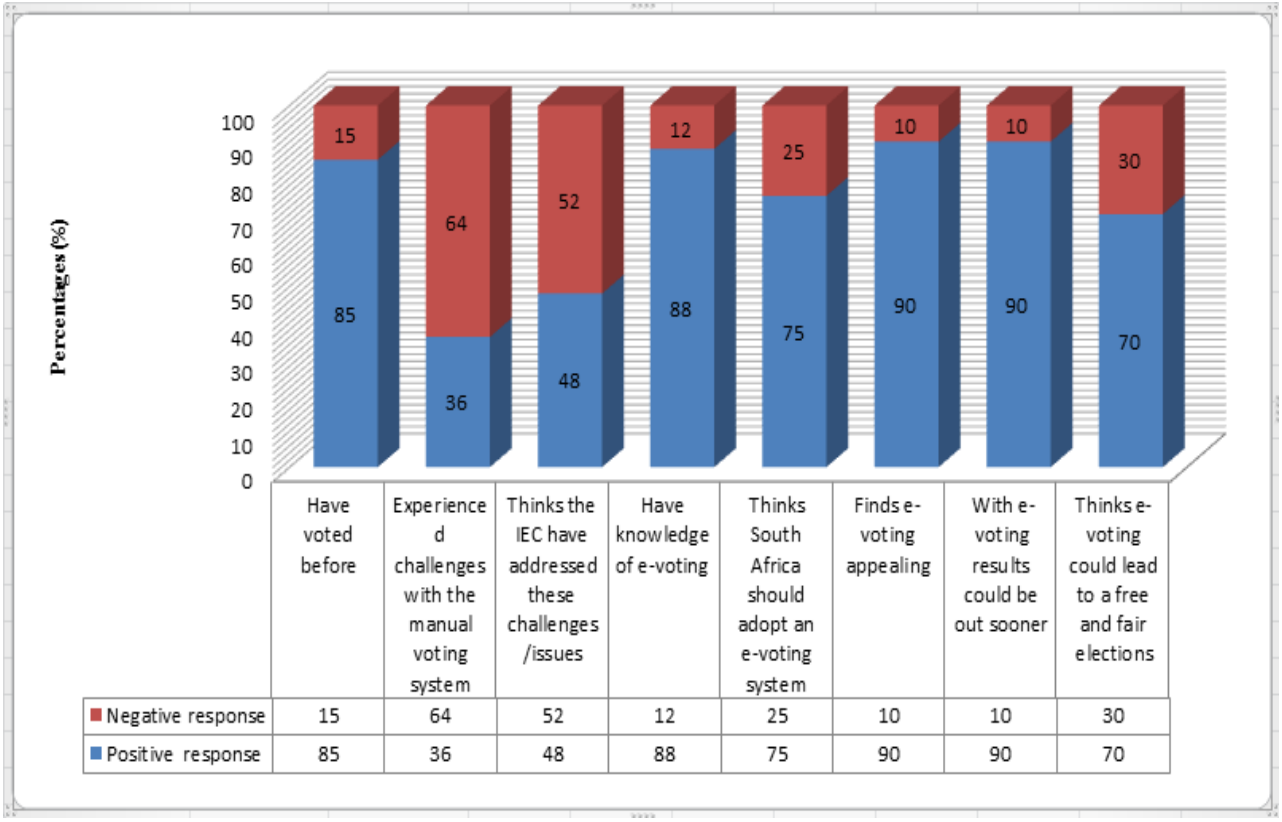

Figure 5: Percentage of Responses comparing e-voting and manual paper based voting.

4.2.2 Thematic analysis of the survey questionnaire

The analysis process was guided by Braun and Clarke (2006) six stages of thematic analysis, the main steps were as follows:

Step 1: Familiarising with the data. The researcher read and re-read through the responses in order to get a broader understanding of the data noting down initial ideas. The researcher then had to do data reduction. The data reduction involved separating responses from open-ended questions from the closed-ended question responses.

Step 2: Generating initial codes. The researcher then began to code some of the information from the highlighted texts and noted ideas and this helped in retrieving different data easily from the different responses.

Step 3: Searching for themes. Codes were categorised under the factors identified earlier from the theory. However if there were any new code that could not be categorised or subcategorised with the factors identified earlier, a new category(theme) was formed and a new result was then coded in terms of the new code and categorised to new category (new theme).

Step 4: Reviewing themes. The next step was reviewing themes with codes of the survey response.

Step 5: Defining and naming themes. After that the researcher went through each category (themes) to identify sub categories. This went on until it was not possible to subcategorise or to group themes anymore.

Step 6: Producing the report. Finally, the findings were written and their relation with the research questions and literature was identified. More details on this will be given in the findings chapter.

4.2.2.1 Themes from the survey response

According to Ryan and Bernard (2003: 103), there are many techniques in literature used in identifying themes such as repetitions of words and generate word frequency, searching for metaphors, linguistic connectors, etc. Themes in thematic analysis are identified from collated codes. Furthermore, they continue to explain that there is no right or wrong procedures in analysis. This depends on the researchers, “theme identification involves judgements on the part of the investigator” (Ryan & Bernard, 2003: 103).

After the analysis of the survey responses, the researcher came up with two main themes: *perception of a technology* and *Attitude towards a technology*. These two themes were derived from several categories and sub-categories as summarised in Table 4.

Themes	Categories	Sub categories
Perception of technology	Convenience and Accessibility	Time efficiency of the technology
		Lessen long queues at polling stations
		Reduce of human error
		Accessible to the disabled
		Cost effectiveness
		Increase voter turnout/participation
		Increase transparency
		Allow accountability
		Alleviate the geographical barriers
Attitude towards technology	Usability	Literacy levels
		Effectiveness of the technology
		Ease of use
	Security and Trust	Fraud and corruption
		Confidentiality and Privacy
		Transparency and credibility

Table 4: Themes, categories and sub-categories from the survey response

4.2.2.1.1 Perception of Technology

This theme is derived from the general perception of e-voting technologies by the surveyed voters. The responses from the questionnaire reveal various perceptions of e-voting technologies compared to the manual paper based system. Most of the voters surveyed had a perception that with an e-voting system the voting process would be more convenient and accessible. They were of the view that compared to the manual voting system; e-voting would reduce the long queues at polling stations increasing the time efficiency, enable voters to cast their votes without the geographical barrier, reduce the margin of human error normally associated with the paper based system, others had the perception that e-voting could reduce the physical cost of running the election due to the fact that there would be no printing of ballot papers and voters rolls.

The responses also reveal that some voters have the perception that e-voting technologies could be advantageous to the disabled citizens especially if the system were to be designed to accommodate them. "…If they could design voice recognition programmes that could assist the blind, the deaf, e-voting would be very helpful… "

Some participant had the perception that e-voting technologies would increase transparency and allow accountability in the electoral process. The responses also reveal that the participants had the perception that e-voting technologies could increase the voter turnout amongst the youth since most of voters in this age group tend to shy away from taking part in the voting process because of the tedious processes in the manual paper-based voting system. There was a portion of the participants who were not enthused with the idea of having an e-voting technology, they had negative perceptions noting that e-voting could raise various issues of security risk such hacking, fraud and corruption; the participants expressed the fear that hackers could get access to the system easily just like other computer programs that have been hacked. The confidentiality and privacy of the voters may also not be guarantee with e-voting. Some participants expressed fear of their votes not being anonymous since the operations would be registered on the computer. Other participants argued that with e-voting you would not be able to see what happens to your vote and therefore cannot be sure if it would be counted or not.

A portion of the participants had the perception that adopting e-voting technologies would alienate those citizens who have no prior knowledge of using computerised systems including the elderly or the illiterate citizens deterring them from exercising their right to vote. Statements from some of the responses included the following: "…for most elderly citizens it would be difficult for them to change from the manual paper-based voting system to e-voting system."; "…e-voting technologies would make voting fast and easy therefore reducing the long queues at polling stations."; "…e-voting technology will reduce the amount of money used for running the elections because there will be no printing of paper ballots etc."; "… e-voting technologies would make voting possible for people in the diaspora and those in remote communities especially the disable people…"; "…voter turnout would increase … because people would be able to vote wherever they are…"; "I think e-voting help with saving time and money travelling to polling stations."

4.2.2.1.2 Attitude towards a technology

According to Rogers (1995), attitude towards an innovation is a critical intervening variable in the innovation adoption decision, thus attitude towards a specific information technology (in this case electronic voting technology) is conceptualised as a potential user's assessment of the desirability of using that technology. In this study the theme attitude towards a technology is linked to the first theme, looking at how the voters' perception of e-voting technologies had effect on their attitude towards it. Based on the responses, the positive perceptions led to positive attitudes vice versa. The responses reveal that the voters' perception that e-voting could make voting more convenient and more accessible as discussed in the in first theme had a positive effect with regards to the attitude they had towards the possible use of e-voting technologies. On the other hand, the negative perception of e-voting generated a negative attitude.

Some of the responses include "…e-voting technologies would make voting fast and easy therefore reducing the long queues at polling stations.", "I am of the view that e-voting would reduce the margin of human error that the paper-based faces…"; " …there are so many trust and fraud issues with electronic systems here in South Africa how will the people involved make sure e-voting is secure and corruption free?" another response is "having an e-voting system would open up possibilities of corruption or even manipulation by politicians involved in elections…"

4.2.3 Thematic analysis of the Interview

The following section presents the analysis of the empirical data collected from the interview conducted with the IEC officials of the Western Cape Province. This analysis was also guided by Braun and Clarke (2006) six stages of thematic analysis. The main steps are as follows:

Step 1: Familiarising with the data. First the recorded interview data had to be transcribed. The interview was then read several times to get a broader understanding of the response from the interview.

Step 2: Generating initial codes. The researcher then began to code some of the information from the highlighted texts and phrases from the data.

Step 3: Searching for themes. The Codes were then categorised under the factors identified earlier from the theory. However if there were any new code that could not be categorised or subcategorised with the factors identified earlier, a new category(theme) was formed and a new result was then coded in terms of the new code and categorised to new category (new theme).

