



**UNIVERSITY OF  
KWAZULU-NATAL<sup>TM</sup>**  

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**INYUVESI  
YAKWAZULU-NATALI**

**A Framework for the Adoption of Digital Terrestrial  
Television - The case of EtheKwini Municipality**

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**Thesis submitted in fulfillment of the requirements for the degree Doctor  
of**

**Philosophy (Management)**

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**2022**

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## **ACKNOWLEDGEMENTS**

I want to thank the almighty God, Heavenly Father, to whom I owe my being, for walking this journey with me from Day One, and for the protection I enjoyed from Him.

To my wife, thank you believing in me, for your patience and understanding, and for being my Number 1 'Cheer-lady'. I am grateful for all the coffees and teas you made for me during those nights of research. To my beautiful daughters, thank you for taking your studies seriously, for understanding when I was not there to take you to school and for being the best children a father could wish for. I love you all!

To my Supervisor, Professor Brian McArthur, and my co-supervisor, Dr. Karunagaran Naidoo, thank you for your patience, your advice and the constructive criticism which strengthened my work to be what it is. I would also like to thank my employers for the financial assistance they provided whenever called upon to do so, and my previous bosses who pushed me to the limit and encouraged me to do better.

My heartfelt gratitude goes to all the respondents and participants, without whom this study would not be possible.

## **DEDICATION**

This thesis is dedicated to:

- My late sister, Pamela Thembi Mabaso: God took you early from our lives.
- My late parents, Minah and Aubrey Mabaso: may you both rests in peace.  
You will be forever missed!



## **ABSTRACT**

Digital Terrestrial Television (DTT) brings many benefits to viewers compared to regular analogue televisions. Although many countries around the world introduced DTT with such benefits in mind, the rates of DTT adoption have been slow compared to other developing nations, and consequently, many countries, including South Africa, had to postpone the analogue switch-off date. Given the lagging consumer adoption of DTT in Ethekewini Municipality, The purpose of this study is to apply the UTAUT model in predicting the citizens' intention to adopt DTT and to determine the possible reasons for the slow adoption of DTT in Ethekewini Municipality.

This study is exploratory and employs a mixed methods approach, combining a quantitative approach using a survey questionnaire as a data collection tool, and a qualitative research approach, using interviews to collect data from industry experts. A total of 138 out of 267 respondents participated in the quantitative study, resulting in a 52% response rate, while 10 industry experts were interviewed as part of the qualitative study. The structural equation model (SEM) was employed to measure and analyse the relationships of observed values and latent variables, resulting in a new developed model.

The findings indicate that the effect of the moderator variables on the relationship between the exogenous constructs and the dependent variable was found not to have a significant impact. The exogenous constructs of the UTAUT model that were investigated are Performance expectancy, The results from the quantitative study showed that there was a positive and significant relationship between the exogenous construct constructs and the behavioural intention to adopt, meaning that the citizens have intention to adopt DTT if it is made available. The qualitative results showed that leadership instability, policy inconsistencies, political interference and self-serving interest from some stakeholders were some of the factors behind the slow adoption of DTT.

The results of this study have implications for policy makers and broadcasters and cannot be generalizable to the wider population as the sample data was collected from social media, thus excluding population without access to social media.

The results of this thesis contribute to the theory in the following ways; the UTAUT model was extended with technology awareness as an additional construct and also makes recommendations to policy makers.

**Key words:** *Digital Terrestrial Television, Set-Top Box, Analogue Switch-Off, Structural Equation Model, Unified Theory of Acceptance and Use of Technology*

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## Glossary of Acronyms

A	Attitude
ATB	Attitude toward Behaviour
BI	Behavioural Intentions
DOI	Diffusion of Innovations Theory
DTT	Digital Terrestrial Television
DTH	Direct to Home
EE	Effort Expectancy
EM	Extrinsic Factors
ICT	Information Communication Technology
IDT	Innovation Diffusion Theory
IM	Intrinsic Motivation
MM	Motivational Model
MPCU	Model of PC Utilisation
PE	Performance Expectancy
SCT	Social Cognitive Theory
SI	Social Influence
SN	Subjective Norms
SPSS	Statistical Package for the Social Sciences
TA	Technology Acceptance
TAM	Technology Acceptance Model
TRA	Theory of Reasoned Actions
TTF	Technology Task Fit
TV	Tele-Vision
UKZN	University of KwaZulu-Natal
UTAUT	Unified Theory of Acceptance and Use of Technology



## **CHAPTER ONE**

### **INTRODUCTION TO THE STUDY**

Television (TV) has been credited as a dominant 'political and cultural force in modern life' (Jolly, 2011). The public has been witness to great sporting events, the transition from an apartheid government to a democratically elected government and other events of significance, both locally and internationally, all through the powerful medium of television. Analogue broadcasting technology has been the only technology used to deliver these great experiences to the public in the comfort of our homes. Until the late 1970s, television broadcast was in black and white before colour television was introduced. The analogue technology was frequency intensive and expensive to maintain.

The innovation in television broadcasting, the ever-growing amount of data and the growth of the internet have rendered analogue technology redundant, and have given rise to digital technology for broadcasting. Digital Terrestrial Television (DTT) is the television platform that brings benefits to the television consumers and is less intensive on the frequency spectrum. If DTT comes with so many benefits to the consumers, why is the adoption of this technology so slow? This study investigates the factors that have contributed to the slow adoption of DTT and whether there exists an appetite for adoption of DTT by television consumers. The study will apply the extended Unified Theory of Acceptance and Use of Technology (UTAUT) model as a conceptual framework for its quantitative research.

#### **1.1 Background of the Study**

Digital terrestrial television (DTT) is defined as a system or format of broadcasting which is land based (terrestrial), and broadcast television content to the citizen's homes in a digital format.

The switch from analogue broadcasting to digital terrestrial television (DTT) has been described as "a transition from a world of spectrum scarcity and one-way



services, to a world of on-demand programming and copious channels” (Galperin, 2004). The demand for high definition (HD) audio and video quality, and more programme channels have motivated the world to digital terrestrial television that is efficient on spectrum use. This transition to digital, also known as digital migration is long overdue in the broadcasting industry that has consistently failed to keep up with the pace of technological changes in the information and communication technology (ICT) industry (Bartoo, 2015).

In 2006, the International Telecommunication Union (ITU) and its member states decided that all member countries in region 1(see below) should migrate from analogue to digital system of broadcasting by June 2015. South Africa is a member of ITU and has not fully migrated due to various factors identified in this study.

The ITU in its international radio regulations divides the world into 3 regions (Figure 1): region 1 countries are Europe, Africa, Mongolia, the former Soviet Union, and the Middle East west of the Persian Gulf, including Iraq. In South Africa, DTT promises economic growth benefits, closing a gap on universal access and bridging the digital divide (Lesame and Mbatha, 2012).

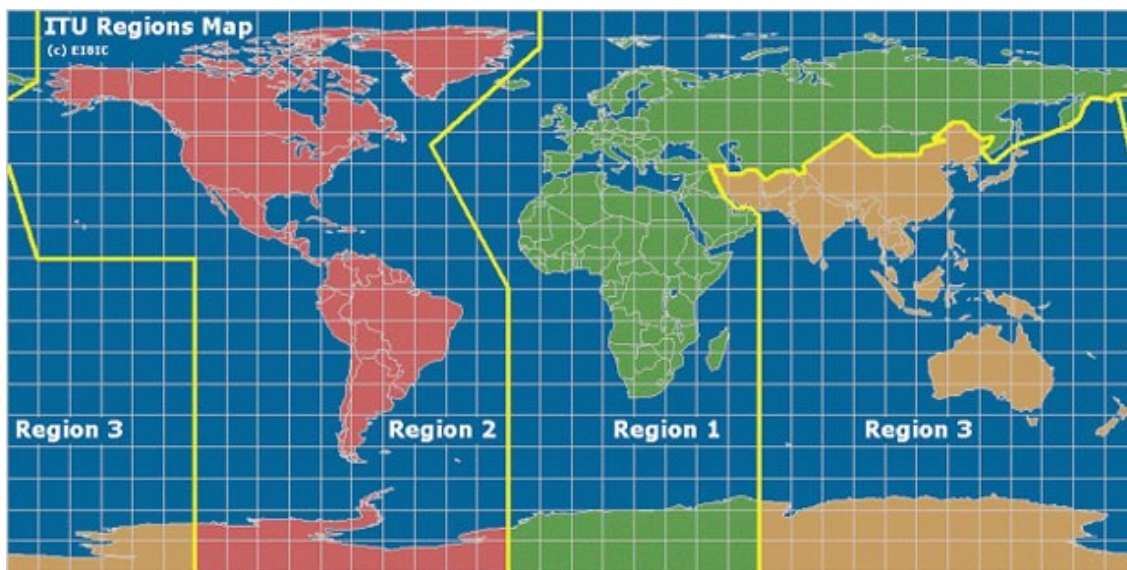


Figure 1: ITU Regions Map

Most countries globally have successfully migrated their citizens from the analogue to the digital terrestrial television, and by so doing, have met the migration deadline set by the ITU-2006 in Geneva. The process to switch from analogue to digital broadcasting is currently underway in South Africa and is expected to be completed by March 2022 (Minister Nsthavheni, 2021). This process was supposed to have been concluded in June 2015 as per the decision taken by the International Telecommunication Union (ITU, 2006).

Globally, the adoption of digital terrestrial television has been progressing at different rates, yet there is little research done on how citizens adopt digital technology and what the contributing factors are towards the adoption of technology (Lesame, 2014). Digital Terrestrial Television (DTT) services are expected to bring many benefits to viewers compared to the current analogue services. Many countries around the world have introduced DTT with such benefits in minds, but the rate of adoption has been slow, to the extent that many countries had to postpone the analogue switch-off date as a consequence (Mitomo, 2013). Documents from the South African Broadcasting Services (SABC) have revealed that a target to deliver 1000 000 units a year of set-top boxes to the citizens, was set in 2016 by the government, but to date, only 530 000 was deployed. This slow uptake of set-top boxes has been a concern for both government and the public at large and has prompted this study.

Studies by Zettl (2011), Cortada (2006) and Mbatha (2012) reveal the absence of public campaign and mass communication around the adoption process of DTT as contributing factors to the slow adoption.

While digital terrestrial television is perceived to bring benefits to the viewers, it also presents some technical challenges to the television viewers. Recent studies done on countries that have already completed digital migration journey revealed the following technical challenges experienced by many households before migrating from analogue to digital terrestrial platform:

- Antenna upgrade and alignment: the antenna used to receive signal were too weak for a digital signal and had to be upgraded and realigned so that they can receive satisfactorily digital signals.

- New equipment upgrade: households with old analogue television sets could not receive digital signals, so they had to buy a set-top box or new integrated television sets which came at a cost to the viewer.
- Higher electricity bills: several households experienced increased energy bills due to set-top box and new television sets which are power intensive.

## **1.1 Research Problem**

The continued usage of old broadcasting transmission technology such as analogue technology by broadcasters, not only deprive indigents South Africans of the benefits of high definition picture and sound quality, but also has cost implications for both broadcasters and regulators. Migrating to a digital format will result in cost saving for both the country and broadcasters as more channels would be broadcasted over a single frequency channel. Even though South Africa has begun the migration process, the rate of DTT uptake is very low. South Africa is one of the few countries that has and continues to experience a slow uptake DTT although the government planned to migrate five million households by January 2017. This target had not been achieved to date as only 500 000 households have been migrated so far.

Some of the impediments towards DTT adoption as well as users' incentives to adopt, have been well documented by some researchers in previous studies but still the adoption rates are very low (Bowen, 2017). These studies make assumptions that removing impediments will see the adoption rate increase, but no reference is made to factors affecting DTT adoption from consumers' point of view (Lesame, 2016).

South Africa has consistently failed to meet any of the deadlines it has set (Amstrong, 2010), and that still remains a concern. According to the Integrated Development Plan for South Africa, there are 14 key development challenges which directly affect the community residing in those townships, while the DTT offers some perceived benefits. South Africa finally began the process of dual illumination (a period in which both analogue and digital signals are simultaneously switched on) on the 1<sup>st</sup> February 2016 and to this day, it has not completed the process of converting to digital television broadcasting by the switchover deadline (Van Zyl, 2015).

The extent to which the perceived DTT benefits and the impact the exogenous constructs have on citizens' behavioural intentions to adopt, are investigated in this study.

The actual reasons for the slow adoption of digital terrestrial television (DTT) were not known at the beginning of this study and the extended UTAUT model was used to test the strength of the relationship between the exogenous constructs and the behavioural intentions to adopt. It thus sought to also solicit the views and opinions of experts on this matter, with the aim of identifying reasons behind the slow adoption of DTT.

#### **1.4 Research questions**

- What are possible reasons that have influenced the slow adoption of digital terrestrial television in Ethekewini Municipality?
- Is there a significant and positive relationship between the exogenous constructs of the UTAUT model with technology awareness as an additional construct and the citizen's behavioural intention to adopting DTT?
- To what extent is the relationship between the exogenous constructs of the UTAUT model and the behavioural intention to adopt DTT being moderated by power distance, individualism, masculinity, uncertainty avoidance and technology awareness?

#### **1.5 Research Objectives**

The objectives of this study are:

- I. To investigate issues that have led to the slow adoption of DTT in eThekewini Municipality
- II. Examine the nature of the association between the exogenous constructs of the UTAUT model plus technology awareness as an additional variable and the behavioural intention to adopt DTT.
- III. Determining the extent of the moderating effect of power distance, individualism, masculinity, and uncertainty avoidance on the

relationship between the exogenous constructs of the UTAUT model and the behavioural intention to adopt the DTT.

## **1.6 Hypotheses**

The study assumes that the following hypotheses are true:

*Ha1* - There is a positive and significant relationship between performance expectancy and behavioural intentions to adopt DTT.

*Ha2* - There is a positive and significant relationship between effort expectancy and behavioural intentions to adopt DTT.

*Ha3* - There is a positive and significant relationship between social influence and behavioural intentions to adopt DTT.

*Ha4* - There is a positive and significant relationship between facilitated conditions and behavioural intentions to DTT.

*Ha5* - There is a positive and significant relationship between technology awareness and behavioural intentions to adopt DTT.

*Ha6* - Power distance positively and significantly moderates the relationship between performance expectancy and behavioural intention to use the STB.

*Ha7*- Masculinity positively and significantly moderates the relationship between effort expectancy and behavioural intention to adopt DTT.