Step 4: Reviewing themes. The next step was reviewing themes with codes from the interview.

Step 5: Defining and naming themes. After that the researcher went through each category (themes) to identify sub categories. This was done until it was not possible to subcategorise or to group themes anymore.

Step 6: Producing the report. Finally, the findings were written and their relation with the research questions and literature was identified. More details on this will be given in the findings chapter.

Themes	Categories	Sub-categories
ICT Infrastructure/resources	ICT infrastructure and resources	ICT readiness: Availability and accessibility of ICT resources and infrastructure in communities
		Trained officials in-terms of skill needed
		The digital divide.
Environment	Political environment	Extent of political acceptance of the technology
	Citizens environment	The extent to which the citizens accept the technology
		ICT-enabled environment
		Level of ICT literacy within the communities
Attitude towards the technology	Security and Trust	Level of trust of the technology
Perception of the technology	Effectiveness and Efficiency of the technology	Reduce counting time (ballot papers)
		Ease of management of the electoral process

Table 5: Categories and Themes from the interview responses

4.2.3.1 Theme: Infrastructure and resources

Based on the responses from the interview, the availability of infrastructure and resources is of vital importance. The responses reveal that even with the current electoral process the IEC still encountered infrastructure and resource challenges especially in the under resourced informal settlements. Asked if South Africa was ready for an e-voting system, the IEC officials noted that the provision of resources and infrastructure to facilitate the introduction of an e-voting system is of paramount importance, but currently there is still a need to address the issue of lack of ICT infrastructure and resources especially in informal settlements. Increased resources would be needed by providing additional skilled staff trained to operate the system or provision of funding to administer the new voting system.

The responses also reveal that the existence of inequalities within communities around Cape Town with regards to availability and accessibility of ICT resources and infrastructure. This creates a situation where communities with better access to the ICTs would enjoy the use of e-voting technology conveniences, while people from informal settlements would be excluded due to lack of operational capacity or other economic reasons. The situation enables the creation of a digitally divided community.

4.2.3.2 Theme: Environment

The environment to which e-voting technologies would be introduced is an important aspect to take into consideration. The responses reveal that the IEC has to take three environmental aspects into consideration in their decision making before adopting e-voting technology. Based on the responses the IEC were of the view that the political environment should be in agreement with the introduction of a new voting system. Same with the citizens' environment, the citizens have to be made aware of the technology and where possible voter education should be provided to enlighten citizens of the new voting system. The level of ICT literacy also plays an important role in the citizen's environment; the responses from the interview reveal that it would be of no use for South Africa to introduce an e-voting system when the intended users do not know how to use it. The level of e-voting technologies acceptance at both political and citizens' environment has an influence on the intention of the IECs' to adopt it.

The responses also reveal that the IEC is also of the view that the ICT-enable environment should be available for e-voting technologies to be able to be implemented successfully. This is especially for the rural and informal communities. All these three environments should be in sync with one another for the successful adoption of e-voting technologies to occur.

4.2.3.3 Theme: Perception of the technology

This theme is general perception of e-voting technologies by the IEC. The interview response reveal that the IEC have the perception that e-voting technologies could significantly improve the way they count the ballots papers after votes had been cast, as this was one of the major challenges they were faced with currently especially in the under resourced communities in the informal settlements.

4.2.3.4 Theme: Attitude towards the technology

Again the perception of e-voting technologies by the IEC had an effect on their attitude toward the technology. Their perception the efficiency and effectiveness of e-voting technologies could significantly improve how they managed the electoral process created a positive attitude towards e-voting. On the other hand, their perception of the security risks that an e-voting system would present created a negative attitude. The responses also reveal that the IECs' perception of other countries experience with e-voting technologies creates a negative attitude from the IEC especially those countries that have had bad experiences.

4.3 Using theoretical framework for analysis

The innovation-decision process explains how an innovation becomes adopted, rejected, or abandoned. It does not, however, explain why one technology may be adopted over another. Roger's diffusion of innovations proposes five factors that shape the rate and likelihood of adoption. Some factors are inherent to the innovation, while others concern the adopters themselves and their usage of innovation.

As stated earlier (Chapter 2) this study makes use of only three (relative advantage, complexity and compatibility) constructs from the DoI framework for analysis, therefore triability and observability are not used to analyse the data.

4.3.1 Relative Advantage

Relative advantage is defined by Rogers (2003:15) as the degree to which an innovation is perceived as being better than the idea it supersedes. In light of this, the study analysed the agreement level of the participants regarding their perception and attitude towards the relative advantage of e-voting technologies. For the participant to be able to choose to adopt and use e-voting technologies, they should be able to provide some form of benefit of the technology to the task it is intended to perform.

The innovation should demonstrate a relative advantage over other option. Increased performance, cheaper costs, increased social standing may all contribute to the sense of relative advantage. The findings of this study indicate that relative advantage has a significant impact on both the IEC and the citizens' intentions to adopt and thereafter, use e-voting technologies. The voters who recognized the benefits of e-voting as discussed in (4.0) would be willing to adopt e-voting technologies. The findings suggest that the IEC acknowledges the relative advantage of e-voting technologies especially with the benefits of this technology providing assistance with tallying of votes. "I think South Africa could use an electronic voting technology that could count the votes as soon as they are cast especially in the under resourced communities…"

Relative advantage is defined by Rogers (2003:15) as the degree to which an innovation is perceived as being better than the idea it supersedes. In light of this, the study analysed the agreement level of the participants regarding their perception and attitude towards the relative advantage of e-voting technologies. For the participant to be able to choose to adopt and use e-voting technologies, they should be able to provide some form of benefit of the technology to the task it is intended to perform.

The innovation should demonstrate a relative advantage over other option. Increased performance, cheaper costs, increased social standing may all contribute to the sense of relative advantage. The findings of this study indicate that relative advantage has a significant impact on both the IEC and the citizens' intentions to adopt and thereafter use e-voting technologies. The voters who recognized the benefits of e-voting as discussed in (4.0) would be willing to adopt e-voting technologies. The findings suggest that the IEC acknowledges the relative advantage of e-voting technologies especially with the benefits of this technology providing assistance with tallying of votes. "I think South Africa could use an electronic voting technology that could count the votes as soon as they are cast especially in the under resourced communities…"

4.3.2 Compatibility

Compatibility is defined by Rogers (2003:15) as “the degree to which an innovation is perceived as being consistent with the existing values, past experiences and need of potential adopters. An idea that is incompatible with the values and norms of a social system will not be adopted as rapidly as an innovation that is compatible.” The adopted technology would be integrated into the citizens’ lives and therefore, must fit well with the citizen’s life and practices. The findings reveal that most participants view e-voting as a technology that would be compatible with their experience of using other similar innovations like online banking, e-filling (submission of taxes online), amongst others. Other participants also perceive e-voting to fill the void of their need for a voting system that would be efficient and effective (cost reduction, time saving, ease to use etc.). The findings also reveal that the IEC does not find e-voting to be compatible to the lives’ of those citizens in under resourced communities or informal settlements where there is lack of ICT infrastructure and resources to support the implementation of this innovation.

4.3.3 Complexity

Complexity is defined by Rogers (2003:15) as “the degree to which an innovation is perceived by potential adopters as being relatively difficult to use and understand.” The easier it is perceived, the greater the potential of adoption. When deciding to adopt an innovation, the inherent difficulty of using the technology is a major concern, especially when it comes to elections which involve all citizens regardless of their level of literacy. Norman (2002) suggests the considerations of traditional human-technology interaction notions of usability and affordance before a new technology is introduced to a society. The concept of complexity also involves the potential user of a technology understanding why the innovation is appropriate or even beneficial to them. The findings of this study suggest that participants understand how e-voting technologies by improving the electoral process would be beneficial to them but at the same time portion of the participants have the perception that it would be difficult to citizens (including the elderly and the ICT-illiterate) with no prior knowledge of computerised applications to use e-voting technologies with ease. “…people in rural areas might find e-voting technologies difficult to use especially those that have never used computers before.”

4.4 Conclusion

This chapter analyses the data from both the questionnaire and the interview which reveals several themes from both sets of data. The analysis also revealed the perception of electronic voting technologies by the participants compared to the current paper-based electoral process that is being used. The analysis also utilises three constructs from the diffusion of innovation theory as a theoretical lens for analysis; relative advantage, compatibility and complexity. The study revealed that most participants acknowledged the benefits of electronic voting technologies compared to the paper-based system currently in use which could increase their intention to adopt the technology. The participants also see the compatibility of electronic voting technologies in the lives, most surveyed voters indicated that they have used other innovation and e-voting technologies would fit well with their lives. The ease of use of the technology is also revealed as an important factor to the intended adopters. The participants reveal that the easier it would be to use and understand e-voting technologies especially amongst the elderly and the illiterate citizens the more likely that e-voting would be adopted.

5 Chapter Five: Discussion of the findings

5.1 Introduction

This study aimed at exploring adoption process of e-voting technologies within the South Africa context. The objectives were to determine those factors that could influence the adoption, to determine the challenges of the current manual paper-based electoral process and to make recommendation that could assist in improving the current system or assist in the implementation of an e-voting system in future. The findings indicated a support for the three DoI theory constructs (relative advantage, compatibility, complexity) used in this study. Based on the results, these constructs would significantly influence the intention of the participants to adopt e-voting technologies. The findings also reveal other factors that could possibly influence the adoption process, these factors include; digital divide, trust, resource and infrastructure.

The next section discusses the findings of this study to answer the research's main question; *how can South Africa leverage on opportunities that e-voting technologies present?* To answer this question the study will answer the two sub-questions: *What are the challenges of the current electoral process? What are the factors that could influence the adoption of e-voting technologies in South Africa?*

5.2 Discussions on the challenges of the current electoral process

This section discusses the findings from the data and literature analysis that answers the question to the challenges of the current manual paper-based electoral process.