*Ha8* - Uncertainty avoidance positively and significantly moderates the relationship between social influence and behavioural intention to adopt DDT.

*Ha9* - Individualism positively and significantly moderates the relationship between facilitated conditions and behavioural intention to adopt DDT.

*Ha10* - Individualism positively and significantly moderates the relationship between technology awareness and behavioural intention to adopt DDT.

*Ha11* - Masculinity positively and significantly moderates the relationship between social influence and behavioural intention to adopt DDT.

## **1.7 Significance of the study**

By employing a mixed methods approach, the study sought to uncover factors that have contributed to the slow adoption of digital terrestrial television in Ethekwini Municipality. The role played by the South African government with regard to policy interventions and perceived interference by some politicians will be explained in detail.

This study combines the qualitative and the quantitative findings to develop a conceptual model adapted from the original UTAUT model. In addition, it suggests that new constructs be added in the adapted UTAUT model for future technology adoption studies.

The study is expected to make a significant and meaningful contribution to the technology adoption body of knowledge in that UTAUT model is extended by an additional construct which Technology Awareness (TA). The recommendations are also expected to have implications for regulators and broadcasters.

## **1.8 Research Methodology**

Research methodology in simple terms is described as the “how” of a given piece of research, explaining how a researcher systematically designs his or her study to ensure reliable and valid results that address the research aims and objectives (Jansen & Warren, 2020). In addition to this, William (2020:36) defines research methodology as a set of processes used to collect and analyse data, while research design refers to procedures used in collecting and analysing measures of variables in the problem (Oates, 2006). Methodology in research primarily deals with methods and principles undertaken in research, and explains how the research is done, how

data is collected, and how material and theory are used. Methodology also explains why a particular method is used and preferred over other techniques.

This chapter describes the research design and methods used to obtain and analyse data in this study. Section 6.2 offers three research paradigms, while Section 6.3 describes the research categories. The selection and justification of the research method is explained in Section 6.4, while the research model and research hypotheses are described in Sections 6.5 and 6.6 respectively. The data collection strategies and the population sample are discussed in Sections 6.7 and 6.8 respectively; lastly, data analysis techniques, reliability and validity are discussed in Sections 6.9, 6.10 and 6.11 respectively.

## **1.9 Research design**

The research design is defined by Burns and Groove (2003) as “a blueprint for conducting a study with maximum control over all factors interfering with the validity of the findings”. The study follows a mixed methods exploratory research design which includes both qualitative and quantitative methods.

### **1.9.1 Research Approach**

The nature and the objectives of this study called for a mixed methods approach to be applied. This study was based on the positivist (quantitative) and interpretive (qualitative) paradigm. Positivism as a philosophy follows the view that only realistic knowledge gained through observation, including measurement, is trustworthy (Collins, 2010). Positivism rests on quantifiable observations that lead to statistical analysis and which are congruent with the empiricist view that knowledge originates from human experience (Collins, 2010). The interpretivist paradigm is of the view that reality is multi-layered and intricate, and that a single phenomenon can have multiple interpretations. In an interpretivist approach, social reality is viewed and interpreted by an individual in accordance with the ideological positions they hold.

Both these research paradigms are consistent the mixed methods approach, capable of combining both qualitative and quantitative designs for data collection. The descriptive research design was adopted in this study, which allowed for the

effective collection and processing of both numeric and non-numeric data through interviews and survey questionnaires.

All ethical requirements of this study were observed in line with the University of KwaZulu-Natal's (UKZN) ethical protocols, and permission was sought where it was required.

### **1.9.2 Study Site**

The study was located in the province of Kwa-Zulu Natal, at the Ethekewini Municipality. Participants came from different townships of the Municipality.

### **1.9.3 Target Population**

The study targeted citizens from Ethekewini Municipality townships who are at least 23 years or older, have a television license and/or have access to a television set, and are employed or self-employed. It is assumed that at age 23, the participants are in a position to make a decision to adopt or not to adopt digital terrestrial television, and can afford to purchase a set-top box.

Participants for the study were recruited from social media platforms such as LinkedIn and Facebook.

### **1.9.4 Sampling strategies**

A random purposeful and convenience sampling method for this study was chosen. Sampling can be described as a process where a portion of the population is selected to represent the entire population (Green and Caracelli, 1997). In mixed methods research, sampling depends on the research design and provides a mechanism by which an estimate of the population's characteristics is obtained.

### **1.9.5 Sample size**

A sample size is generally a group of subjects or participants/respondents that are selected from the general population and are considered to be representative of the targeted population for a specific study (Onwugbuzie, 2014). A Sekaran sample size table was used to select a sample with a 95% confidence level and a confidence



interval of 5% for a population size of over 700 000. The sample size for the study using Sekaran table was calculated to be 271.

#### **1.9.6 Data collection methods**

The following methods were used to collect both quantitative and qualitative data: a survey questionnaire was used as a quantitative data collection tool, and interviews were conducted as part of qualitative data collection instrument.

#### **1.9.7 Data Analysis**

According to De Vaus (2002), data analysis is affected by the number of variables being examined, the level of measurement of variables and ethical responsibilities. Primary data was collected from citizens and industry experts via survey questionnaire and research interview questionnaires. The quantitative data was analysed by descriptive and inferential statistics using SPSS software, and the qualitative data was analysed using Thematic Analysis method.

The statistical independent relationship between the external variables of the UTAUT model and the behavioural intention to use STB was tested using Spearman's correlation test. The hypotheses were tested by calculating the value of the test statistics to accept or to reject the null hypothesis. Regression analysis was performed to test the extent of the moderation variables on the relationship between exogenous variables and the behavioural intentions.

Confirmatory factor analysis (CFA) was used to test how well the measured variables represent the number of constructs. Structural equation model (SEM) which is a statistical technique used to measure and analyse the relationships of observed and latent variables, was employed in the study to show the causal relationships between variables.

### **1.9.8 Data Quality Control**

Data quality control refers to the efforts and procedures undertaken by researchers to ensure the quality and accuracy of the collected data, using the methodologies chosen for a particular study (Lavraka, 2008). For the quantitative part of the study, validity and reliability tests were performed, while triangulation and coherence test methods were conducted for the qualitative part of the study.

For the reliability test, Cronbach's alpha coefficient was calculated to test the reliability of the survey questionnaire. Cronbach's alpha coefficient of between 0.7 and 1.0 indicates that the questionnaire is reliable. Selltitz (1976) describes reliability as the ability of a research method to yield consistently the same result over repeated testing periods.

For the validity test of the research instrument, a Rasch analysis was performed. This is a technique used to improve the precision with which researchers construct instruments, monitor instrument quality, and compute respondents' performances (Boone, 2016). Validity in this study was measured by ensuring congruency between the research objectives, research questions, investigations, findings and recommendations, using the Rasch analysis.

A test for multicollinearity was conducted to check if any of the exogenous variables correlate highly with each other. This was followed by a test for normality of data and a test for outliers before a goodness of fit test was conducted using fit indices.

### **1.10 Preliminary literature review**

The literature reviewed in this study was drawn from empirical studies. The researcher sourced the literature from newspaper articles, journals, theses, conference papers and magazine articles. The studies that this research relied upon were mostly undertaken in Africa, Middle East, Europe and America. The researcher selected studies in the field of digital technology adoption factors (Skare & Soriano, 2021; Ejaku, 2014; Lee, Falahat & Sia, 2020; Elliot, 2020; Gbongli, Xu & Anedjonekou, 2019; Tennant & Virtue, 2018); adoption and diffusion of technology

(Miranda, Farais, De Araujo & De Almeida, 2016), and technology adoption theories and models (Al Emran, Mezhuyev and Kamaludin, 2018; Granic and Marangunic, 2019).

Recent studies on the adoption of digital technology highlight several factors impacting upon the adoption of technology and use. Mbatha (2014) and Vejlgaard (2016) list the issue of poverty and corruption as factors delaying the adoption of digital technologies in indigent communities. Virtue and Tennant (2018) identified policy and regulations as the main issue for the slow adoption of digital terrestrial television. They argue that policies and regulations in many countries neglect the interests of the marginalized communities, especially the disabled. Lee, Falahat and Sia (2020) identified globalisation as the factor supporting the adoption of digital technology.

Oleschewski, Renken and Mueller (2018) conducted a study to assess the impact of social influence on the acceptance of technology and found that social influence has a positive influence towards the adoption of technology. The researcher also reviewed literature on impact of moderators on the relationship between exogenous constructs of the UTAUT and the behavioural intentions to adopt (Amzaourou & Oubaha, 2018; Tarhiri, 2017; Abasi& Tarhiri, 2015; Riskinata, Kelana and Hilmawan, 2017; Bora & Dutta, 2018; Senshaw, 2021).

The literature search on the effect of moderating variables on the relationship revealed that not all moderators have a significant effect on the relationship between exogenous constructs and behavioural intention construct of the UTAUT model.

The literature review also examined the technology acceptance models and theories by Taherdoost (2018), Rana & Dwivedi (2015), Chen (2015), Dauda & Lee (2015), Venkatesh (2003), Davis (1986) and Momani (2017). The conceptual framework in this study comes from the extended UTAUT model that was developed as a result of the review of other previous models.

This study proposes the use of extended UTAUT model by adding the exogenous construct of Technology Awareness, and the constructs of Individualism, Masculinity,

Power Distance and Uncertainty Avoidance as moderating variables. Several methods have been proposed to predict technology acceptance particularly in the digital technology space. It is important to examine this theory and others that shaped the UTAUT model in order to understand technology adoption and validate it in the context of digital technology at the individual level.

### **1.11 Ethical Considerations**

Resnic (2016) defines ethics as *a branch of philosophy that deals with the conduct of people and guides the norm or standards of behaviour of people and relationships with each other*. Norms enhance the purpose of research, which includes knowledge dissemination, truthful in reporting and the need to counteract errors.

Application for ethical clearance for this study was done and the approval to proceed was granted.

For the quantitative part of the study, all respondents signed the declaration and informed consent to participate in the study. For the qualitative part of the study, participants agreed to participate and be recorded.

In undertaking this study, the searcher upheld the UKZN code of ethics: a letter of consent to partake in the study was obtained from each participant. The researcher further explained to the participants that their participation in the study was voluntary and confidential, and that they may withdraw from participating at any given time.

### **1.12 Limitations of the study**

This adopted a mixed methods approach for data collection. Due to the global pandemic (Covid-19) that started in 2019, certain restrictions were put in place by the government. In complying with the government restriction on Covid-19, UKZN issued a directive that discouraged researchers from collecting data physically from respondents. As a result, data was only collected using online platforms like Facebook, email and LinkedIn.

Another limitation was the low response rate attributed to the slow email response. Generally, online response tends to yield a response rate between 30% and 40%, but in this study, the response rate was just over 50%.

The study excluded respondents who did not have access to Facebook, LinkedIn and email due the Covid-19 restrictions. To overcome of these limitations, future study that is all inclusive should be conducted not only on adoption but the adoption and use of set-top boxes.

### **1.13 Organisation of the study**

The thesis is organised as follows:

Chapter Two introduces the topic of the thesis, provides the necessary background and explains the importance of the study.

Chapter Two provides an overview of the Digital Terrestrial Television (DTT), also known as digital migration.

Chapter Three discusses innovations in television broadcasting and the departure from linear analogue broadcasting to digital broadcasting and the growth of Over-the-Top (OTT) services.

Chapter Four discusses theories and models that led to the development of the extended UTAUT model as a conceptual model.

Chapter Five presents the literature review.

Chapter Six outlines the research methodology including the research approach for this study.

Chapter Seven presents the analysis of qualitative data and presentation of results.

Chapter Eight presents the analysis of quantitative data and presentation of results

Chapter Nine discusses the finding of the study in relation to the research questions and objectives.

Chapter Ten presents the conclusions of the study and recommendations for future research.

## **1.14 Chapter Summary**

The success of the digital migration project is dependent on, amongst other things, the collaboration of all stakeholders in the project; the consultation and involvement of the communities; the production of quality content; reliable signal distribution and also, the availability of affordable access equipment such as STBs. This chapter has provided a synopsis of the thesis by highlighting the benefits of migrating to digital terrestrial television and has presented the factors contributing to the delays in other countries. These delays are not unique to South Africa, and have been found in Europe, Asia and America.

The chapter also introduced the methodology used in the study, the literature reviewed and the limitations experienced by the researcher.

## **CHAPTER TWO**

### **FUNDAMENTALS OF DIGITAL TERRESTRIAL TELEVISION (DIGITAL MIGRATION)**

#### **2.1 Introduction**

This chapter gives an overview of digital terrestrial television. It starts by explaining analogue and digital systems of broadcasting, the DTT broadcasting value chain, and reasons for digital migrations, policy and regulatory approaches. The benefits of both systems are explained, including the definitions of terms that are widely used in studies of this nature. After describing the digital migration process from content creation to signal distribution, the chapter ends with defining the spectrum auction and the types of auctioneering used by other countries.

#### **2.2 Digital Terrestrial Television (DTT): South African perspective**

The world has indeed moved towards digital switch-over, which is the beginning of the digital migration. This is where the analogue terrestrial transmission of broadcasting signal is switched-off and replaced by digital terrestrial transmission signal. Before the replacement of the analogue signal begins, both transmission methods take place at the same time. This dual transmission period is termed the “‘dual illumination period’ and it continues till a sufficient number of households have migrated to DTT. The digitization process, coupled with the new content distribution models plus competition, has placed the traditional linear television under extreme pressure (Chalaby & Segel, 1999).

Multichoice had enjoyed a monopoly in the television sector for a lengthy period of time, and the introduction of digital terrestrial television in South Africa was supposed to shake the market and offer viewers more channel options, thereby growing the competition (Carmichael et al., 2006).

For consumers of television to be able to access DTT on their old television sets, they would need to connect to a set-top box (STB). This device converts the DTT signal so that it can be received by an ordinary analogue television set.

### **2.2.1 Analogue switch-off**

The European Commission (EC, 2005a: 3) defines analogue switch-off as “terminating the terrestrial transmission of analogue television”, while switch-on is defined as “the transition from analogue to digital broadcasting of all types of broadcasting”. When comparing the two, the switch-over is more of a broader process and entails lower distribution cost. Many countries have completed the analogue switch-off process, and the benefits are starting to accrue. In South Africa, the analogue switch-off date was set at 15 June 2015, but the deadline was never met. The Free State province was announced as the first province to have to switch-off the analogue signal. Several deadlines were also set by the government of South Africa and again, none of those deadlines were met. This perhaps could be attributed to lack of investment in both the transmission equipment and the receiving equipment.