The manual paper-based voting system that the IEC currently uses has often been associated with a lot of challenges as it has been discussed extensively on the literature to the background of the research problem chapter 1 (1.2). The findings of this study support the findings from the literature analysis; the findings reveal lack of infrastructure and resources to aid in the running of electoral processes especially within informal settlements is one of the difficult challenges the IEC is facing currently with the manual paper based system. The IEC mentions that often they are forced to improvise resources and infrastructure during elections in these communities which does not make running elections easy whereas they do not have the same experience in communities where there are adequate infrastructure and resources. This challenge can be attributed to the vast inequalities that exist in the greater Cape Town area where the study done.

Another challenge emerging from the findings is the immense task of counting of votes especially in under resourced communities, this challenge partly stems from lack of infrastructure and resources. Counting of paper ballots after the elections is usually a tedious job especially when voting goes beyond scheduled times. A delay in releasing election results is often more associated with election violence and always leads to the questioning of the credibility of the results.

The findings of the responses from the questionnaire reveal that long queues at polling stations are an ever-present challenge that is associated with the paper-based electoral process. Voters see this as one of the deterring factors to go to polling station on election days to cast their votes. The findings from the survey participants also reveal that understanding of the ballot papers can be a challenge especially amongst elderly citizens some who are illiterate; these voters usually end up requiring assistance, which sometimes leads to them being cohered into changing their votes. The issue of spoilt ballots is another challenge that faces the current manual paper based voting that the findings reveal. Another challenge to emerge from the survey participants was the issue of voter intimidation at polling stations by either other voters of political party officials.

5.3 Discussions on the factors that could influence the adoption of e-voting technologies

This next section discusses the findings to the second question; *what are the factors that could influence the adoption of e-voting technologies in South Africa?*

Understanding the factors influencing technology adoption helps the decision makers (in this case the Electoral Management Body) predict and manage when and under what conditions to make decisions about adopting e-voting technologies. Armed with this information, the Electoral management Body can then make informed decisions and can the leverage on the opportunities that e-voting technologies presents. The findings of the study revealed several other factors that could influence the adoption process of e-voting technologies within the South African context including the three constructs of the diffusion of innovation framework used in this study.

5.3.1 Perceived Relative Advantage of e-voting technologies

Based on the findings, the perception of the relative advantage of e-voting technologies compared to the manual ballot voting system by the votes would be a major influence on their intentions to adopt the technology. The findings reveal that the favouritism of e-voting technologies over paper-based system is based on the perception by participants that e-voting would be convenient in time and costs savings, reduction of human error, increase transparency and accountability etc. The findings also reveal that participants are of the perception that e-voting would be useful in accommodating people with different disabilities, helping them to vote without human assistance which some of the participant perceive as a challenge of the manual paper based system. The findings also reveal the perception by the IEC that in addition to other benefits of e-voting technologies, it would also provide a more rapid and accurate process of counting the votes. These findings from the data seem to coincide with other scholar's findings in the literature of technology adoption field using diffusion of innovation theory. The literature also show support for perceived usefulness in the adoption of e-government services and that if the e-services are perceived to be useful, then more citizens and other stakeholders are likely to adopt and use them (Carter & Belanger, 2004; Lean *et al*., 2009).

5.3.2 Perception of ease of use (Complexity)

The perception of ease of use in this study is defined as the degree to which the potential adopters of e-voting technologies perceive an e-voting system to be free of difficulty in understanding and using. The findings reveal that a section of the voters surveyed were of the view that e-voting would be difficult to use and understand especially for the elderly and those citizens who have very limited to no skills of using computerised systems, mostly, those who live in informal settlements or rural areas of South Africa. The simplicity of the e-voting system in terms of understanding how to use the system would be an important influencing factor especially for the illiterate and the elderly. Fairweather and Rogerson (2002) state that "… all voters are equal and there should not be any organised discrimination that will make voting more difficult for one segment of the voters than others… e-voting systems should not increase inequalities." Technologies that are distributed among citizens should be able to be used and accessed equally including the low skilled, elderly and disabled citizens (*ibid)*. The findings reveal that the IEC are the view that the people under resourced communities might not have the necessary skills to be able to use an e-voting system as they have not been exposed such computerised systems.

The overall perception of the participants was that e-voting technologies would be easy to learn and use, especially when support is provided. These perceptions were formed as a result of the participants' ability to use computerised applications such as online banking, e-filling of taxes etc. The findings suggest that the more experience the citizens have with online and computerized applications the easier it would be to learn and use e-voting technologies. It is therefore clear that e-voting systems need to be straight forward and easy to use and understand to enable all potential users with or without ICT skills to benefit from the conveniences of e-voting. Carter and Belanger (2005) and Phang *et al.* (2005) found that ease of use is a significant determinant of the intentions of people with limited skills in the use of computerised application to adopt the innovation.

5.3.3 Compatibility

The findings reveal that those voters who have used other online applications systems like internet banking and e-filling of taxes have a perception that an e-voting system would not be any different from these applications and are more likely to adopt it because it already fits into their livelihoods. This finding coincides with other studies that have been done by other scholars on technology adoptions. Carter and Belanger (2004) state that higher levels of perceived compatibility are associated with increased intentions to adopt e-government initiatives. In their study they found that citizens who had adopted other internet supported initiatives (like e-commerce) were more likely to adopt e-government services as they viewed these initiatives as compatible to their lifestyles (*ibid*).

Carter and Bélanger (2005) found that citizens' intention to use e-government services are positively influenced by compatibility, ease of use and perceived trustworthiness of the service. Furthermore, they argue that e-government information presented on websites should meet the needs of citizens and be well-organised and that online government services should be designed to be compatible with citizens lifestyles, because people who trust the internet and Government agencies are more likely to use e-government services (Carter & Bélanger 2005; Carter & Weerakkody, 2008).

5.3.4 Trust in the technology

The findings suggest that trust in an e-voting technology is a likely influence in the adoption process. Whether e-voting technologies can become a tool for increasing citizen's trust in election or the contrary, a barrier for political participation, depends to a great extent on voter's attitude and perceptions regarding the new voting procedures. The literature on the information and communication technologies has long recognised that for successful adoption and trust, technology-based transactions must appear useful, easy to use and secure.

Trust in the security of the system influences the voters' opinion about e-voting technologies considerably. The findings reveal that voters who trust the security of similar innovations to e-voting like (e-filling of taxes, online banking, etc.) have a higher perception of trust in the accountability of the system, more positive of how fast it would be, have the perception of it being easy to use and would find the system less vulnerable.

This shows that trust in the security of e-voting technologies would be an important factor to influence the intension of adopting e-voting technologies. Literature shows that trust is an important factor in adoption of e-government services (Welch et al., 2005; Belanger & Hiller, 2006; Colesca & Dobrica, 2008; Carter & Weerakkody, 2008; Lean et al., 2009). As noted from the findings both the IEC and the voters talk of the possibility of e-voting presenting several security issues such as hacking, absence of privacy of personal data. Literature also shows that a voter's perception of security of the electoral process is equally important to the actual security itself. Since procedural security is evident and understandable to voters, it has a comparative advantage when it comes to developing and supporting the social acceptance for the new e-processes (Xenakis & Macintosh 2005).

5.3.5 Availability of Infrastructure and resources

The development of basic infrastructure to capture the advantages of the new technologies and communications tool is of vital importance for the implementation of e-voting technologies. However, an ICT infrastructure does not consist simply of telecommunications and computer equipment. E-readiness and ICT literacy are also necessary in order for people to be able to use and see the benefits of e-governance initiatives like e-voting technologies. Having the education, freedom and desire to access information is critical to e-governance efficacy. Presumably, the higher the level of human development, the more likely citizens will be inclined to accept and use e-governance services like e-voting technologies.

The findings point out that the availability of ICT-enabled infrastructure especially in the informal settlements would have a positive influence in the adoption of e-voting technologies. Equal availability of these ICT-enabled infrastructures in both the rural and urban communities increases the intentions of adopting an e-voting system. The availability of ICT-enabled infrastructure makes it easier for the ICE to implement an e-voting system. The findings reveal that the IEC perceive that increased resources would be needed by providing additional skilled staff that would have the knowhow of operating e-voting technologies, and the provision of funds to assist in acquiring these technologies.

5.3.6 Digital divide

The digital divide is quite evident between the various communities in Cape Town this would make some portion of the citizens to enjoy the conveniences of e-voting technology. The citizens from the rural areas and informal settlements would be excluded from e-voting for the lack of operational capacity or other economic reasons.

Digital divide is the gap between those who use and have access to digital technologies and those who do not (Reddick et al., 2000; Oostveen & den Besselaar, 2004; Bozinis, 2007). Reddick *et al*. (2000) stresses that the previous definition is not complete, as non-users are not homogenous. They are divided into two groups; the first group are those who have different levels of awareness to the advantages of using computers and accessing the internet, but are not capable of doing so because of challenges such as economic circumstances, availability of services, cost, lack of skill literacy etc. (*ibid*). The

second group consists of people who believe that the technology can add nothing to their lives and their needs for different reasons such as actual disinterest, lack of observing value, lack of the needed skills to use technology, lack of understanding the available services and information, and lack of trust (*ibid).*

DiMaggio and Hargittai (2001) expand the definition of the "digital divide" to "digital inequality" between people who are already online and those who are not. This inequality comes from the inequality in technical means, inequality in skills and inequality in the availability of social network. These inequalities affect the quality of knowledge the user receives in the IT world. The digital inequality rather evident in Cape Town where the study takes place most citizens from the informal settlements may not have the necessary skills to use the ICT applications.

The study reveals the concern that the IEC have regarding the inequalities that exist currently within the Cape Town communities and are concerned with that with the introduction of an e-voting system would further marginalise those citizens in informal settlement with no ICT enabled infrastructures, or those citizens with low skills to use the technology. The findings from the survey also reveal concerns of other voters who foresee that e-voting would cause a drift between those who have experience with using computer applications and those who do not have experience or the skills to use the technology.

5.3.7 Awareness

Technology adoption can also be seen as a process that begins with awareness of the technology and progresses through a series of steps that end in appropriate and effective usage. *Awareness:* - potential users learn enough about the technology and its benefits to decide whether they want to investigate further. According to Rogers (2003) the innovation-decision process is the process through which an individual (or other decision-making unit) passes from first knowledge about the innovation to formulating an attitude towards it, to a decision regarding adoption or rejection, to implementation of the new idea, and to confirmation of this decision. Figure 2 shows the five phases of innovation-decision process; in the *Knowledge phase,* an individual is exposed to an innovation, a person (or other decision-making unit) first becomes aware of the technology. The study concludes that awareness of technology before its adoption is crucial and may increase the perceived usefulness of the technology, thus contributing to the adoption of the new technology.

The findings reveal that of the 180 voters that were surveyed, 80% of the admissible responses were aware of electronic voting technologies in other countries. The findings also reveal that the IEC are aware of e-voting technologies. The awareness of e-voting in South Africa may increase the perception of relative advantage, compatibility and ease of use amongst the voters thus increasing the chances of them adopting e-voting. The more IEC are aware of e-voting the more they can make amicable decision when implementing an e-voting system should they decide to. This could be either by collaborating with countries that have experience with e-voting.

5.4 Conclusion

The first section of this chapter discusses the problems and challenges of the current paper-based electoral process. The study reveals several challenges from the perspective of both the IEC and the surveyed voters, these findings seems to concur with the findings from the literature analysis. Some of the challenges revealed include the long queues at polling stations etc. The next section in this chapter discusses factors that could influence the adoption of e-voting technologies within the South African context. Several factors including the perceived relative advantage, the perceive ease of use, and the compatibility of e-voting technologies compared to the manual paper based system. The findings of the study also reveal other factors that could influence the adoption of e-voting technologies including; trust in the security aspect of the technology, digital divide and availability of ICT infrastructure and resources.

6 Chapter Six: Conclusion and recommendations

6.1 Introduction

This study concludes that for the adoption of e-voting technologies to be successful in South Africa, relative advantage, compatibility and complexity (ease of use) of e-voting should be taken into consideration. How the citizen's perception of e-voting based on this three constructs is very crucial for its success. Besides the three constructs based on the diffusion of innovation theory, there are also other factors that emerged from the literature, the interviews and questionnaires that together with these constructs play as important part in the adoption of e-voting in the future.

6.2 Research Contribution

The findings of this research are expected to contribute a broader understanding of the factors that could influence the adoption of electronic voting technologies in South Africa. The findings of this research could assist the IEC when it comes to making crucial decisions like the availability of infrastructure and accessibility of these infrastructures to the general public.

6.3 Research Limitations

One of the limitations of this research is that the study was conducted in Cape Town, Western Cape South Africa and the sample size used in this research cannot therefore allow generalizability of the findings to the entire Republic of South Africa. Another limitation to research is that the data collected from voters represent those voters who had access to internet as the survey distribution was done online.

6.4 Future research

This research has created a foundation for further research investigating the adoption of e-voting technologies within the South African context. This study focused mainly on the factors that could influence the adoption of e-voting technologies using Rogers' diffusion of innovation framework, future research could perhaps use a bigger sample size and cover other variables or other adoption models. Future research could also address the comparison of how e-voting technologies would diffuse amongst the young and the elderly voters.

6.5 Recommendations

Literature on other countries with experience in e-voting has shown that the introduction of technology in elections is a challenging project that requires careful deliberation and planning. Literature has also shown that e-voting can greatly reduce direct human control and influence in the electoral process. This provides an opportunity for solving some electoral problems, but also introduces a whole range of new concerns. As result of this e-voting usually attracts a lot of criticism and opposition. Recommendations that can be drawn from this study are that the important principles of traditional democratic elections like transparency are to be applied to e-voting systems as the e-voting system should be as reliable and secure as the traditional voting procedures.

However, the study also recommends that electoral management bodies have to take into consideration the cases of other countries like the Netherlands and Germany who used e-voting system but later abandoning the system and going back to the manual voting system. The Netherlands and Germany discontinued the use of e-voting systems citing security and verifiability. Australia and England discontinued the use of e-voting systems citing the cost of implementing and sustaining the system. Although the study recommends the adoption of an e-voting system in South Africa, it is worth mentioning that there are still a lot of scepticisms especially when you have most developing countries discounting the use of e-voting systems.

Despite the scepticism and controversies that surround the adoption of e-voting systems there are several countries such as India and Brazil that have successfully implemented e-voting systems as discussed in chapter 2 (2.6.1). The e-voting system that Brazil is currently using has benefited the electoral system especially when it comes to distribution of ballot papers. India has also used the e-voting system to ease the distribution of electoral ballot papers in areas that are not easily reached. The benefits that countries like Brazil and India have acquired with the use of e-voting system can be translated to fit the South African context. However this should not be adopted without serious deliberations, and consulting all relevant institutions.

The study makes references of these two democracies because they are considered to be on the same economical scale as South Africa. It is also worth mentioning that just because the implementations of e-voting systems seems to work for India and Brazil does not conclude that the results would be the same for South Africa.

For the IEC and the decision makers, before the introduction of an e-voting system, first and foremost the e-voting system must be genuinely viewed as useful to the voters. There should be a massive widespread and attractive awareness campaigns conducted by the electoral management body targeting those citizens in rural areas or informal settlements, appropriately informing them about the real benefits (lower costs, time saving, reducing long queues at polling stations, etc.) if the adoption of e-voting system is to be effective.

The IEC should also take into consideration the cultural diversity of South Africa, in terms of the literacy level and internet experience. Moreover, knowledge, resources and support should be provided to the various communities such as, providing computers and internet access at the community level in public places, especially in areas that have lack of ICT enabled infrastructure.

6.6 Conclusion

This study identified the determinants that could have an influence on the potential users' intentions to adopt e-voting technologies within the South African context using Rogers' diffusion of innovation framework. The findings of the study revealed that relative advantage, compatibility and complexity (ease of use) together with other facilitating conditions such the availability of ICT –enabled infrastructure and resources, the perceived trust in e-voting technology digital divide within the Cape Town area and the awareness of the technology are important in the potential adoption of e-voting technologies in South Africa. These findings could perhaps assist electoral management body in South Africa on how they could leverage the opportunities that e-voting presents.

The likelihood of the potential adoption of e-voting technologies by the participants of this study is based on their perception of the relative advantage of e-voting technologies compared to the traditional manual voting system, their perception on the ease of use of the e-voting technologies and their perception of how compatible e-voting technologies is to the daily lives. These findings are consistent with the finding from other studies done on technology adoption using diffusion of innovation theory such as (Carter & Belanger, 2005; Demir, 2006; Choudhury & Karahanna, 2008; Carter & Weerakkody, 2008; Chen, 2009; Harting et al., 2009; Lopez-Sisniega, 2009; Richardson, 2009;).

The availability of ICT enabled infrastructure and resources is crucial for a technology to be adopted especially in the informal settlements and the rural areas. Although the study reveals that there is some kind of awareness of e-voting technologies amongst voters, the findings do not reflect on those voters who do not have access to information technologies.

Despite the fact that the study used a small sample size limited to voters in Cape Town thus limiting the generalizability of the findings of the study, the research provides useful insights into the influences underlying the intentions to adopt and use e-voting technologies in South Africa. The study also reveals the problems and challenges that the current electoral voting system and how the potential use of technology in the electoral process could potentially help solve these challenges. It is clear that the electoral management body need to address some of these problems before introducing a new voting system.

This research has revealed that although e-voting has many potential benefits over the manual voting system; there should be careful deliberation by decision makers (IEC) before making decisions on the adoption of an e-voting system. The IEC must take into consideration all factors that could influence voters both positively and negatively into consideration. This study is of the view that for South Africa to be able to leverage on the opportunities that e-voting technologies present, all factors that may influence the adoption of e-voting revealed in study should be taken into consideration before introducing an e-voting system. Otherwise the full potential and benefit of e-voting technologies may never be achieved.

7 REFERENCES

ACE Electoral Knowledge Network 2010 http://aceproject.org/ace-en/focus/e-voting/countries [5 July 2012].

Agarwal, R. & Karahanna, E. 1998 “On the Multi-dimensional Nature of Compatibility Beliefs in Technology Acceptance” presented at the *Annual Diffusion of Innovation Group in Information Technology (DIGIT), Helskinki, Finland.*

Anthony K. Asare, Thomas G. Brashear Alejandro, Elad Granot, Vishal Kashyap, .2011. "The role of channel orientation in B2B technology adoption", *Journal of Business & Industrial Marketing*, 26 (3): 193 - 201

Alexander Prosser, R. K. 2004. The Dimensions of Electronic Voting Technology, Law, Politics and Society. *Proceedings: Electronic Voting in Europe*, p. 22. Austria.

Al-Qeisi, K. 2009. „Analyzing the Use of UTAUT Model in Explaining an Online Behaviour: Internet Banking Adoption", *Doctoral dissertation*, Department of Marketing and Branding, Brunel University.

Ajzen, I., & M. Fishbein. 1980. *Understanding attitude and predicting social behavior* Englewood Cliffs: Prentice- Hall

Babbie, E. & Mouton, J. 2001. *The practice of Social Research*. Cape Town: Oxford University Press South Africa.

Babbie, E., & Mouton, J. 2008. The practice of social research South African edition. Oxford University press Southern Africa (pty) Ltd.: 150-265.

Bagozzi, Richard 1982. A Field Investigation of Causal Relations Among Cognitions, Affect, Intentions, and Behavior, Journal of Marketing Research, (19): 562-584.

Bajwa, D. S., Lewis, F.L., Pervan, G., & Lai, V.S. 2005. The adoption and use of collaboration information technologies: International comparisons. *Journal of Information Technology, (*20) 130-140.

Barker, Paul M.A. & Moon, Nathan W. 2005 “Getting out the vote: Assessing Technological, Social and Process Barriers to (e)Voting for people with Disabilities”, The Twenty-Seventh Annual APPAM Research Conference, 3-5 November, Washington, DC.

Bazeley, P. 2009. Integrating analyses in mixed methods research [Editorial]. *Journal of Mixed Methods Research, 3*(3), 203-207.