The most recurring concept in the digitization dialogue amongst policy makers is that of digital dividend. The frequencies that are released by the analogue television switch-off are referred to as digital dividends. In simple terms, digital dividends can be understood as the amount of spectrum that is made available over and above the amount required to accommodate the existing analogue television services in a digital format (Doeven, 2007, p. 1). This freed spectrum is reserved for other telecommunication services and will be made available through an auctioneering process. Figure 2.1 reflects the digital dividend.



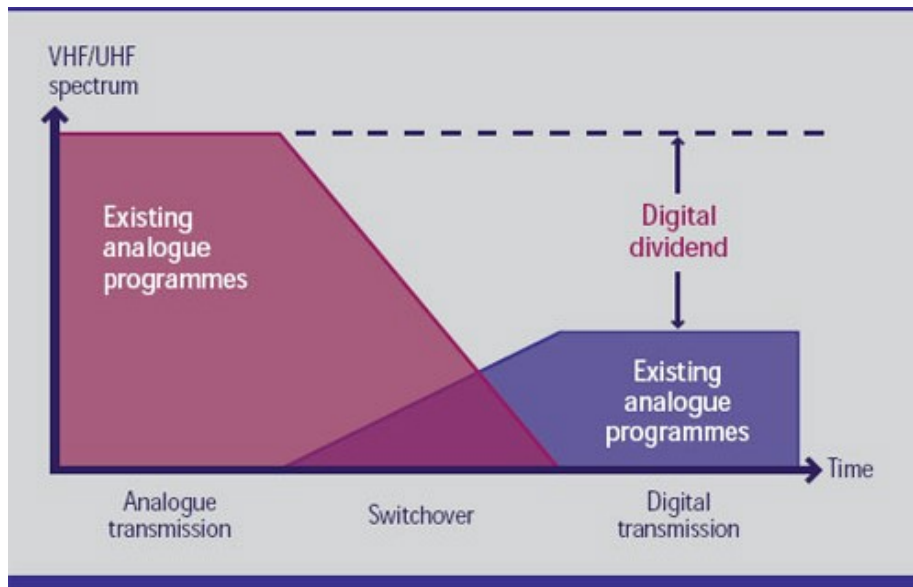


Figure 2: From analogue to digital - digital dividend (ITU, 2010)

The digital dividend is made possible by the digital compression technology that allows up to six (depending on the coding and modulation technologies) standard digital television channels of acceptable quality in the radio frequency spectrum, used previously by a single analogue channel (ITU, 2010). The freed spectrum will be used for, amongst other things, multimedia applications, mobile communications, and wireless broadcast systems.

### 2.2.2 Digital switchover (DSO)

DSO is simply a process where an analogue signal is switched off while at the same time switching on a digital signal. DSO is a natural outcome of the technological evolution in the television landscape that brings advantages to both the citizens and broadcasting companies. In many countries in Europe, digital switchover has been completed. These countries include Finland, Germany, Luxembourg, the Netherlands, Switzerland and Sweden. The DTT network coverage and the penetration of DTT receivers have reached a high level that is enough to begin the digital switchover. D'haenens and Brink (2001) highlight the following benefits for both citizens and broadcast companies;

- Costs of distributing content is lower
- More channels can be transmitted at the same cost

- More choice for consumers, higher picture and sound quality for viewers, and better signal stability
- Greater efficiency in spectrum usage
- Interactivity and more customised services

The Department of Communication initiated a nationwide campaign called "Go Digital South Africa" to raise a public awareness campaign in support of the broadcast digital migration program. The program did not achieve the desired results as many South African remain confused as to what digital migration is and what it would mean.

It is important to note that during the switch-over, both analogue and digital signals have to be on simultaneously and that the switch-over period is under government control. In South Africa, the process has been slow, and no provision was made to encourage the acquisition of STB by slow adopters.

### **2.2.3 The universal service and access**

The World Bank explains the principle of universal service and access as having access to telecommunication services by the public. South Africa has established an agency (Universal Service and Access Agency of South Africa) that will ensure that its entire citizen from the remote poorest areas to the rich urban arrears has ICT connectivity. This agency (USAASA) was established through an act of Parliament in 2005.

Traditionally, broadcasters have not been part of the universal service and access, but now they are regarded as part of the ICTs due to the converging nature of the underlying technologies and delivering mechanism for broadcasting and telecommunications (Berger, 2010).

According to several authors (Blackman, 1995; Jayakar & Sawhney, 2004; OECD, 2005), the following dimensions embody the universal characteristic of service:

- Availability - Access to ICT services should be available at any time
- Affordability - Cost of accessing ICT services must be affordable to the large part of the population
- Accessibility or Disability – ICT services should be geographically as close as possible to the general public, including people with disability
- Sustainability – ICT point of presence should be managed and maintained to ensure sustainability
- Quality of service - Services provided should be the same regardless of the area or zone

#### 2.2.4 Analogue v/s Digital broadcasting

The difference between analogue and digital broadcasting is the manner in which the signal is transmitted from the source to the receiving device. Figure 3 shows signals transmitted from both analogue and digital. DTT has, in most countries, replaced analogue and offers a high definition TV signal and the efficient use of spectrum for additional channels. Another interesting point about “over-the-air digital signals is that they don’t weaken over distance as compared to analogue, whose signal is continuously variable (see Figure 3).

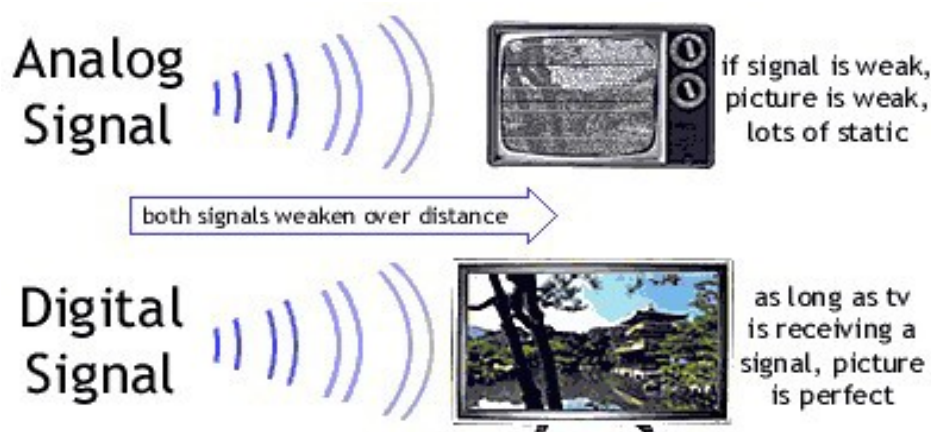


Figure 3: Analogue signal vs digital signal (ITU, 2012)

The picture received from digital signals is perfect, with no ghosting or signal degradation (Figure 2.3), as long as the signal is received. One of the reasons that digital migration is encouraged is the fact that the transmission requires less bandwidth than a similar analogue transmission. The limiting factors that were inherent in analogue television have contributed to the development of digital broadcasting technologies (Punchihewa, 2010). Ghosting is often a result of average or low signal during analogue transmission.

Ghosting is defined as “the blurry of a television picture resulting from interference caused by multipath reception” (Jirsa, 2013) (Figure 4). Interference, on the other hand, is defined as the presence of other signals interfering with the television reception and is usually the main cause of TV reception problems. This may be caused by damaged antenna or cabling equipment (Figure 5).

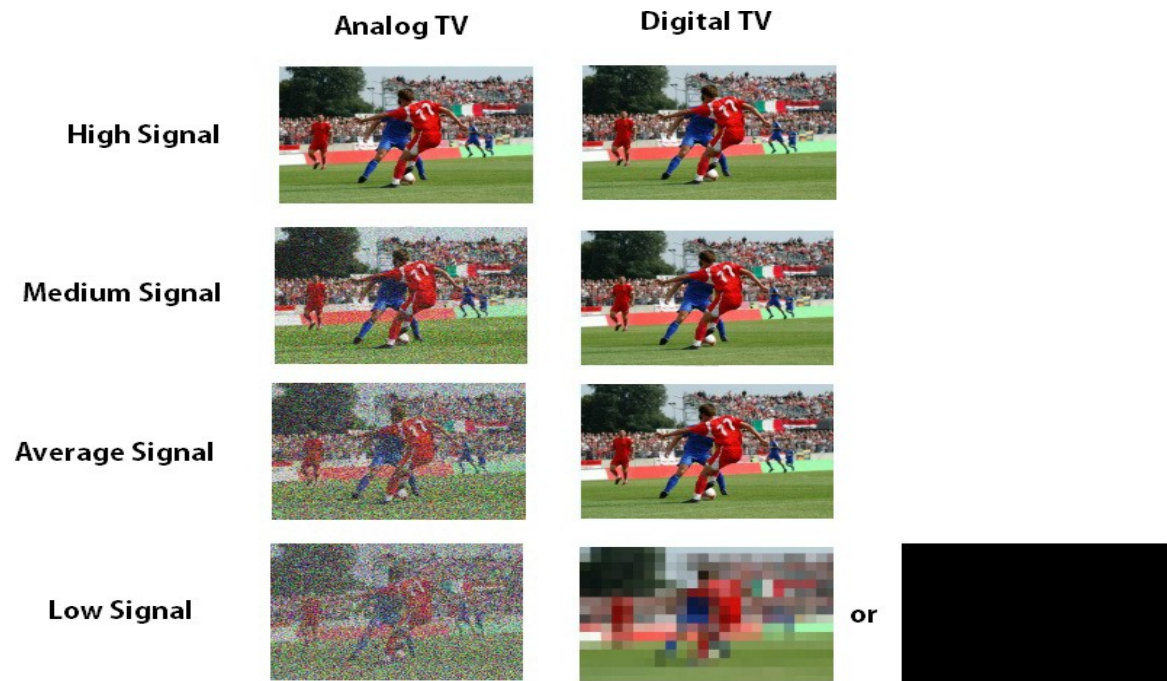


Figure 4: Picture quality - analogue vs digital (Practicannetworking.net)



Figure 5: Signal interference image (dream time pictures)

### **2.3 Phase of digital migration in South Africa**

Digital migration is defined in the Broadcasting Digital Migration Policy as the process of moving from analogue broadcasting to digital broadcasting. This process is said to offer our country a distinctive opportunity of meeting the growing demand for telecommunication services by wireless communication services, thus exploiting the freed spectrum, which is commonly referred to as digital dividends.

The successful implementation of the digital migration process will entail policy and regulatory instruments, together with the communication strategy and consumer awareness campaigns. Figure 6 depicts the phases of digital migration; currently, South Africa is on Phase 3.



Figure 6: Faces of digital migration (tech-central, 2016)

The ITU deadline for the switch-over in South Africa passed in June 2015, with other countries in region one such as Zambia, Kenya, Malawi, Rwanda, and Namibia now having completed the process. In 2016, the first analogue TV transmitter was switched off in the Northern Cape's SKA area. The switchover process is one such process that should be planned carefully in a transparent manner with consultation with all relevant stakeholders affected by the digital switchover. A successful switchover starts with the adoption of the digitalization strategy that sets out the requirements and how the impediments can be overcome (Punchihewa, 2012). This strategy should be able to, amongst other things:

- Define the roles and responsibilities of all stakeholders involved in the migration process
- Determine the required broadcasting and compression standards
- Determine budget and the source of funds
- Determine the exact switch-off dates
- Draft a detailed action plan

## 2.4 The DTT value chain

The DTT value chain is a process of activities by which broadcasters add value to its primary stakeholder (viewers), from content production to transmission and receiving of terrestrial signals.



### 2.4.1 Content creation

Broadcasters today are finding new ways of increasing viewership through compelling content. The television industry has seen continuous technology-driven change, which has compelled broadcasters and content producers around the world to introduce innovative ways of creating content. Hecht (2016) defines TV content as content transmitted in a video format and accessible via television network, internet, or recorded in a compatible media format such as DVD. Decades ago, the content was primarily captured on film, videotapes, and now on digital media, delivered to the viewers via a growing number of platforms like cable, satellite, IPTV, and more recently, online.

Content creation has, in recent years, showed considerable growth, with a shift from mainstream content providers such as traditional television studios to internet start-ups seeking to expand their portfolios through an exclusive content introduction.

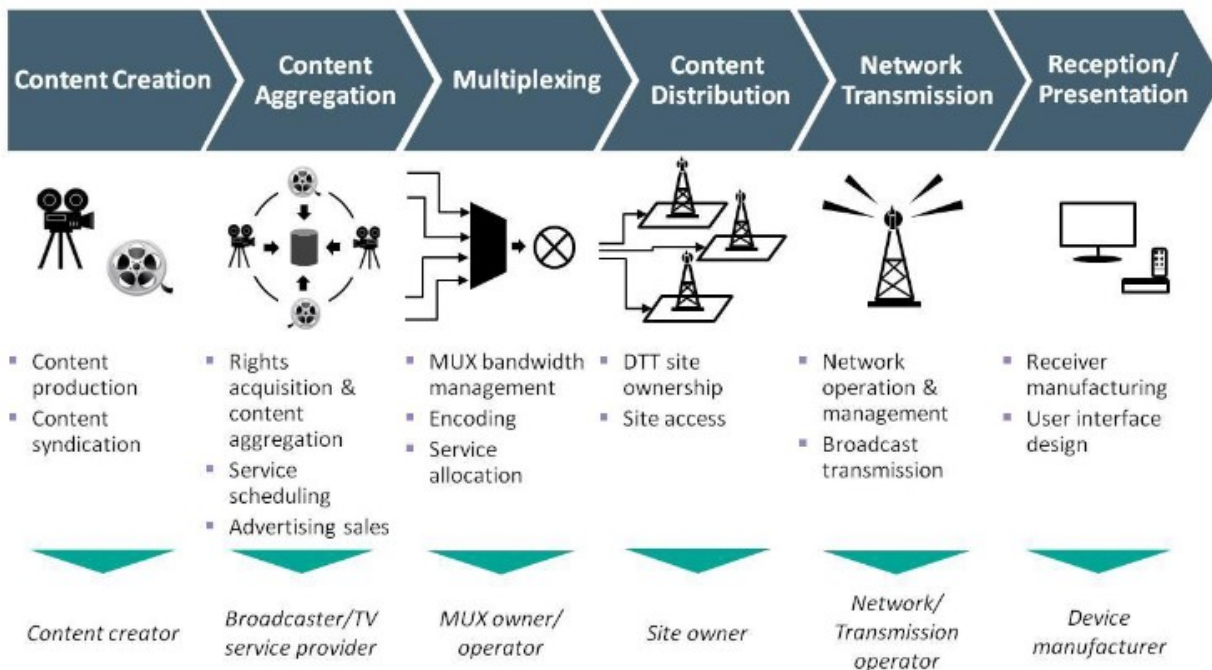


Figure 7: DTT value chain

Figure 7 summarises the process of digital terrestrial television. The process start when content is received from content distributors and then packaged in the right format. The packaged content is then compressed in the multiplex and then sent to signal distributors for transmission into homes.

How do these transformations of digital television influence viewer's intention to adopt digital television? Ooyala (2015) argues that this transformation leads to fragmentation of viewers, and as such, it becomes difficult to conclude if innovations such as OTT increase users' intention to adopt digital television or not. Global players like Netflix, You Tube, and Amazon have attained high revenue growth as a result of large and high number of subscribers, while domestic broadcasting houses have seen declining revenue. This demonstrates the impact that content has on the adoption of digital television.

#### **2.4.2 Content aggregation**

The capacity of the internet to pull content from numerous sources and then make it accessible to a particular or dedicated site for viewing, is called content aggregation. This aggregation is done by video content aggregators who then package video content for programming and distribution. Examples of such content aggregators include television and theatrical film distribution entities. Google, Netflix, and Spotify are amongst the well-known content aggregators. Broadcasters as aggregators of television programmes have historically positioned themselves as intermediaries between viewers and producers of TV programme rights holders (Collins et al., 1988: 13).

Figure 8 illustrate the process flow from content aggregators to consumption of content. Entities that pull together content and applications from the online sources for reuse or resale are referred to as content aggregators (Lin, 2010).



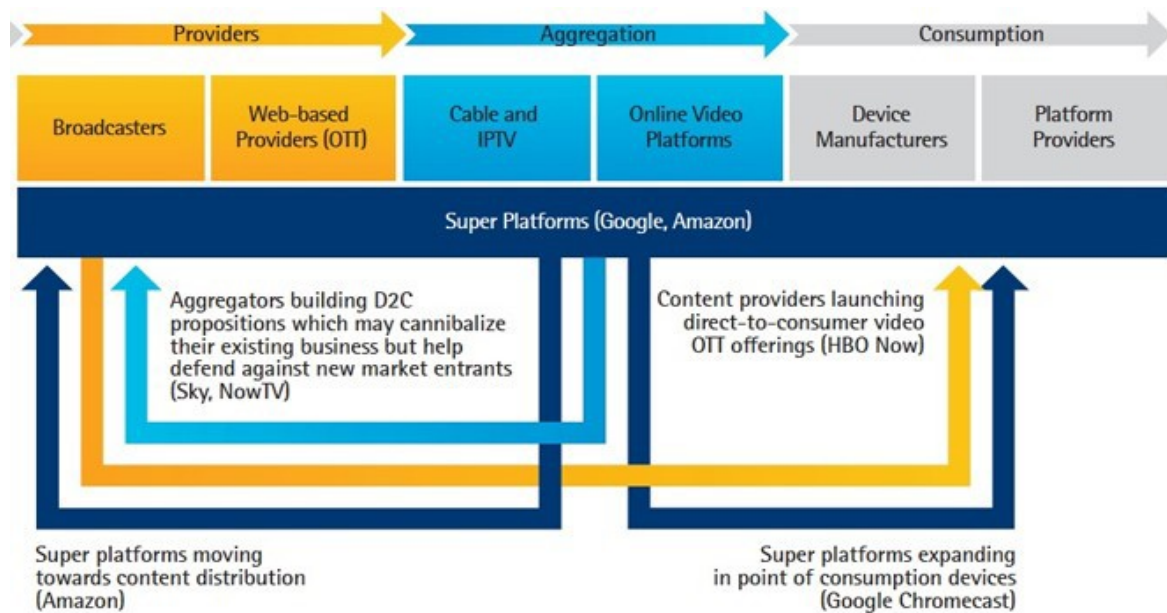


Figure 8: Illustration of content aggregation and consumption (Accenture, 2016)

### 2.4.3 Multiplexing

Multiplexing is defined as a method by which multiple analogue or digital signals are combined into one signal over a shared media (Sheldon & Burke, 2021). This is achieved by using a multiplexer, which is a device that has several input signals and one output signal. In the case of DTT, when channels reach a multiplex, they are compressed and multiplexed together before distribution and transmission. According to ICASA, which is the regulator of telecommunications in South Africa, the spectrum allocation for DTT involves two multiplexes, and each multiplex is expected to carry up to 20 standard definition television channels. Multiplex one is allocated for public television, with SABC being allocated 85% of the capacity and 15% to the rest of the existing community television channels. Multiplex two is allocated to M-Net and e.tv with a 45/55 percentage split. This will ensure that the signal will be transmitted more efficiently over a given communication channel, thereby decreasing transmission costs. This should be motivation factor for consumers of television since more channels will be added to give them options.

#### 2.4.4 Content and signal distribution

Content distribution refers to how content is distributed to the transmission site. In South Africa, SENTECH, which is the provider of electronic communications network services to the broadcasting and communications industry, has completed the installation of 178 transmitter stations nationwide to ensure 100% DTT access for South African citizens. In 2015, SENTECH extended its contract with Intelsat, the world's leading provider of satellite services for many more years. The contract extension saw SENTECH enhancing its Direct-to-Home (DTH) and Digital Terrestrial Television (DTT) services in Africa for a reasonable fee. Intelsat's ability to support and deploy DTH and DTT transmission has enabled SENTECH to continue the seamless migration of its customers to DTT. SENTECH continues to offer digital content delivery services to public and commercial entities. Figure 9 reflects the services that SENTECH offers.

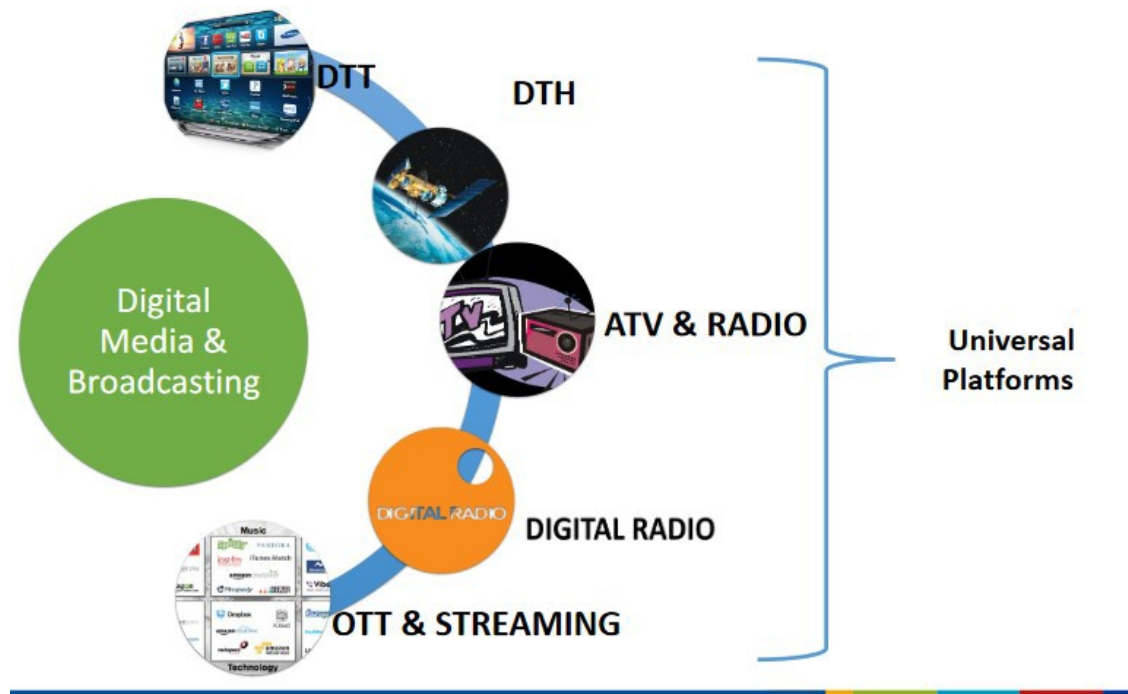


Figure 9: Sentech services and platform (SENTECH, 2020)

### 2.4.5 Reception

Once content reaches the transmission site, it is transmitted to the homes where it is received via a digital set-top box (STB), or a TV gateway or an integrated tuner embedded inside the television set. Figure 10 illustrates how a signal is received from the transmission site to the Holmes. Digital signal is received from the broadcasters by the signal distributors and then transmitted to the homes. This signal is then received through a standalone antenna before being converted by a set-top box for analogue TV sets.

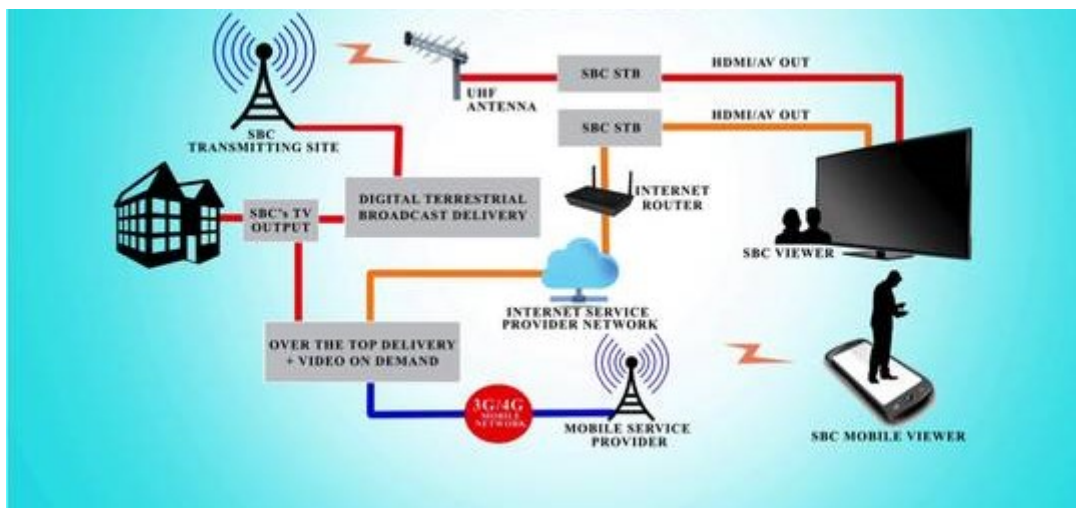


Figure 10: DTT signal reception from signal distributor (tech-central, 2016)

## 2.5 Benefits of Digital Terrestrial Television

Radio frequency spectrum is a scarce resource and its efficient usage should be encouraged. Migrating from analogue to digital improves the efficient use of this precious scarce resource. Broadcasters will be able to use less frequency spectrum in providing broadcasting services such as adding more channels (Gillwald et al., (2012). Currently, the public broadcaster is utilizing one frequency per channel on analogue transmission. This means that SABC1, SABC 2, and SABC each use a separate frequency to broadcast. After migration to digital, all channels will be accommodated under one frequency spectrum. The migration to digital will also provide broadcasters with the opportunity to upgrade their aging and obsolete infrastructure, adding more channels and to increase their viewership (Mbatha, 2012). Mobile operators also stand to benefit from the freed spectrum (digital

dividend), as this would present them with an opportunity to provide services to the remote and rural arrears in the country.

Local electronic equipment manufacturers will also benefit from the manufacturing of set-top boxes (STBs) and related equipment. From the employment point of view, local unemployed youth will be trained as installers of STBs, thereby reducing the country's unemployment rate.

## **2.6 Digital migration policy considerations**

This section discusses the process of policy formulation, implementation and inconsistencies in relation to digital migration. Government's role is to develop broadcasting policy and its structures within societies (Smith, 2014). The rapid change in technology and the emergent of new services in the broadcasting landscape calls for new policy initiatives. In putting this statement into practice, the South African government started the Broadcasting Digital Migration Policy process as early as 2007. This was to ensure that the digital migration is not left at the hands of the market forces and that the purported benefits of migrating to digital terrestrial are generalised across society. The government recognised that the free to air television services were at risk of being marginalised by paid television services, and as a result, a DTT transition policy that would be public-led was needed.

## **2.7 Economic spin-offs of DTT**

The successful roll-out of DTT is expected to address the unemployment issue facing the youth in the continent, as the industry will require a lot of professionals/personnel in content production to be able to fill the content requirement for digital television. Innovations in video programming and information services are expected to increase, triggered by the convergence of personal computers and television technologies. This would create job opportunities for indigenous computer programmers. The installation of Digital facilities in the area of broadcasting is expected to provide work for technicians.

The independent TV production sector will similarly experience a boost, with the film industry requiring studio hires and post-production crews. Given greater investment in the Terrestrial TV industry, there is sure to be an economic boom.

## **2.8 Competition in content production**

DTT brings about competition between platforms and channel packages, which in turn affect investment in original content and content rights. The overall framework supports "competition for quality," which has been described as a vicious cycle of investment in content, which supports exports, feeds back to revenues, and then again into content production.

DTT is expected to stimulate content investment by pay subscription operators, who will naturally start competing with free-to-air operators. This will contribute to the continent's successful independent production sector leading to possible exportation of TV content. DTTB promises to help in generating substantial income for the broadcasters and, in turn, will support content production and job creation in the broadcast industry.

## **2.9 Spectrum allocation**

This is a process whereby the Government, through the regulator (ICASA), allocates spectrum to interested role players in DTT projects. Several countries have adopted the market mechanism when allocating and assigning the spectrum through the use of spectrum auctioning. In South Africa, this process was expected to start in 2019 but has since been delayed due to the war of words between the department of Communications and the regulator (ICASA).

The issue of spectrum allocation is considered necessary to minimize the resource constraints experienced by internet service providers and mobile operators, and also to level the playing field so that new entrants into the market can participate (Business-tech, 2019). It is also expected to drive down the cost of data, reduce the communication cost, and to drive the universal service and access goal.

The US and UK have also adopted the principle of “secondary trading”, which is the exchange of ownership of spectrum or spectrum licenses which have already been issued, accompanied by the opportunity for the existing or new licensee to change the use of the spectrum, a concept known as liberalisation (Ofcom, 2015). It is no secret that under the liberalised regime, the spectrum can be used interchangeably for mobile communications, mobile broadcasting, traditional terrestrial broadcasting, and a range of other possibilities (Ottaviani, 2014). The choice of use would then depend on the varying willingness by potential licensees to pay for such, which will also depend on the willingness by end-users to buy those services.