Beierle, Thomas C., & J., Cayford. *Democracy in practice: Public participation in environmental decisions*. RFF Press,

Belanger, F., & Hiller, J., 2006. A framework for e-government: privacy implications. Business Process Management Journal 12 (1): 48-60.

Bekkers, V.J.J.M. & Zouridis, S., 1999. Electronic Service Delivery in Public Administration: Some Trends and Issues. *International Review of Administrative Sciences*, 65(2), pp.183–195. Available at: http://ras.sagepub.com/cgi/content/long/65/2/183 [30 September 2013]

Bhattacherjee, A., 2012. Social Science Research: principles, methods, and practices. Available at: http://scholarcommons.usf.edu/cgi/viewcontent.cgi?article=1002&context=oa_textbooks [17 July 2012].

Booz Allen Hamilton. 2002 *Re-Learning e-Learning* www.boozallen.com [10 August 2012]

Braun, V. & Clarke, V. 2006. Using thematic analysis in psychology. *Qualitative Research in Psychology, (*3): 77-101.

Brown, K. M. 1999. Diffusion of innovations. http://hsc.usf.edu/~kmbrown/Diffusion_of_Innovations_Overview.htm [12 September 2012]

Brown, Susan A., Dennis, Alan R. & Venkatesh, Viswanath 2010. Predicting Collaboration Technology Use: Integrating Technology Adoption and collaboration Research. *Journal of Management Information Systems,* 27(2): 9-53.

Bryman, A. & Bell, E. 2007 *Business Research Methods, 2nd ed. Oxford:* Oxford University Press.

Burns N, Grove S. 2007. Understanding nursing research: Building an evidence-based practice. 4. St. Louis, MO: Elsevier; pp. 60–96.

Burton-Jones, & A., Hubona, G.S. 2005 Individual differences and usage Behavior: Revisisting a Technology Acceptance Model Assumption. In *ACM SIGMIS Database,* (17) 1825 – 1834.

Burrell, G. & Morgan G. 1979, *Sociological Paradigms and Organizational Analysis*, Heineman, London.

Calland, R. (ed)1999 The first 5 years: A review of South Africa's Democratic parliament. Cape Town: idasa

Carter, L. & Belanger, F., 2004. The influence of perceived characteristics of innovating on e-government adoption. *Electronic Journal of E-government*, 2(1):.11–20. Available at: http://www.ejeg.com/issue/download.html?idArticle=18 [4 March 2013].

Carter, L. & Bélanger, F., 2005. The utilization of e-government services: citizen trust, innovation and acceptance factors. *Information Systems Journal*, 15(1):.5–25. Available at: http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2575.2005.00183.x/full [8 October 2012].

Carter, L. & Weerakkody, V., 2008. E-government adoption: A cultural comparison. *Information Systems Frontiers*, 10(4): 473–482. Available at: http://www.springerlink.com/index/10.1007/s10796-008-9103-6 [5 October 2012].

Carter, Lemuria, Shaupp, Ludwig Christian, Hobbs, Jeffrey and Campbell, Ronald. 2011. The role of security and trust in the adoption of online tax filing. *Transforming government : People, Process and Policy,* 5(4)

Cassell, C., A. Buehring, G. Symon,P. Johnson, & V. Bishop 2005 'Research Report: Benchmarking good practice in qualitative management research'. London: Economic and Social Research Council.

Cetinkaya, O. & Centinkaya, D. 2007 *"Towards Secure E-Elections in Turkey: Requirements and Principles" International Workshop on Dependability and Security in e-Government (ARES'07), Vienna, Austria, pp. 903-907, 10-13 April 2007. http://www.ceng.metu.edu.tr/~corhan/Papers/desegov07.pdf.* [Accessed May, 2013].

Chen, B. 2009. Barriers to adoption of technology-mediated distance education in higher-education institutions. *The Quarterly Review of Distance Learning, 10*(4), 333-338.

Chigona, W. & Licker, P., 2008. Using Diffusion of Innovations Framework to Explain Communal Computing Facilities Adoption Among the Urban Poor. *Information Technologies and International Development*, 4(3), pp.57–73. Available at: http://www.mitpressjournals.org/doi/abs/10.1162/itid.2008.00017.

Chiu, Yen-Ting Helena, Fang, Shih-Chieh &Tseng, Chuan-Chuan 2010. Early versus potential adopters: Exploring the antecedents of use intentions in the context of retail

service innovations. *International Journal of Retail and Distribution Management Vol. 38 No. 6, pp.443*

Clift, S. 2003. E-Government and Democracy: Representation and citizen engagement in the information age. United Nations-DESA

Council of Europe (CoE) 2004 http://www.coe.int/T/E/Com/Files/Themes/e-voting/definition.asp [10 November 2012]

Colesca, S. & Dobrica, L. 2008. Adoption and use of e-government services: the case of Romania, Journal of Applied Research and Technology, Universidad Nacional Autonoma Mexico, 6(3): 204-217

Cohen, L., Manion, L. & Morrison, K., 2007. Research Methods in Education, Routledge.

Coleman, S. & D. Norris, 2005. *A new agenda for e-democracy*. Oxford Internet Institute, Forum Discussion Paper No. 4, January 2005.
Crow, Graham & Wiles, Rose 2008 *Managing anonymity and confidentiality in social research: the case of visual data in community research.* London, GB, Economic & Social Research Council (NCRM Working Paper Series,8/08).

Curran, K. & Nichols, E., 2005. E-Democracy. *Journal of Social Sciences*, 1(1):16–18. Available at: http://www.thescipub.com/abstract/?doi=jssp.2005.16.18.

Davids, I 2005 Voices from below – Reflecting on ten years of public participation: the case of local government in the Western Cape Province. Cape Town: Foundation for contemporary Research

Davis, F.D. 1986. "A Technology Acceptance Model for Empirically Testing New End-User Information Systems: Theory and Results", *Doctoral dissertation, Sloan School of Management, Massachusetts Institute of Technology*.

de Vaus, D. A. 2002. Surveys in Social Research, 5th edition, Allen & Unwin, Crows Nest, Australia, 379 pp.,.

Demir, K. 2006. Rogers' Theory of the Diffusion of Innovations and Online Course Registration. Educational Administration: Theory & Practice, (47): 386-392. Retrieved from EBSCOhost.

Denzin, N.K. and Lincoln, Y.S. 2005. *The Sage Handbook of Qualitative Research.* 3rd edn. USA: Sage Publications.

DiCaterino, A., & Pardo, T. A. 1996. The World Wide Web as a universal interface to government services. Available at: http://www.ctg.albany.edu/resources/abstract/itt96-2.html. [22 March 2013].
DiMaggio, P., Hargittai, E., Neuman, W. R., & Robinson, J. P. 2001. Social implications of the Internet. Annual Review of Sociology, 27(1): 307–336.

EIS (2009) Interim statement: Eisa observer mission to the 2009 South Africa national & provincial elections. *www.**eisa**.org.za/PDF/eusa**2009**bk.pdf* [22 July 2012].

Everett, S., Greene, K.& Byrne, M., 2008. Electronic voting machines versus traditional methods: Improved preference, similar performance. In *CHI 2008 Proceedings. Measuring, Business, and Voting*. pp. 883–892. Available at: http://dl.acm.org/citation.cfm?id=1357195 [Accessed September 12, 2013].

Fairweather N B & Rogerson S., 2002. 'Technical Options Report' The technical options available for electronic voting available on line: - http://www.dca.gov.uk/elections/e-voting/pdf/tech-report.pdf [10 March 2013].

Fereday, J., & Muir-Cochrane, E., 2006. Demonstrating rigor using thematic analysis: A hybrid approach of inductive and deductive coding and theme development. International

Journal of Qualitative Methods, 5(1)
http://www.ualberta.ca/~iiqm/backissues/5_1/pdf/fereday.pdf [9 April 2013].

Fichman, R.G., 1992. Information technology diffusion: a review of empirical research. *Proceedings of the International Conference on Information Systems*, p.195.
Foxall, G.R., 2007. EHAVIORISM Gordon R. Foxall. , (55):1–55.

Fuchs, C.,Bernhaupt, R., Hartwig, C., Kramer, M.A., & Maier-Rabler, U., 2006. Broadening eParticipation: Rethinking ICTs and Participation. In *Association of Internet Researchers(AoIR)*. p. 38. Available at: http://icts.uni-salzburg.at/media/pdf/pdf1131.pdf [26 February 2013].

Garson, G. David. 2006. Public Information Technology and E-Governance: Managing the Virtual State. Sudbury, MA: Jones & Bartlett

Gianluca, M., 2006. E-Governance in Africa, from Theory to Action: A Practical-Oriented Research and Case Studies on ICTs for Local Governance. In *Proceedings of the 2006 International Conference on Digital Government Research*; ACM: New York, NY, USA; 2006; Volume 151: 209–218.

Goldsmith, B., 2011. *Electronic Voting & Counting Technologies*, International Foundation for Electoral Systems (IFES).

Gupta, V. 2011. E-voting Moove to Intelligent Suffrage. *SETLabs Briefings,* 9(2): 3-9.

Ham, C. 2007. Green Labelling: Investigtion into the marketing of FSC certified timber along the domestic timber value chain in South Africa. MBA thesis work, Stellenbosch University South Africa.

Heeks, R., 2002. e-Government in Africa: Promise and practice. *Information Polity*, 7(2): 97–114.

Hye, K., Jong, K., and Hae, L. 2008. A Study on the Public Sphere of Mobile Media. *Journal of Korea Information and Communications Society,* 31(4B).

IEC 2004 Report on the national and provincial elections. Technical report, Independent Electoral Commission http://bit.ly/PFodqu [26 June, 2012].
IEC .2009a. Voting questions and answers. http://bit.ly/PFodqu [26 June 2012].

IEC 2009b. IEC. Constitutional court ruling on overseas voting. [26 June 2012]http://bit.ly/PFodqu
Ii, G.C.B., Nasco, S.A. & Clark, T., 2007. Toward a Unified Theory of Consumer Acceptance. , December 2007 (24):1059–1084.

Islam, M.S., 2008. Towards a sustainable e-Participation implementation model. *European Journal of ePractice*, 5(10).

Jansen, Harrie , 2010. The Logic of Qualitative Survey Research and its Position in the Field of Social Research Methods [63 paragraphs]. *Forum Qualitative Sozialforschung / Forum: Qualitative Social Research*, *11*(2), Art. 11, http://nbn-resolving.de/urn:nbn:de:0114-fqs1002110. [15 April 2013].

Juntumaa, M. 2011. Putting consumers' IT adoption in context: failed link between attitudes and behaviour. Aalto university publications series. Doctoral Dissertation 14/2011

Keats, D.M. 2000 Interviewing: a practical guide for students and professionals (Sydney, UNSW Press).

Kersting, N., 2009. Africa Spectrum. , pp.125–133.

Kroeze, J.H. 2011. Interpretivism in Information Systems: A Postmodern Epistemology? [Online], Sprouts: Working Papers on Information Systems, 11(171). Available at: http://sprouts.aisnet.org/11-171 [17 November, 2012].

Kroukamp, H., 2005. E-governance in South Africa: are we coping? *ACTA ACADEMICA-UNIVERSITY OF THE FREE …*, 37(September 2004), pp.52–69. Available at: http://www.sabinet.co.za/abstracts/academ/academ_v37_n2_a3.html [4 June, 2013].

Kumar, N. 2008. Use of ICTs for voting process: The Indian experience. In S. J. Krisna & N. Kumar (Eds.), *E-Voting: Perspectives and experiences* 121–135. Hyderabad, India: The Icfai University Press.

Kvale, S., 1996 Interviews An Introduction to Qualitative Research Interviewing, Sage Publications,

Lai, R. & Haleem, a., 2002. E-Governance: An Emerging Paradigm. *Vision: The Journal of Business Perspective*, 6(2): 99–109. Available at: http://vis.sagepub.com/lookup/doi/10.1177/097226290200600210 [2 May 2013].

Lean, O.K., Zailani, S. and Fernando, Y. 2009. "Factors influencing intention to use e-government services among citizens in Malaysia", International Journal of Information Management, 29(6): 458-75

Liptrott, M., 2006. E-Voting in the UK: A Work in Progress. *Proceedings of the 6th European Conference on e- …*, 4(2), pp.71–78. Available at: http://books.google.com/books?hl=en&lr=&id=KHmF1aZtUaYC&oi=fnd&pg=PA253&dq=e-Voting+in+the+UK+:+A+Work+in+Progress&ots=vr8kVw-9Nd&sig=tLeAnfHIsPlTXG4CN6g-fK7xM88 [4 June 2013].

Longfield, K., 2004. In-Depth Interviews, Social Marketing Research Tool Kit. (Online) available at: www.aidsmark.org/.../14_Research-Toolkit-Ch6-In-Depth-Interviews [09,February ,2012]

Lopez-Pintor, R., 2000. *Electoral Management Bodies as Institutions of Governance*, Macintosh, A., 2004. Characterizing e-participation in policy-making. *System Sciences, 2004. Proceedings of the 37th …*, 00(C), pp.1–10. Available at: http://ieeexplore.ieee.org/xpls/abs_all.jsp?arnumber=1265300 [7 August 2013].

Mack, N., Woodsong, C, MacQueen, K M., Guest, G. & Namey,E. 2005. Qualitative Research Methods: A data collector's field guide. Family Health International. Module 2: Observation skills. http://www.fhi.org/en/RH/Pubs/booksReports/QRM_datacoll.htm [15 September 2012].

Maree, K. 2007. First Steps in Research. Pretoria: Van Schaik Publishers.
Marshall, C., & Rossman, G. B. 2011. Designing qualitative research. (5 ed). Thousand Oaks, CA: Sage Publications.

Macintosh, A., 2004. Characterizing e-participation in policy-making. System Sciences, 2004. Proceedings of the 37th …, 00(C):1–10. Available at: http://ieeexplore.ieee.org/xpls/abs_all.jsp?arnumber=1265300 [7 August 2013].

Mathieson, K., Peacock, E. & Chin, W. W. 2001 "Extending the Technology Acceptance Model: The Influence of Perceived User Resources", The DATA BASE for Advances in Information Systems, 32(3): 86-112.

McClure, C. R. & Bertor, J.C., 2000. The chief information officer (CIO): Assessing its impact, *Government Information Quarterly* 17(1) :7-12.

Mesfin, B. 2008. Democracy, elections & Political Parties: A conceptual Overview with Special emphasis on Africa ISS paper 166. Pretoria: Institute for Security Studies (ISS).

Miles, M. B., & Huberman, A. M. 1994. Qualitative data analysis (2nd ed.). London: Sage Ltd.

Moore, G., C. & I. Benbasat 1991. Development of instruments to measure the perceptions of adopting an information technology. Inform.Syst. Res.,(2):192-222

Mouton, J.,1996. Understanding Social Research. Pretoria: J.L. van Schaik
Myres, M.D. 2009.*Qualitative Research in Business and Management* Sage Publications, London.

Neuman, L.W. 2006. Social Research Methods, Qualitative and Quantitative Approaches. Cape Town: Pearson.

Newman, I., Ridenour, C., Newman, C. & DeMarco, G.M.P. Jr., 2003. A typology of research purposes and its relationship to mixed methods research. In A. Tashakkori & C. Teddlie , (Eds.) Handbook of mixed methods in social & behavioral research 167-188. Thousand Oaks, CA: Sage
Oostveen, A.-M. & Besselaar, P., 2004. Security as belief: user's perceptions on the security of electronic voting systems. *Electronic voting in Europe: Technology, law, politics and society*, (47): 73–82.

Orlikowski, W. and Baroudi, J. 1991. Studying Information Technology in Organizations: Research Approaches and Assumptions. Information Systems Research 1 (2): 1-28.
Ozdemir S., Trott P. & Hoecht A. 2008. Segmenting internet banking adopter and non-adopters in the Turkish retail banking sector. *International Journal of Bank*, 26(4).

Parycek, P. S. 2003. Electronic democracy: Chances and risks for municipalities. In A. K. Prosser, E-Democracy: Technology, right and politics. Vienna: OCG.

Park, Y. & Chen, J. V., 2007. Acceptance and adoption of the innovative use of smartphone. Industrial Management & Data Systems, (107):1349-1365.

Phang, C. W. , Sutanto, Y. Li, J. & Kankanhalli, A. 2005 . "Senior citizens adoption of e-government: in quest of the antecedents of perceived usefulness" *38th Hawaii International Conference on System Sciences*.

Pieters, Wolter. 2006. "Acceptance of Voting Technology: between Confidence and Trust."In iTrust, eds K. Stolen. LNCS 3986: 283-297.
http://citeseerx.ist.psu.edu/viewdoc/summary?doi=10.1.1.102.8519

Piper, L., 2005. South Africa's 2004 Election: The quest for Democratic Consolidation.

Powell, Anne, Clay K. Williams, Douglas B. Bock, Thomas Doellman, & Jason Allen, 2012. "e-Voting intent: A comparison of young and elderly voters."*Government Information Quarterly* (293): 361-372. [29 October, 2012].

Qadah, G. & Taha, R., 2007. Electronic voting systems: Requirements, design, and implementation. *Computer Standards Interfaces*, 29(3):376–386. Available at: http://linkinghub.elsevier.com/retrieve/pii/S0920548906000754.

Reddick, Andrew, Boucher, Christian, & Groseilliers, Manon. 2000. *The dual digital divide: The information highway in Canada*. Ottawa, ON: Public Interest Advocacy Centre.

Republic of South Africa. 1996.Constitutional court of South Africa.
http://bit.ly/Sm2vca [26 June 2012]

Rodrigues-Filho, Jos´e; Alexander, Cynthia J. & Batista, Luciano C. 2006. E-voting in Brazil – the risks to democracy. In: Krimmer, R. ed. Electronic Voting 2006, GI Lecture Notes in Informatics. Bonn, Germany: Bregenz, 85–94.

Rogers, E.M. (1995). Diffusion of Innovations (4th ed.). New York: Free Press.

Rogers, E. M. 2003. Diffusion of innovation (5th ed.). New York: Free Press.

Rose, R., 2005. A Global Diffusion Model of e-Governance. *Journal of Public Policy*, 25(1):5–27. Available at: http://www.journals.cambridge.org/abstract_S0143814X05000279 [19 March 2013].

Ruane, J. M. 2005. *Essentials of research methods: A guide to social science research.* Malden: Blackwell Publishing

Ryan, G. & H.R. Bernard. 2003. Techniques to identify themes. Field Methods 15(1): 85-109.

Sæbø, Ø., Rose, J. & Skiftenes Flak, L., 2008. The shape of eParticipation: Characterizing an emerging research area. *Government Information Quarterly*, 25(3):400–428.

Sahin, I., & Thompson, A. 2006. Using Rogers's theory to interpret instructional computer use by COE faculty. Journal of Research on Technology in Education, 39(1):81-104.

Sanford, C. & Rose, J., 2007. Characterizing eParticipation. *International Journal of Information Management*, 27(6), pp.406–421. Available at: http://linkinghub.elsevier.com/retrieve/pii/S0268401207001041 [27 February 2013].

Saunders, M., Lewis, P., & Thornhill, A., 2009 Research methods for business students. Fifth edition England: Pearson Education Limited.

Schulz-Herzenberg, C., 2011. Elections and accountability in South Africa. *Institute for Security Studies*, (June). Available at: iss@issafrica.org [4 March 2013].

Shapira, Z. 2011."I"ve got a theory paper-do you?: Conceptual, Empirical and Theoretical Contributions to Knowledge in the Organizational Sciences", *Organization Science*, 22(5):1312-1321

Shirazi, F (2009). The Contributions of ICTs to freedom and Democracy: An Empirical Analysis of Archival Data on Middle East. Electronic Journal of Information System in Developing Countries. 35(2).

Silverman, D. 2000.*'Doing Qualitative Research: A Practical Handbook'* London. Sage.