Spectrum licensing auction is a very difficult process to initiate and manage and South Africa attempted twice but failed to proceed (Christianson, 2021). The initial attempt was followed in 2010 by another attempt in 2016. In March 2021, ICASA, who is the regulator of telecommunication services in South Africa, was prohibited by the Johannesburg High Court from proceeding with the spectrum auction process, pending the hearing on contentions raised by e.tv and Telkom. At the centre of the dispute was the decision by ICASA to put on auction the 700MHz and the 800MHz spectrum bands, which are currently in use by television broadcasters before the migration. The implication of the court decision has impacted data supply and speed at the back of 165% increase in data traffic since the beginning of Covid-19 pandemic.

### **2.9.1 Spectrum Management**

The management of spectrum entails the process where the use of radio frequencies is applied in promoting the efficient use of spectrum for societal benefits (ITU, 2006). Regulation of spectrum has prevented interference from neighbouring geographic arrears. The growing demand for mobile and wireless internet access has led to a huge demand for spectrum, thus highlighting the need for the efficient use of all available spectrums. A 2015 report by one of the biggest network companies, CISCO, projected a 69% growth in the amount of data between 2015 and 2020. This is a period that saw high demand for online streaming and video-on-demand as a new way of consuming television (Lesame, 2015).

## 2.9.2 Spectrum Assignment Methods

In most countries, the primary tool for spectrum management is a licensing system, which is a form of property rights (Cave, 2007). A spectrum license, therefore, gives its holder an exclusive right to transmit at a given frequency, and it is the responsibility of the regulator (ICASA) to award such. The regulator, therefore, has in most countries the following goals to achieve in order to maximize the spectrum value to society:

- Efficient use and assignment of the spectrum resources
- The promotion or protection of social welfare and public service
- Government revenue generation
- Minimization of potential interference and coexistence issue

The ITU, Ofcom and the FCC have differentiated between three spectrum management methods as follows: traditional administrative methods, market-based methods, and new methods, which are explained next.

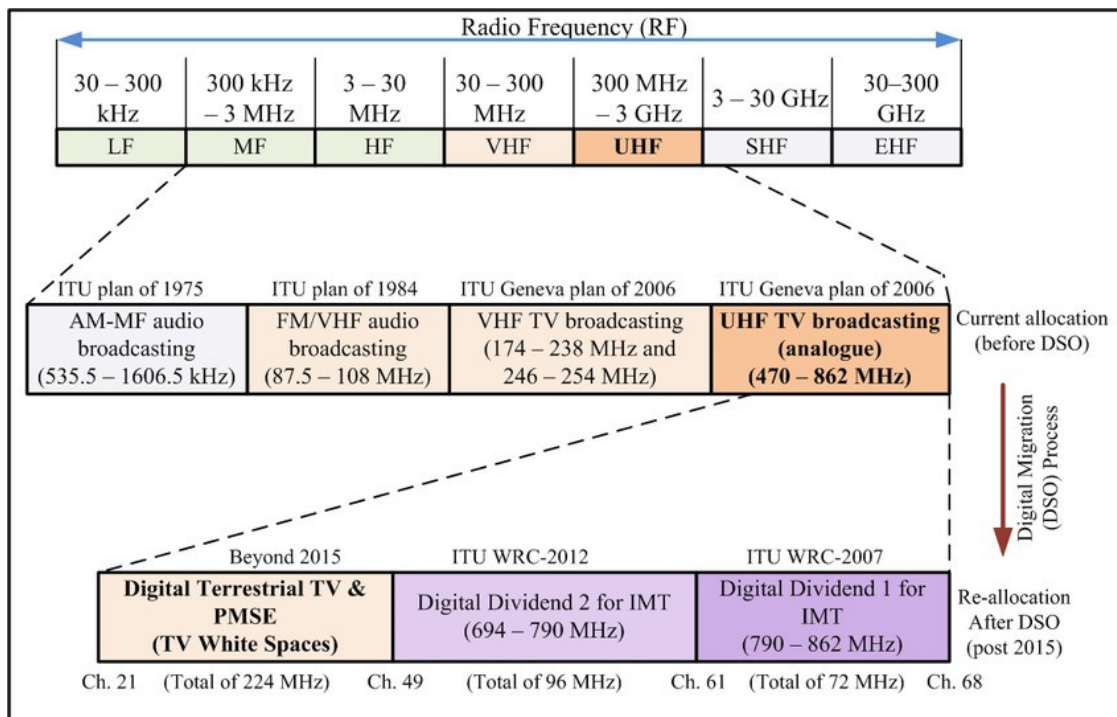


Figure 11: Radio frequency bands (ITU, 2014)

### **2.9.2.1 Traditional administrative methods**

For this method of assignment, the regulator does not impose a price on frequencies, although it is common for other regulators to impose small cost recovery fees. These, according to the ITU, include lottery method, first-come first-serve method, and the beauty contests.

Lotteries follow a random selection process whereby the licensees are selected by chance. This method is considered to be more quick and economical, as compared to the administrative process, but comes with its own shortcomings. Through this method, the bidder's technical ability to develop, maintain, and operate the license cannot be determined (Jilani, 2015). This method was a preferred method in the 80s due to its nature of assigning licenses quickly. The lottery method attracted too many speculative applicants who were not technically competent.

The first-come first-serve method was purely an administrative decision of assigning the license to the first credible applicant/s for low valued frequencies with low demand.

The beauty contest method is when the regulator releases an invitation to bid for the spectrum license in question. This invitation comes with a set of pre-determined criteria like the population to be served, spectrum efficiency, and ability to stimulate competition. This method is still being used today in most countries.

### **2.9.2.2 Market-based methods**

The market-based method places less reliance on the regulator, based on the assumption that the market mechanism, while properly monitored and supported, is the most effective way of allocating the spectrum. Examples of these methods include auctions and spectrum trading. The auction method was first proposed in 1951 by Leo Herzel in his article entitled "The public interest and the market in color television." In this method, the price and the licensee of the frequency are determined in a bidding process. Currently, auctions are the dominant assignment method for spectrum, and they are carried out where there is strong competition for scarce spectrum with a high commercial value (Milgrom et al., 2011), and are



generally considered to be the most efficient spectrum management tools in achieving efficiency.

In South Africa, the mobile operators have been waiting for years and pleading with the regulator for the allocation of spectrum in order to provide faster and more reliable high-speed data services.

## **2.10 Spectrum Auction**

Auctions are now the standard approach for allocating spectrum licenses mobile use in many countries, including South Africa. A justification for auction is the efficient allocation for this scarce resource. The process of spectrum auctioning in South Africa was supposed to have started in April 2019, but this date has come and gone. This has the potential to harm the citizen who is already paying more for data and will struggle to access Wifi and the internet. Some researchers like (Kwerel, 2000 & Wolfstetter, 2001) and policy makers have claimed that spectrum license fees are sunk cost and should have no impact on the subsequent investment and consumer pricing decision (Marsen & Treber, 2015). (Choi, Lee, & Park, 2010) have presented empirical evidence that appears to support the sunk cost argument. These claims are contradicted by recent work by (Cambini & Garelli, 2017) in the field of financial and behavioural economics.

## **2.11 Chapter Summary**

This chapter has provided the background on Digital Terrestrial Television in South Africa. It started by explaining the difference between analogue and digital broadcasting and provided the examples for each method of transmission. The chapter then discussed the benefits for migrating to digital terrestrial television and the limiting factors of analogue television. The concept of analogue switch-on and digital switchover were also explained, together with the digital dividends and the spectrum management. The chapter ends by explaining spectrum auction and the methods used for auctioning the spectrum.

## **CHAPTER THREE**

### **BROADCASTING INNOVATIONS**

#### **3.1 Introduction**

This chapter looks at the latest innovations in television broadcasting as an alternative to DTT. Different broadcasting platforms and streaming services such as Over The top (OTT), Video-on-Demand (VoD), and Pay-Per-View (PPV) are discussed. The chapter begins with a brief background on the advent of the video industry, the rise of OTT and the impact of OTT on traditional linear television and pay channel television. It becomes relevant to the study in that it aids understanding of the impact of OTT services on the adoption of DTT.

#### **3.2 The advent of the online video industry**

Since the establishment of the online video platforms around 2004, streaming has become prevalent. Viewing preferences by television consumers began to change from traditional linear television to online viewing (Meng, 2016). This shift in consumer preference is encouraged by the ubiquity of connections, diffusion of broadband and ultra-broadband networks (LTE, 5G, optical fibre), and evolution of the mobile devices.

Figure 12 depicts the evolution of online streaming for a 10-year period between 2004 and 2014. The business model for streaming moved from user generated content to advertising and acquisition of premium content.

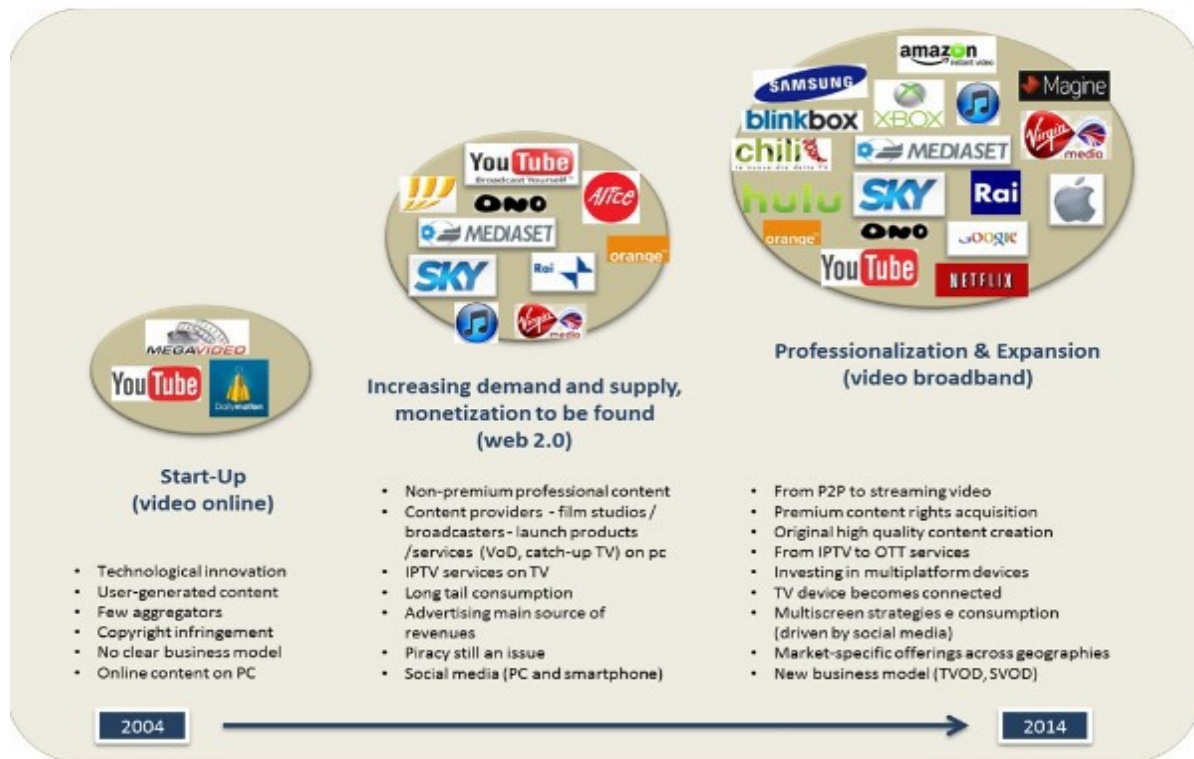


Figure 12: Evolution of the online video streaming (IT Median Consulting, 2016)

The improvement of the mobile network performances has supported the evolution of the online video streaming.

Digitization of video content globally has changed the way television is consumed (Gupta, 2021). The growth trajectory experienced in internet connections and availability of smart devices, technological innovations and better networks have culminated in the rise of new OTT companies that offer services directly to viewers via the internet. The effect of the Covid-19 pandemic has also forced the lifestyle and behavioural change in consumers, including change in their media consumption (Livemint, April, 2020). The rise in internet consumption has forced service providers to create innovative ways of responding to the increased demand for data (Madhukalya, 2020).

Currently, streaming services are dominating the entertainment industry and researchers such as (Chen et al., 2018 & Lee et al., 2018) are focusing on understanding factors that drives people towards adoption of such innovations. Over

the top (OTT) companies such as Amazon Prime, Hulu and Netflix, who are all competitors, are now transforming the coopetition relationship amongst media firms in the broadcasting market and structure of the broadcasting industry (Kwon & Park, 2019).

### **3.3 Overview of television subscription services in South Africa**

South Africa's population is estimated at around 59 million and 82% of the households own a television set (General Household Survey, 2020). The broadcasting landscape in South Africa is characterised by free-to-air (FTA) television services and subscription or pay television services. The FTA is a government owned South African Broadcasting Corporation (SABC) and e.tv and open view which are privately owned by eMedia Holdings. DSTV and StarSat are pay TV operators and the pay TV subscribers are estimated to be around 7million. Year 1986 saw the launch of the first pay television services in South Africa when M-Net channel was launched. In 2007, StarSet, which acquired Top TV, was launched after the company was granted pat-TV operator licenses by the Independent Communications Authority of South Africa (ICASA).

Continued broadcasting innovations globally have given birth to OTT service providers such as Amazon Prime, YouTube premium, Black, Netflix, Showmax, Hulu and others. These service providers have caused massive disruptions in the local and international television industry. Consumers of television are now spoilt for chose as long as they have access to stable and fast internet. Data costs have come down thus increasing the pool of consumers who can now afford data for internet access on any device that can connect to the internet.

Many broadcasters around the world are looking past DTT and linear broadcasting and are contemplating other innovative content distribution methods and platforms such as over-the-top (OTT). In the digital economy, the information has become the driver of wealth, and digital technology is very often a key to success (Aldrich, 2017). Through this digital evolution, the consumers have also evolved and are looking at new ways of consuming television content.

The introduction of 5G in television broadcasting has further threatened the slow demise of DTT and allows the co-existence of services of a different nature at a level that has not been seen before (Noblet, 2020, TVtechnology.com).

With all these developments in the broadcasting innovations, a case can be made that television viewing behaviour is changing and that DTT may no longer be a relevant platform. Japan has the highest consumption of live online video content, followed by the USA. On the other hand, China and Brazil have the highest consumers of streaming services, followed by the USA as well (Figure 13).