Singleton, R. A., & Straits, B. C. 2005. Approaches to social research (4th ed.). New York: Oxford University Press.

Smith, E. & Macintosh, A., 2003. E-voting: Powerful symbol of E-democracy. *Electronic Government*, 1064.

Southafrica.info (2006) http://www.southafrica.info/ [21 July 2012].

Strach, P. & Everett, A.M. 2008. Transforming research case studies into teaching cases. Qualitative Research in Organisations and Management, 3(3): 199–214.

Straub, E.T., 2009. Understanding Technology Adoption: Theory and Future Directions for Informal Learning. *Review of Educational Research*, 79(2):625–649. Available at: http://rer.sagepub.com/cgi/doi/10.3102/0034654308325896 [30 September 2013].

Strauss, A. and Corbin, J. 1990 *Basics of qualitative research: Grounded theory procedures and techniques*. Newbury Park, CA: Sage.

Suha Al Awadhi & Anne Morris, 2008. "The Use of the UTAUT Model in the Adoption of E-Government Services in Kuwait," hicss,219, *Proceedings of the 41st Annual Hawaii International Conference on System Sciences (HICSS 2008),*

Svensson, J. & Leenes, R., 2003. E-voting in Europe: Divergent democratic practice. *Information Polity*, 8(1):3–15.

Tambouris, E., 2007. A framework for assessing eParticipation projects and tools. *System Sciences, 2007. …*,1–10. Available at: http://ieeexplore.ieee.org/xpls/abs_all.jsp?arnumber=4076551 [4 March 2013].

Tambouris E., Liotas, N., Kaliviotis, D., Tarabanis K., A 2007. Framework for Scoping eParticipation. In the *Proceedings of the 8th Annual International Digital Government Research Conference. Philadelphia, USA*.

Taylor, S., & Todd, P. 1995a. Decomposition and crossover effects in the theory of planned behaviour: A study of consumer adoption intentions*. International Journal of Research in Marketing*, 12(2):137-155.

Taylor, S., and Todd, P. 1995b. Understanding Information Technology Usage: A Test of Competing Models. *Information Systems Research* 6 (2):144-176.

Thompson Jiménez, J. 2009. La experiencia reciente del voto electrónico en América Latina: Avances y perspectivas. *Revista de Derecho Electoral*, *7*. Retrieved from http://www.tse.go.cr/revista/articulos07.htm

Thakur, S. 2013. Overview of e-voting- cross national experience. *seminar on Electronic voting and Counting Technologies, Cape Town* March 2013.
Tula, M. I. 2005. Las nuevas tecnologías en los procesos electorales. Perspectivas y comentarios sobre la adopción del voto electrónico en la Argentina. In M. I. Tula (Ed.), *Voto electrónico. Entre votos y máquinas. Las nuevas tecnologías en los procesos electorales*. Buenos Aires: Ariel - CIPPEC.

Twinomurizi, H., Phahlamohlaka, J., & Byrne, E., 2012. The small group subtlety of using ICT for participatory governance: A South African experience. *Government Information Quarterly*, 29(2): 203–211. Available at: http://linkinghub.elsevier.com/retrieve/pii/S0740624X12000147 [5October, 2012].

U.S. Department of State. 2008a Defining democracy. http://usinfo.state.gov/products/pubs/whatsdem/whatdm2.htm

Unicef.org/South Africa http://www.unicef.org/southafrica/resources[20 August 2012]

Van Selm, M., & Jankowski, N. W. 2006. Conducting online surveys. Quality & Quantity, 40(3):435-456.

Venkatesh V, Morris MG, Davis GB & Davis FD (2003) User acceptance of information technology: toward a unified view. *MIS Quarterly* 27(3): 425–478.

Von Solms & Von Solms. 2008. Information Security Governance. Springer, Heidelberg.

Walsh, Lucas. 2004. "What is e-democracy? An introduction." *Australia and New Zealand Communication Association Conference Proceedings (ANZCA04).*

Watson, R.T. & Mundy, B., 2001. Perspective of Electronic Democracy. *Communication of the ACM*, 44(1):27–30.

Welch, E. W., Hinnant, C.C. & Moon, M.J. 2005. Linking Citizen Satisfaction with E-government and Trust in Government. *Journal of Public Administration Research and Theory,*15(3): 371-391.

Wells, John, Campbell, Damon, Valacich, Joseph & Featherman, Mauricio. 2010. The Effect of Perceived Novelty on the Adoption of Information Technology Innovations: A Risk/ Reward Perspective. Decision Science, 41(4): 813-843.

Welman, J.C., Kruger, S.J. & Mitchell, B. 2005. 3rd Edition *Research Methodology.* Cape Town: Oxford University Press Southern Africa.

Worldbank South Africa 2009 http://www.worldbank.org/en/country/southafrica [20 May 2013]

Xenakis, A. & Macintosh, A., 2005. Procedural security and social acceptance in e-voting. In *… , 2005. HICSS'05. Proceedings of the …*.1–9. Available at: http://ieeexplore.ieee.org/xpls/abs_all.jsp?arnumber=1385476 [12 September 2013].

Yildiz, M., 2007. E-government research: Reviewing the literature, limitations, and ways forward. *Government Information Quarterly*, 24(3):646–665.

Yin, R. K. 2009 *Case Study Research: Design and Methods*. Applied Social Research Methods Series, 5.(4). USA: Sage Publications.

Yousafzai, S.M., Foxall, G.R. & Pallister, J.G. 2010, "Explaining internet banking behavior: theory of reasoned action, theory of planned behavior, or technology acceptance model?" *Journal of Applied Social Psychology*,. 40 (5): 1172-202.

APPENDICES

A: Interview Questions for the IEC (Western Cape Province offices)

B: Questionnaire for the voters in Cape Town Area

C: Letter of Request to the IEC (Western Cape Province)

D: Sample of the Interview Transcript

APPENDIX A: INTERVIEW QUESTIONS FOR THE IEC (Western Cape Province)

These questions have been developed to obtain the views of the IEC regarding elections in South Africa and the possible adoption of an E-voting system for future use. Respondents should not that the identity of interviewees will be protected and individual names or statements will not be used in the report. The results of this study will solely be used for academic purposes.

1. Given that elections were never conducted during the apartheid era, how has running the elections been for the IEC in a multi-racial country that South Africa is?
2. What are some of the challenges/issues the IEC has faced during the electoral process over the past 19 years?
3. How has the IEC address these challenges/issues?
4. According to a research done by Kersting Norbert (2009) there has been a steady decline in voter participation since 1994, what are some of the initiatives the IEC have taken to motivate/encourage voter participation in the Local, Provincial, and National elections?
5. Are these initiatives working?
6. How often does the IEC receive complaints regarding issues such as accuracy, privacy of votes, voter intimidation at polling stations, confidentiality of votes and fraud during elections?
7. What does the IEC think of the amount of time and resources spent on counting ballot votes manually when they can use an electronic technology to assist in this?
8. What has been the progress of South Africa towards e-elections?
9. Is the IEC aware of any countries around the world that are using e-voting technologies?
10. Is South Africa ready to adopt an electronic voting (e-voting) system?

11. Does South Africa need an e-voting system as a solution to some of the challenges of the current paper-based voting system?
12. What are some of the factors that could positively influence the adoption of an e-voting system in South Africa?
13. What are some of the challenges that could possibly influence the adoption of an e-voting system?

APPENDIX B: QUESTIONNAIRE FOR THE VOTERS

Facilitated by Mourine Achieng in consultation with my supervisor Ephias Ruhode for my M-tech Thesis at the Cape peninsula university of technology

Email address: sachiengm@gmail.com

November 2012

GENERAL:

This questionnaire has been developed to assist in obtaining the views of the public on the South African electoral process and a possible adoption of an electronic voting (E-voting) system. The results of this study will be utilised to draw conclusion and recommendations of the adequacy of an e-voting system for future electoral purpose. Respondents should note that the identity of interviewees will be protected and individual names or statements will not be used in the report. Responses will be consolidated and research findings will be presented in aggregated fashion.

Demographics

GENDER

Female ☐

Male ☐

AGE GROUP

18-24 ☐ 25-29 ☐ 30-35 ☐ 36-44 ☐ 45 and Above ☐

Questions

1. Have you voted before? Yes ☐ No ☐

2. If No, Why have you not voted before?

--

3. If you have voted before, at what level of government?

Local/Municipal elections ☐

Provincial elections ☐

National elections ☐

4. Have you experienced any challenges with the electoral process during the previous elections?

Yes ☐ No ☐

5. If yes, what are some of these challenges?

---

6. Do you think the IEC have taken measures to address these issues/challenges?

Yes ☐ No ☐

7. If yes, what are some of the measures that the IEC put in place to address the issues/challenges.

--

8. If no, what do you think the IEC should do to address the challenges?

---

9. Have you heard of electronic voting before? *(Electronic voting (also known as e-voting) is a term encompassing several different types of voting, embracing both electronic means of casting a vote and electronic means of counting votes.)*

Yes ☐ No ☐

10. What is your view/opinion on e-voting?

--

11. Do you think South Africa should adopt an e-voting system to address some of the challenges facing the electoral process?

Yes ☐ No ☐

12. If No, why do you think South Africa should not adopt an e-voting system?

13. Do you think the adoption of an e-voting system by the IEC would appeal to you more than the paper based currently used?

Yes ☐ No ☐

14. If Yes, Why would it be more appealing?

---

15. If No, Why would it not be appealing?

---

16. Do you think the e-voting system would reduce the duration of counting votes?

Yes ☐ No ☐

17. Do you think the adoption of an e-voting system would lead to a free and fair election?

Yes ☐ No ☐

18. If yes, why do you think an e-voting system would lead to a free and fair election?

---

19. If no, why do you think an e-voting system would NOT lead to a free and fair election?

APPENDIX C: LETTER OF REQUEST TO THE IEC

Cape Peninsula University of Technology

The Independent Electoral Commission
Western Cape Provincial Office

3 April, 2013.

To whom it may concern

The bearer, Mourine Achieng is currently a Master of Technology (MTech) student in the Information Technology Department of the Cape Peninsula University of Technology (CPUT). Her academic research is on the Adoption and challenges of electronic voting technologies within the South African context. The aim of the study is to understand e-voting technologies and how South Africa can leverage on the opportunities they present.