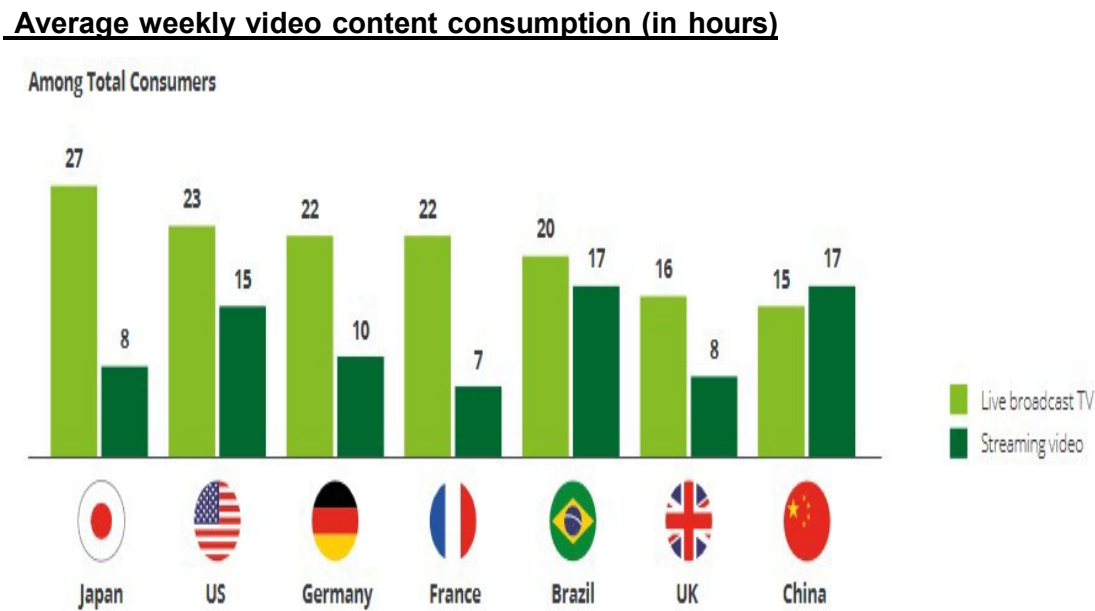


Figure 13: Digital media trends (2018)

### **3.4 Over-the-Top (OTT)**

An OTT service is an online distribution platform that uses the infrastructure of the internet to distribute and deliver content from producers or license holders to the consumer (Van der Velden, 2017). McAdams (2018) describes the OTT services as the “productized practice” of streaming content directly to the consumers/viewers over the internet. It represents the future of entertainment that is already unfolding. The OTT signifies liberation from the classic model of distribution (Figure 14) and this will no doubt re-evaluate the television audience (Livingston, 2009). According to Havaness and Lau (2021), there has been a steady decline in audience experienced by linear television over the years. The device platform and OTT TV has both gained a large share of viewership and usage. Consumers have found it easy to make a shift from linear TV to OTT TV due to the low cost of entry to Netflix, Showmax, Amazon Prime and others, coupled with the large and growing digital content libraries.

This new technology fixed on the internet, has made the distribution of audiovisual content less complicated in recent years. This evolution is altering the playing field of the players in the television value chain (Firrester, 2011). With OTT, the previous distribution technologies like terrestrial or satellite are circumvented. The distribution does not go through the multiple service operators, but on top of the existing infrastructure. OTT provides the viewers with control over content and user experience, and it provides ad-free content by enabling subscription services.

Figure 14 show the main difference between OTT and traditional video business models.

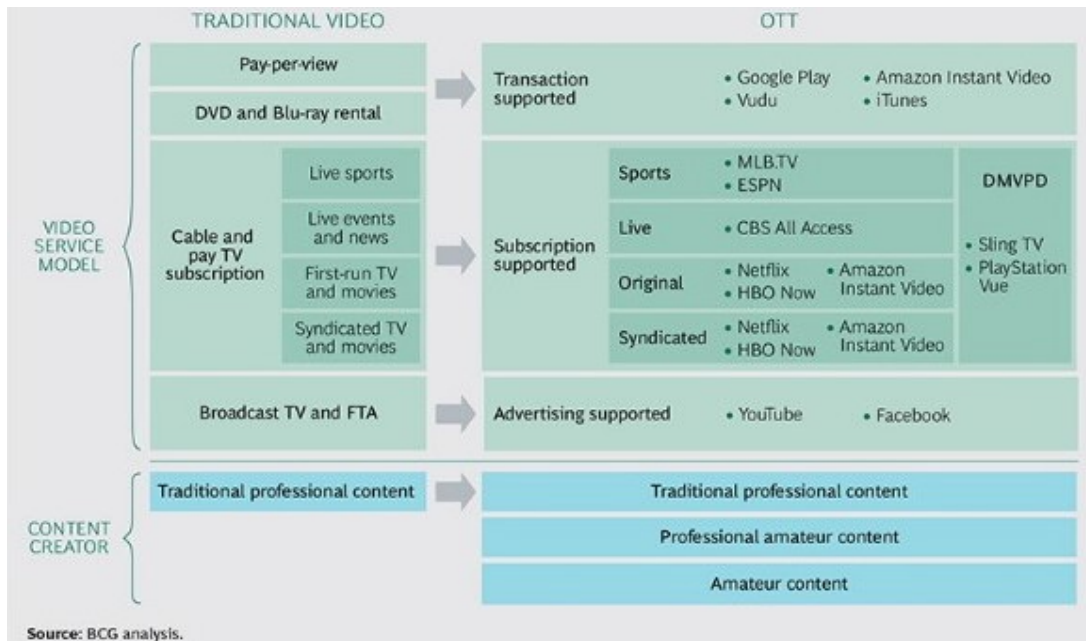


Figure 14: Traditional Video and OTT business models (BCG, 2016)

Figure 15 shows main difference between linear TV distributions of content and OTT content distribution. In a linear distribution, the TV signal is one directional from the broadcaster as opposed to OTT, where content distribution is usually through streaming to multiple devices simultaneously or video on demand. Arolovitch (2015) has noted an increase in the number of consumers that are streaming or downloading video programming such as movies and TV shows, by using OTT video services, while at the same time unsubscribing from pay television channels. This suggests that the business models of traditional television service providers are under constant threat (Alleman, Banerjee & Rappoport, 2014).

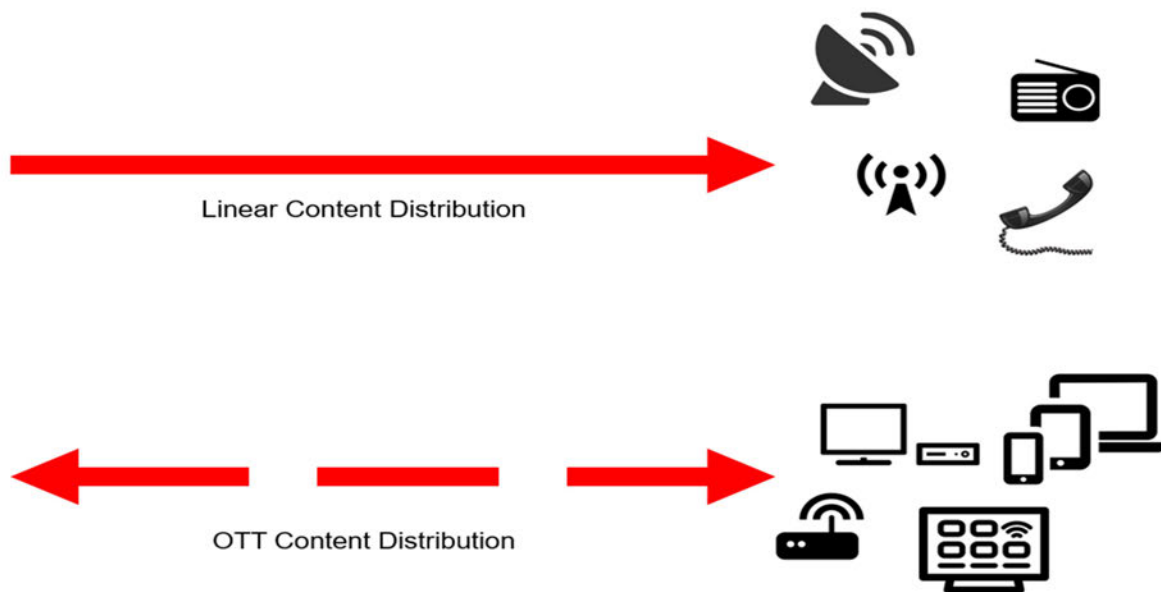


Figure 15: Linear versus OTT content distribution (Guggiola, 2018)

A recent study on the impact of Over-the –Top television services on pay television subscription services in South Africa (Tengeh & Udoakpan, 2020) ) has found that a growing number of consumers are now ditching their pay TV services and going wireless using the Wi-Fi route to access OTT services. Over-the-Air (OTA) services are still popular in some rural areas of this country because they are free to access as opposed to the cost of data involved in accessing the OTT services (Pillar, 2019).



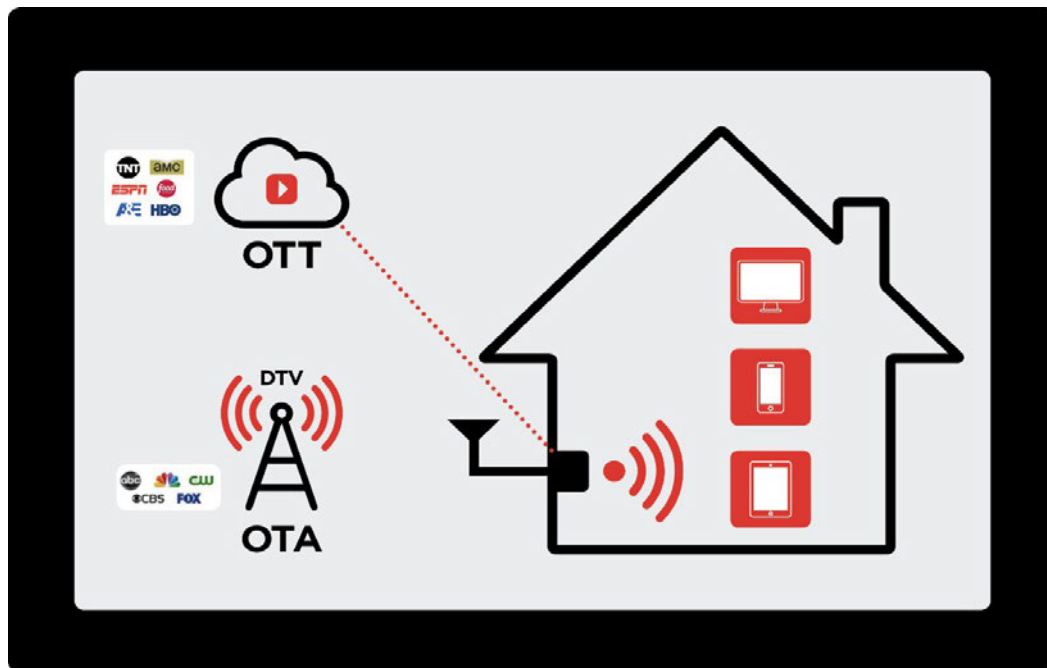


Figure 16: OTT and OTA content distribution (Pillar, 2019)

### 3.5 Pay-per-View (PPV)

This is a broadcasting method by which a television audience can purchase video content or an event to view via private telecast of that specific event direct to their homes. These events are shown by the broadcaster at the same time to those who have made a purchase. Viewers have no choice with regard to the viewing times, and these events may include movies, sporting events and adult content movies.

### 3.6 Streaming

The term 'streaming' in relation to computing was first used in the 1970s, and in 1991, the first long-distance audio streaming took place (Spilker & Hoier, 2013). This is the period that saw rapid development of audio streaming technology and the mushrooming of internet radio as a low budget add-on (Atton, 2004). More initiative in the distribution of online content took place around the early 2000s when Apple launched iTunes as a download service, followed by more user generated content (UGC) like MySpace and YouTube.

Strangelove (2015) describe the advent of streaming as a shift that is termed post TV era; however, digitization also made it possible for innovative streaming solutions for text-based media likes newspaper, e-books, and magazines.

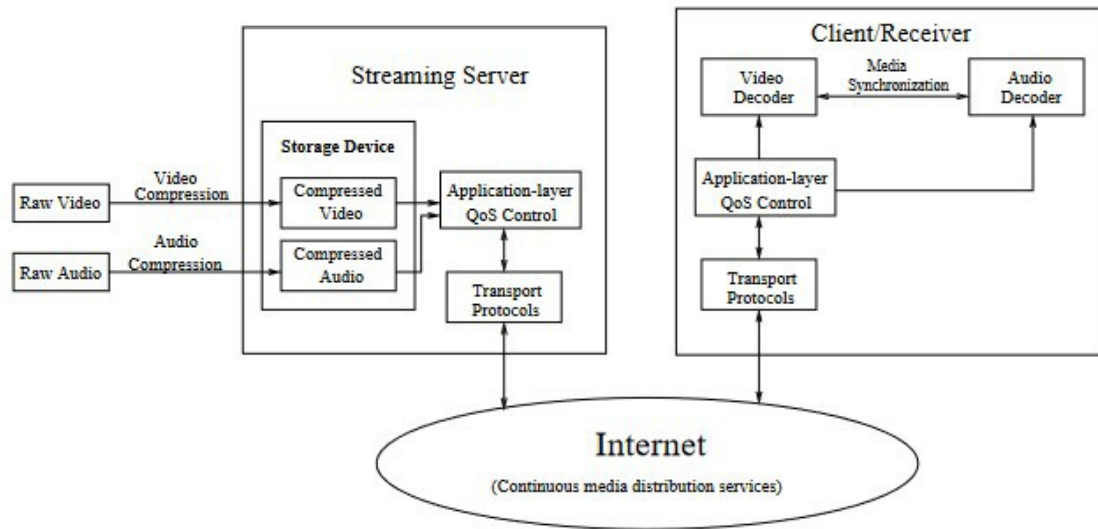


Figure 17: Architecture of video streaming (Wu, 2001)

Figure 17 describes the video streaming architecture where the video content resides in the server which is directly connected to the internet. To access the content, the client must be connected to the internet first and then choose their preferred content.

The latest data from PWC indicates that more people are warming up to the idea of streaming due to the freedom that video streaming has to offer compared to traditional TV. The results of this study were consistent with the survey by Deloitte (2018) which found that younger people are now spending time streaming videos than watching linear TV. As often is the case with new technology, younger people are showing more interest in the adoption of video streaming and are moving away from the traditional way of Television viewing. Netflix, which is the biggest distributor of online content, has an impressive selection of new titles every month, with a growing library of premier original programmes.

### **3.6.1 Live video streaming**

Live streaming is form of online communication and transmission mode of collecting, releasing and watching video content at the same time in real-time over the internet (Wang, 2017). Another definition of streaming is provided by Colbjornsen and Spilker (2020) as the transmission and retrieval of digital content that is stored and processed on a remote server. The transmission of this content takes place through 'packet switching', implying that the transfer is in a steady and continuous stream on open and uninterrupted lines. Streaming provides a limitless way of distributing and consuming media content to consumers of digital content (Colbjornsen & Spilker, 2020). This content is digitally stored temporarily in the cache, and not in the hard drive of the user's device. The downside of this solution is the stream that lags and buffers when we least expect.

Streaming remains an integral part of online content distribution and has affected all form of traditional media industries. Figure 18 show an example of live video streaming.

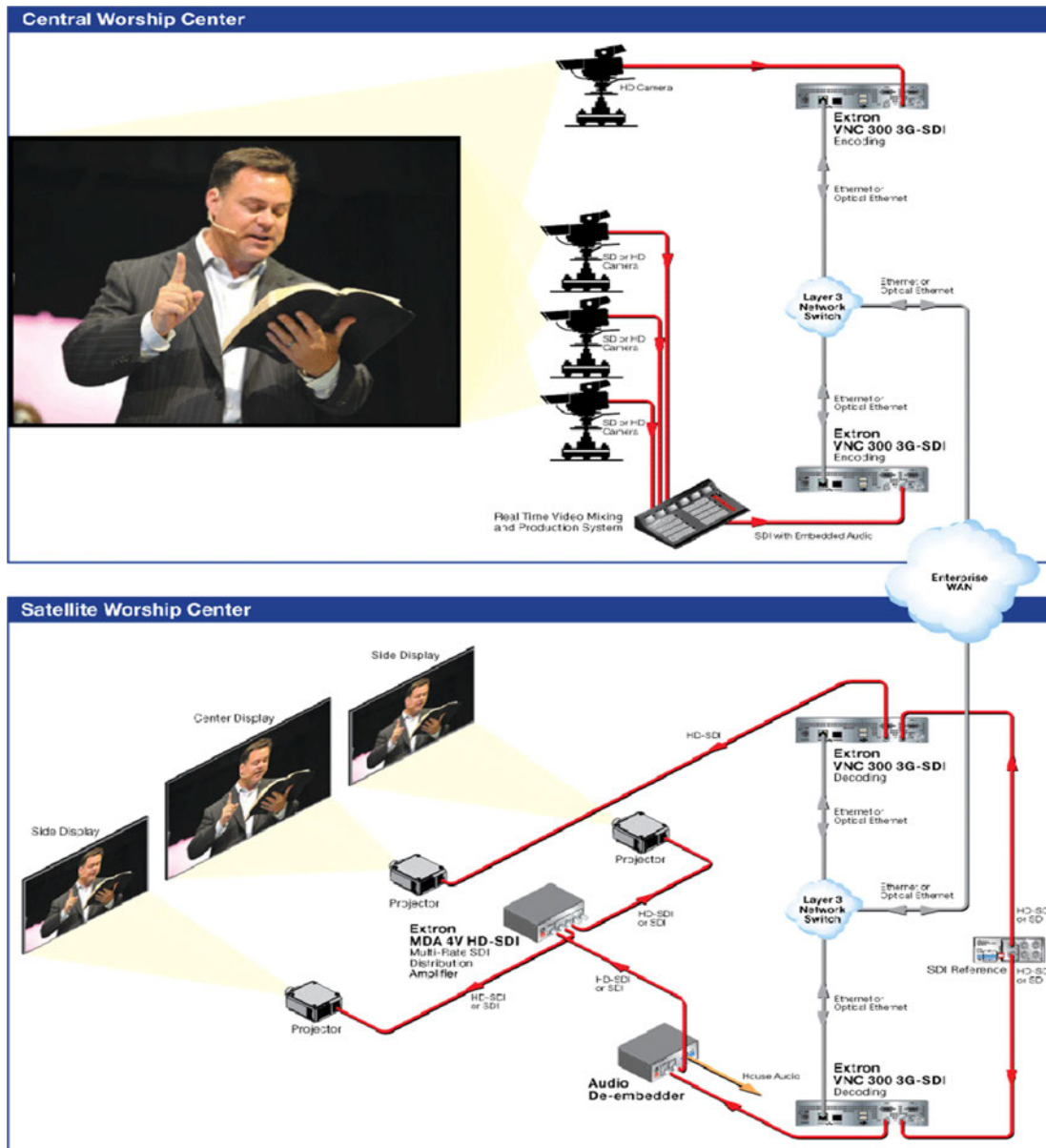


Figure 18: Real-time video streaming (Extron, 2018)

### 3.6.2 Video on demand

The internet video has gained popularity in the past decade, and video-on-demand (VoD) in particular has become a part of the citizen's daily lives (Cha, 2015). VoD is an online video subscription services that allows a viewer to watch as and when they so desire. The video is streamed as content to a viewer's device. Currently, there are different VoD technologies and business models that are available. I discuss a few of them next.

A recent study by Ericssons (2015) has revealed that watching on-demand video content is growing; however, linear TV popularity remains high. Figure 19 is a picture showing the video-on-demand services. A consumer is presented with a variety of video content to select from at a cost which may be high for linear television viewers.



Figure 19: Video-on-demand (tech-central, 2016)

Near Video-on-Demand (N-VoD) is a digital video delivery service that allow a viewer to choose from a restricted site a number of broadcast video channels when they are broadcast. They are part of pay per view services delivered by cable or satellite broadcast and have pre-designated schedule times (Palacin, 2015). These times normally ranges between five to thirty minutes depending on the infrastructure provider. The disadvantage to the broadcaster is that the technology is very costly to run as it requires that the same movie be delivered to multiple channels on different times and frequencies.

Lee (2015) highlighted some of the main issues with N-VoD technology:

- There is little video selection for consumers because of the bandwidth requirement. However, this problem has been overcome by the roll-out of fibre to the homes (FTTH).
- The technology does not offer interactive control and as a result, the viewer cannot pause the movie and continue watching again when they are ready to

watch. This means that the viewer has to wait for another start time to continue to watch.

- Lee further discovered that more than 52% of the viewers aged between 35 and 45 have shown willingness to adopt this technology only if it offers interactivity and can allow them to pause and re-start at any point during the movie.

### **3.6.3 Subscription-video-on-demand (SVOD)**

Television has always been watched for social purposes and leisure, together with family and friends. A recent study that was done on university students showed that TV is not time-critical anymore and viewers are no longer watching TV for social reasons, but for entertainment (Batkhuus, 2015).

Subscription video-on-demand (SVOD) is a service streamed or downloaded from the internet and offer content for a subscription fee. The SVOD service providers have in recent past been increasing their audience through high quality content (Deloitte, 2014). Since the arrival of SVOD, the quality of television content has increased substantially (Nakono, 2015) and the technological improvements made it easy for the SVOD services to be delivered to customers across the multitude of platform and devices (Jenner, 2016). The drawback of SVOD in South Africa is that currently it does not offer current affairs and sports.

## **3.7 Chapter Summary**

The chapter provided overview on the innovation around content delivery. Online content can be received in the form of video, audio, text and multimedia. The process of digitization has created options for television content across a multitude of platforms. These options have created problem for linear television services as viewers or consumers of content have made a shift to online platforms like OTT. The use of OTT is expected to continue the rise, while linear TV is likely to be used mainly for events and background viewing. There is a shift in audience preferences away from the mainstream television towards OTT platform, and content providers should understand what attracts audience to their products.

## **CHAPTER FOUR**

### **MODELS AND THEORIES APPLIED IN ACCEPTANCE AND USE OF TECHNOLOGY**

#### **4.1 Introduction**

Chapter Four looks into different technology acceptance models that help researchers predict the adoption of information technology. This study's conceptual model is the extended UTAUT model, and this chapter will discuss the evolution of other models leading to the extended UTAUT model. The diffusion of technology into communities plus different types of adopters together with their characteristics is discussed in this chapter.

Simon (2001, p. 179) defines acceptance as "antagonism to the term refusal and means the positive decision to use an innovation". Adopters of an innovation are the decision-makers who ought to be aware of factors influential to their making a decision of using (Mathieson, 1991). The technology acceptance model and theories are applicable in various studies to understand and predict users' behaviour, such as computer usage.

#### **4.2 Technology adoption and diffusion theories**

Studies of how and why users accept and use technology continue to draw interest amongst researchers. Various models and theories have been applied across various areas or research resulting in their modification, extension and integration into the information system research (Venkatesh et al., 2003).

Examples of these integration, modification and extensions include the integration of gender and subjective norms into the technology acceptance model (TAM) by Venkatesh and Morris (2000) in understanding whether gender has an influence in the adoption of technology.

Researchers are often confronted with a problem of choosing the model and constructs that is appropriate and relevant to their research objectives. Since there is

so many models to choose from, researchers often find themselves choosing the “favoured model” instead of an appropriate model, thereby ignoring contributions from other alternate models (Venkatesh, 2003). In trying to address this problem, Venkatesh et al. (2003) sought to review the eight prominent models which ultimately gave birth to the Unified Theory of Acceptance and Use of Technology (UTAUT) model. This model, UTAUT, elucidates the user intentions to use an information system and ensuing usage behaviour. The model holds the theory that there are three direct determinants of the usage intention and behaviour, the fourth is a direct determinant of user behaviour. These four determinants or constructs are Effort Expectancy (EE), Performance Expectancy (PE), Social Influence (SI and Facilitated Conditions (FC). The theory further states that the relationship between the four key construct and the intention and use behaviour is moderated by Age, Gender, Experience and Voluntary of Use.

The reviewed models and theories have all been validated and tested to elucidate the acceptance and usage of technology from the users’ viewpoint.

The following section provides a review of the key models and theories used in the acceptance and use of technology.

#### **4.2.1 The theory of reasoned action (TRA)**

This model was established by Azjen and Fishbein (1975) from their social and psychological research. Psychology uses the three main reasoning components, mentioned below, to predict human behaviour;

- Social norms (unwritten rules of conduct that are considered acceptable in a group or society).
- Attitude (defined as un-favourableness or favourableness of a person's feeling or behaviour).
- Intentions (described as individual’s decision to execute or not to execute a behaviour).



This human behaviour, according to Azjen and Fishbein (1975), should be voluntary, systematic, and rational. Predicting behaviour has been a significant objective of psychological theories, and some of these theories have been excellent in predicting human behaviour (Chang, 1998). The TRA makes the assumption that the behaviour under investigation is based on volitional control, which means that people believes that they can execute the behaviour whenever they are willing to do so.

According to Ajzen and Fishbein (1975), there are two main factors that influence the behavioural intention; these are attitudes shown by the user towards behaviour, and subjective norms which are determined by the perceived social pressure from other members of the community, which influence their behaviour to perform in a certain manner. These two factors were found to have influence on the users' behavioural intention to use a technology. Several studies that were done did confirm the existence of a correlation of attitude and subjective norms to behavioural intentions (Hartwick, Sheppard & Warshaw, 1988; Coursaris, Sung & Swierenga, 2010; Olarte-Pascual et al., 2015).

Like any other study, this theory was criticised by other researchers who did not support behavioural intention as the adequate predictor of behaviour. Ajzen (1991) improved the predictive power of the TRA by making an extension of the theory and developed the Theory of Planned Behaviour (Figure 4.2).

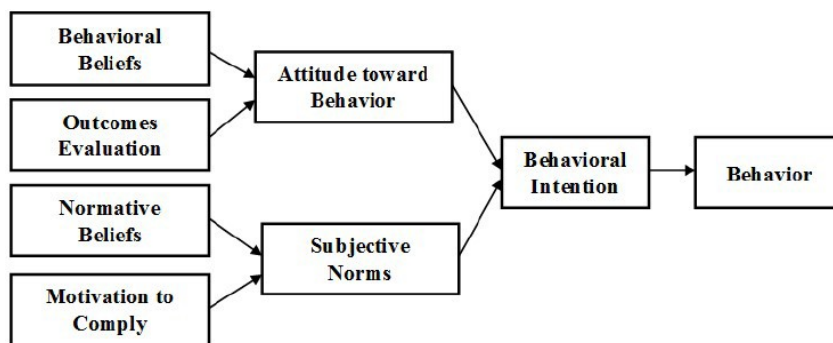


Figure 20: Theory of Reasoned Action (Fishbein, 1975)

#### 4.2.2 The Theory of Planned Behaviour TPB

The theory came into being as an extension of the TRA model, which had low predictive power on behaviour. The extension saw the addition of a novel construct called perceived behavioural control to the original TRA model. This construct explains the perception by an individual of how easy or how difficult it is to perform behaviour (Ajzen, 1991).

In the TPB model, attitude and subjective norms can still explain the individual's behavioural intention. Results by Semin and Fiedler (1996) suggest that using the perceived behavioural control (PBC) leads to improved predictive power of behavioural intention.

The PBC has a direct influence on the actual behaviour and an indirect effect through the behavioural intention. The behavioural intention in the TPB is impacted upon by perceived behavioural control, subjective norm and behavioural attitudes. The following limitations were identified in this model;

- Attitude towards information system becomes irrelevant if the computer system (technology) is not accessible.
- The model accounts for 37% of the variance in the behaviour.

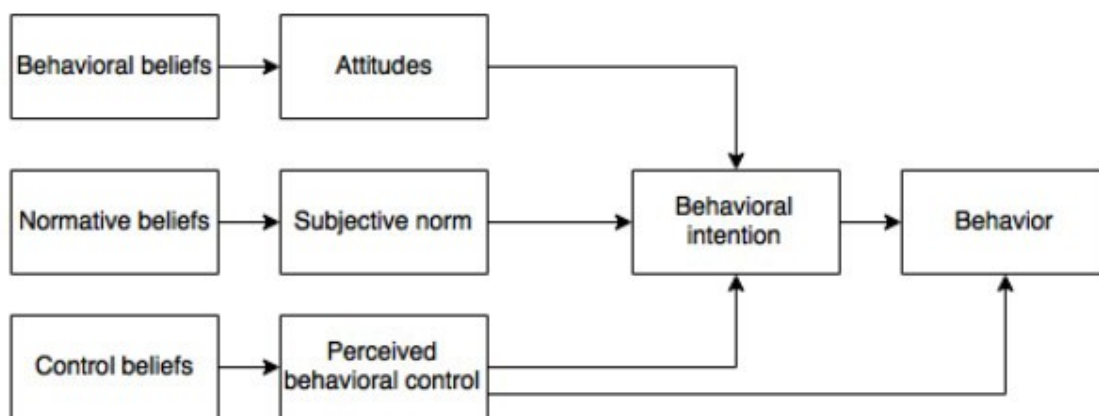


Figure 21: Theory of Planned Behaviour (Ajzen, 1991)

The recent studies on TPB focused on the reasoned action approach (RAA) which is splitting the subjective norms, attitude and perceived behavioural control into two components (Fishbein and Ajzen, 2010).