Mourine's studies have progressed well and she is now at a stage where she needs to conduct field work. At your convenience, Mourine would like to schedule a 30 minute (approx.) interview with you. The purpose of the interview is to gather the IEC's views on the current electoral process and electronic voting systems.

Any information which Mourine will collect from you will be used for academic purposes only. The results of the data analysis can be made available to you if you find it necessary.

For any information you may require, you can contact the undersigned.

Regards,

Ephias Ruhode (Mr)
Lecturer and Post-Graduate Studies Supervisor
Information Technology Department
Faculty of Informatics and Design
Cape Peninsula University of Technology
Keizersgracht and
Tennant Street
Zonnebloem
PO Box 652
Cape Town
8000
Email: RuhodeE@cput.ac.za
Office Phone: 021-460-3284

CAPE PENINSULA UNIVERSITY OF TECHNOLOGY
IT DEPARTMENT
04 APR 2013
INFORMATICS & DESIGN

PO Box 1906 Bellville 7535 South Africa
086 123 2788

APPENDIX D: SAMPLE OF THE INTERVIEW TRANSCRIPT

The Interview Transcript

Q1. How has running elections been for the IEC in a multi-racial country that South Africa is?

The 1994 elections was managed by a group of volunteers and later on in 1997, it was decided that a commission needed to be established to manage the elections and that's when the IEC was officially formed. The 1999 elections was the first for the IEC and running the elections was not easy given the environment in which the elections took place with the history of South Africa there were high levels of suspicion. Nobody trusted anybody due to that mistrust the voters roll was in such a way that people had to go in person to register as a voter and the IEC still works in that way. The one thing that marked the 1994 elections was the long queues and the reason for that was nobody new how many people to expect at the voting stations. As of 1997-1998 voting districts were established where you have to vote in the voting district where you are registered.

Q2. What are some of the challenges the IEC has faced during the electoral processes over the past elections?

The biggest challenges we have had during the preparation of elections is in the informal settlements, the vast inequality that you find in South Africa, the gap between the rich and the poor for example the informal settlements and under resourced areas, where in some places it is hard to even find space to put up voting stations for people to vote. On the other hand, places with better infrastructure vote with no problems. We cannot look at elections outside these logistics.

The people who work in voting stations have a certain level of literacy and the people who come to vote especially in the rural/ informal settlements/ cape flats have different level of literacy. Most of the voters in the informal settlements have very low levels of literacy so as the IEC we are faced with the challenge of dealing with such challenges.

Another challenge is voter behaviour (when voters turn up late at voting stations for various reasons) this normally prolongs the counting process. You find that voters will only turn up at voting stations with only an hour left till the polling stations are closed then they demand to be allowed to vote past the allocated time. This in the end affects us the IEC in terms of counting the votes in time.

Another challenge is the counting of votes and how to manage the voting process within under resourced communities. This is because once the voting is done counting takes place at the station. Once you start moving ballot papers the people become suspicious.

Training the presiding officers in the under resourced communities the same way we train those in the urban areas.

Q3. How has the IEC address these challenges/issues?

There are a number of challenges that we have begun to address, we have looked at how we utilise the infrastructure that we have e.g. before we used to have one voting station per voting district, what we have begun to look at now is to split the voting districts into voting centres where you could have several voting centres under one voting station.

Voter education; how we interact with the public on their responsibilities when it comes to voting. We have launched programmes to educate voters of the importance of turning up at voting stations in time so as to allow us the IEC to be able to count and announce the results in ample time. We are also educating voters on the importance of turning up at the correct voting station where they registered to avoid being turned away because their particulars are not on the voter registration books.

Training the presiding officers at voting stations; there should be a lot more effort put in training those presiding officers in under resourced communities where you find high level of illiteracy they are the ones' who experience a lot of challenges.

Q4. According to a research done by Kersting Norbert (2009) there has been a steady decline in voter participation since 1994, what are some of the initiatives the IEC have taken to motivate/encourage voter participation in the Local, Provincial, and National elections?

Voter turnout has never been a problem in South Africa but local government election participation is probably a little bit lower than the national election. There has been a consistency rather than an improvement. In 1994 there was no measurement of voter turnout because there was no voters' role, as of 1999 there was a measurement of voter turnout since the voter's role was introduce between then and 2011 there has been a consistency in voter turnout.

One of the drives for the consistency in voter turnout even though you know that the ANC could potentially still be the winner in an election is the citizens' expectations especially the working class and the impoverished communities. The flip side of this is the major onslaught of the DA as the main opposition party or other new opposition parties like COPE and many others.

Q5. Are these initiatives working?

Voter education is the most important initiative but at the end of the day the responsibility lies with the voters to turn up on the day of elections.

Q6. How often does the IEC receive complaints regarding issues such as accuracy, privacy of votes, intimidation at polling stations, confidentiality of votes and fraud during elections?

We do get complaints not so much from the citizens as we normally get from the parties as opposed to voters and they are fairly documented. There were no major complaints regarding the outcome of an election like did somebody win as a result of fraud or as a result of people not participating.

Q7. What does the IEC think of the amount of time and resources spent on counting ballot votes manually when they can use an electronic technology to assist in this?

As mentioned before one of the major challenges the IEC is faced with is the counting of votes especially in the under resourced communities because counting has to be done where the voting takes place. I think a counting technology system would be of good use because e-voting technologies work in two ways the voting systems and the counting systems. We looked at a model that they use in India, where they have a system or voting machine that is not linked to any other voting machine. With this model, as you cast your vote the machine also counts immediately, once the voting is done you know right away how many people have voted and the counting is also done. We have also looked at the Brazilian model.

Q8. What has been the progress of South Africa towards e-elections?

Even though the IEC has won numerous awards for consistently researching and testing different election technologies to determine how, whether, or when such technologies can be used or integrated into the electoral process, we have yet to implement any for the purpose of electoral process.

Q9. Is the IEC aware of any countries around the world that are using e-voting technologies?

The IEC is very much aware of e-voting systems in other countries around the world. In fact we had a conference not so long ago on e-voting technologies where we had representatives from various countries discussing this issue. We have looked at models used by countries like India, Brazil who have been successfully using e-voting technologies for a number of years now, they started using e-voting systems as an evolving process, and they started with pilot phases and then progressed from there. We have also looked at those countries like (Holland, Germany, Ireland) that adopted e-voting

and later abandoned it and went back to the paper-based system because they could not monitor the system and various other reasons. Each of these countries has their own reasons as to why they have gone back to using the manual system.

Q10 Is South Africa ready to adopt an electronic voting (e-voting) system?

Am not sure if South Africa is ready for an e-voting system because of the obvious challenges we phase with the under resourced communities, digital divide and so on. But we could definitely use a system that helps with the counting of the votes or make the counting a lot easier.

I am not convinced that e-voting technologies are necessarily for South Africa, at least not in the immediate future. If South Africa were to adopt an e-voting system it would have to be an evolving process maybe starting with small pilots and then rolled out nationwide. At the moment South Africa is not ready for such a technology.

Q11. Does South Africa need an e-voting system as a solution to some of the challenges of the current paper-based voting system?

Not necessarily, although one of our biggest challenges is the counting of votes and management of the voting process within under resourced communities, we still manage quite well to run the elections. So what South Africa need right now may be would be a voting machine that is able to count the votes as it is cast by the voters and leave a record so that there is proof afterwards of the number of people who voted. We have looked at the models that India and Brazil are using.

South Africa is still young democracy and we do see a need for an e-voting system at the current moment and I don't think adopting an e-voting system would necessarily solve the challenges we have. Some of the problems cannot just be solved by introducing a new voting system.

Q12. What are some of the factors that could positively influence the adoption of an e-voting system in South Africa?

For us one of the major influence for adopting an e-voting system would be the benefits of acquiring a system that tabulates votes immediately after they voters have cast their votes more than anything because that is one of our biggest challenge especially in the under resourced communities. You find that most countries that experience post-election violence normally experience delays in relaying results to the citizens on time thus creating tension which usually leads to violence sometimes.

Another factor that could possibly have an impact on whether the IEC considers an e-voting system is by looking at other countries experience with the technology and looking

at what may be works for South Africa. From this we can maybe learn from the mistakes those countries made.

Having an e-voting system may increase the voter turnout especially amongst the youth who would normally not come to vote because of the long queues they see at voting stations.

Q13. What are some of the challenges that could negatively influence the adoption of an e-voting system in South Africa?

We have looked at e-voting technologies and there are a number of issues involved, there is the question of resources, infrastructure problems especially in the informal settlements and the rural areas in South Africa that we have to deal with, there is the problem of political parties involved, are the political parties going to accept this technology for example if the opposition thinks it's a good idea to have an e-voting system but the ruling party is against it how do we as the IEC solve such a conflict to be able to satisfy all the parties involved. The same goes for the citizens, the extent to which they accept this voting system makes it easier for us to able to implement. There has to be a high level of trust in the system from both the voters and political parties involved.

The problem with e-voting is that as soon as I excise my right to vote I lose my right to know, because the entire system becomes electronic I have absolutely no control of it (what happens behind in the scene, can the machine be tampered with, how the results are handled) all these should be taken into consideration otherwise the whole idea of democracy is lost. We as the electoral management body have to see to it the system is designed in such a way that it is not easy to tamper with and easy to use.

Many of the first world countries that are now switching back to the old system or new systems are doing so because it is been shown that people have the ability to track and monitor the system. As the IEC we should be able to look into the reasons as to why this countries abandoned the e-voting system, if the risks are too high then there is no need for South Africa to adopt an e-voting system.

Another reason that could possibly have an influence is the fact that there is still a high percentage of adult illiteracy in South Africa, if we are to adopt an e-voting system we have to take inconsideration the impact this will have on this citizens and also we have to ask ourselves a question of how this will violate the rights to vote.