#### **4.2.3 Theory of interpersonal behaviour (TIB)**

The theory was proposed by Triandis in 1977 as a theoretical alternative to the TRA and TPB. It recognises the role of emotions and habit in developing intentions to perform behaviour. The previous models had weakness which are overcome and addressed in the TIB by addition of habit, affect, facilitated conditions and emotions. The original model (TRA) did not include the actions over which people have incomplete volitional control, hence it was revised and modified to Theory of Planned Behaviour (TPB).

The difference between Fishbein and Triandis models lies in the variance accounted for. The former accounted for the most variance with fewer variables, whereas the latter was so interested in accounting for the total variance. Since TIB account for the total variance, it becomes the most desirable and reliable model to use in predicting behaviour compared to the other two. In TIB, roles, interpersonal agreements, and self-image are considered, while habits and facilitated condition are taken into account as intervening between intention and behaviour. Triandis (1997) recognised that emotions and social factors play a critical role in forming intentions. This model was found to have more explanatory powers than the TPB and TRA, yet is being constantly overlooked. All the aspects of the TRA and TPB are included in this model and also additional construct (Habits, facilitated conditions and affect) that helps to advance the TIB's predictive power.

TRA was applied in many studies on behaviour post-2000, including adoption of telemedicine by physicians (Cloutier, Gagnon, Godin & Fortin, 2006), the use of internet in the workplace for non-work related (Kankahall, Pee & Woon, 2008), the abuse of internet in the workplace (Woo & Pee, 2004).

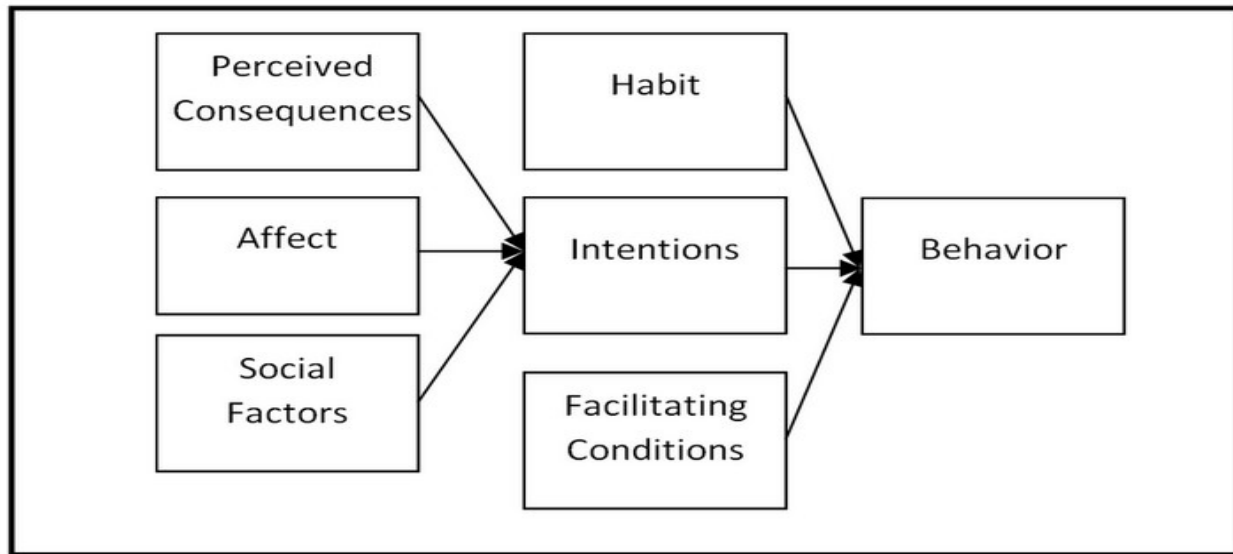


Figure 22: Theory of Interpersonal Behaviour (Egmond and Bruel, 2007)

#### 4.2.4 The Technology Acceptance model (TAM)

Davies (1996) proposed this model as an alternative to the TRA and other previous models with the aim of providing an explanation and predicting the users' acceptance behaviour of new technological innovation.

Previous studies (Kaplanidou and Vogt, 2006; Hsu and Lin, 2003; Morosan & Jeong, 2008; Baier & Stuber, 2010; Wang & Foxall, 2011) used TAM to investigate the users' intention and use technology such as internet, online shopping, website and blog to name a few. According to Davis, social influences and the subjective norms discussed in previous models do not fit into a technological concept of acceptance and adoption. He instead uses the concept of external variables Perceived ease of use (PEOU) and perceived usefulness (PU) to explain the adoption of a new information technology. Davies went on to define PEOU as "the degree to which an individual believes that using a particular system would be free of physical or mental effort". PU was defined as "the degree to which an individual believes that using a particular system would enhance his or her job performance". Davis makes the following argument that when the system is easier to use, "the overall job performance will be improved". Between the two determinants (PU and PEOU),

perceived usefulness has been revealed as the leading factor in determining intention to use.

The TAM's limitation is that the social influence aspect is ignored, hence the model cannot be used beyond the workplace. This study is not conducted in a workplace setting hence the application of the TAM will not assist in the determination of this study's objectives. Improving the specificity, the explanatory power and the adaptivity of the TAM, new constructs were added as an addition to the TAM model. A comparative study by Gentry and Calantone (2002) of TAM, TPB and TRA in examining behavioural intention to use, revealed that TAM model displayed a variance of 81.2% of the explanation in behavioural intention, while TRA could only explain 43.2% of the variance. The TPB displayed a variance that was between 43.2% and 81.2%. TAM as good as it is in predicting behaviour, does have its own limitation as well, in that it ignores the social influence in the field of technology acceptance and cannot be used beyond the workplace. Since this study is not conducted in the workplace, TAM becomes irrelevant in the determination of this study's objectives.

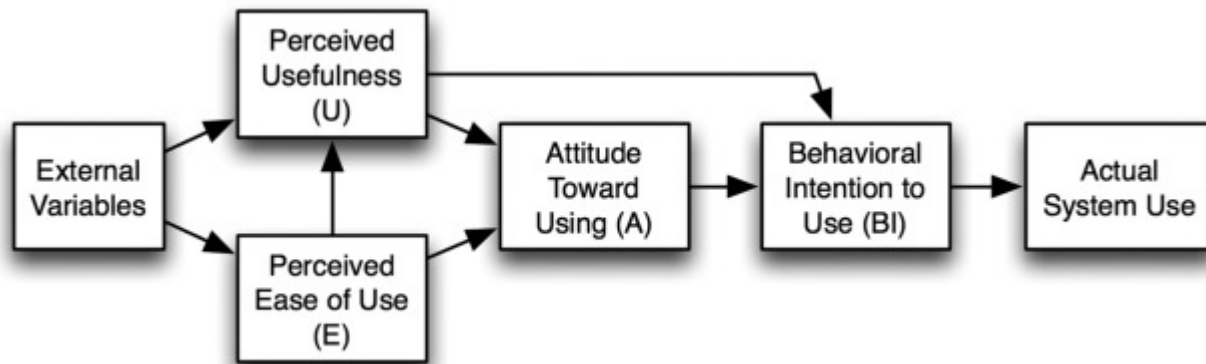


Figure 23: Technology Acceptance Model (Davies, 1996)

#### 4.2.5 Social Cognitive Theory (SCT)

This theory deals with how citizens process, store, and apply information about other people in the social situation. It describes how the experience of individuals, the actions of others, and the environmental factors influence their behaviour. This theory was proposed by Albert Bandura in 1986 and places its reliant on these three factors: the environment, the person and the behaviour. The environmental factor in

this model is external to the individual and includes both physical and social factors. The behaviour factor deals with usage, adoption and performance issues, while the personal factor places focus on cognitive, personality and demographic aspects that characterise a person. These factors together can better predict both individual and group behaviour (Pajares, 1996). According to Bandura (1986), "people are neither driven by inner forces nor automatically controlled by external stimuli".

The theory, as a limitation, assumes that environmental changes influence changes in a person's behaviour, which is not entirely true. SCT does not explain the extent to which these three factors influence behaviour, and which factor is more influential than the other. Instead, the theory places focus on the process of learning, thereby disregarding biological and hormonal predispositions that may influence the behaviour (LaMorte, 2019).

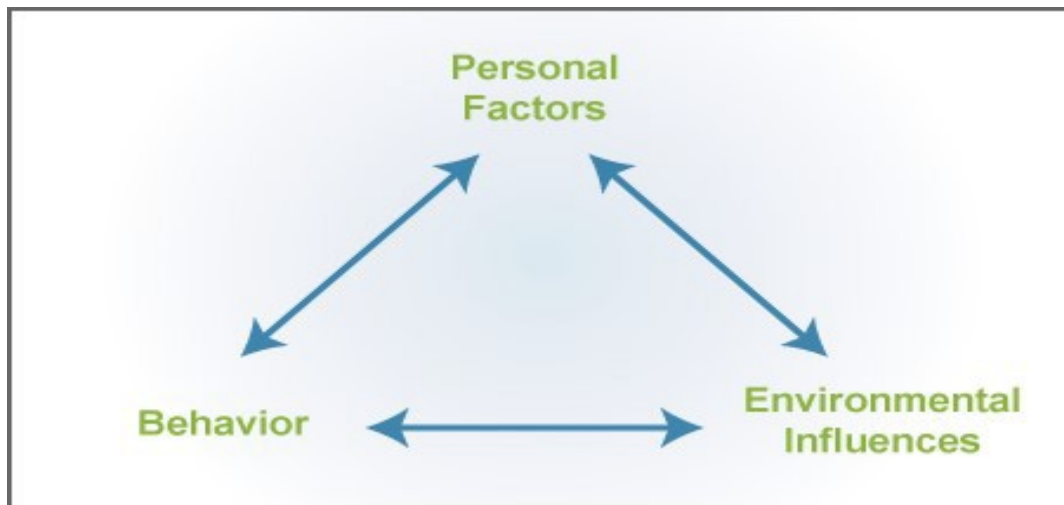


Figure 24: Social Cognitive Theory (Bandura, 1989)

#### 4.2.6 Motivational Model (MM)

This model (MM) was employed by Davies et al., (1992) in studying adoption and use of information systems. The primary assumption of this model is that there are "outer and natural" motivations that merge the behaviour of the adopter (Sharma and Misha, 2014). The outer motivation, also known as extrinsic motivation,

acknowledges that a user of technology wants to be involved and also perform an action because “it is perceived to be helpful in attaining the valued outcomes that are dissimilar from the operation itself”. The natural motivation also known as intrinsic motivation, describe the extent of enjoyment which a person derives from using a technology (Cheng & Yeh, 2009).

Although the motivational model is useful in understanding acceptance and use of new technologies, it explained just between 28% and 62% of the variance in behavioural intention. This further highlighted the need for further research to explore other factors that could improve the explained variance in behavioural intention.

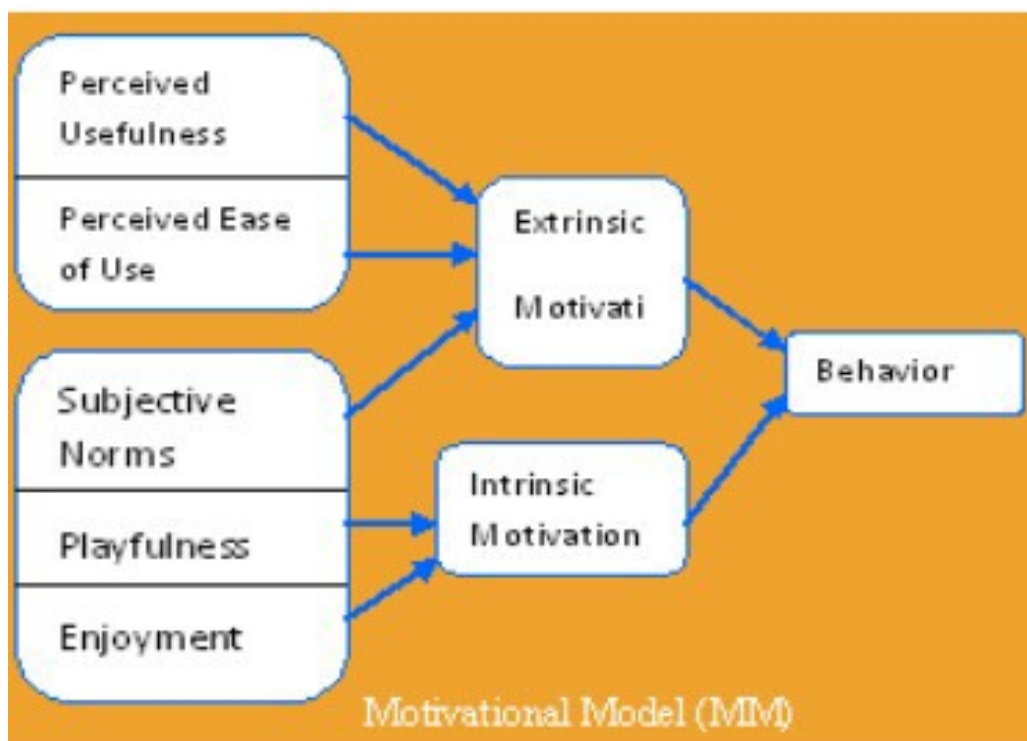


Figure 25: Motivational Model (Davies, 1996)

#### 4.2.7 Model of PC Utilization (MPCU)

Thompson (1991) developed this model from the Triandis theory of personal behaviour with the aim predicting PC utilization. This model seeks to assess the actual behaviour and excludes the behavioural intention, since behaviour is determined by attitudes, social, norms and habits. Furthermore, habits are also excluded in this model because of their repetitive relationship in the context of PC



utilization. The PC utilization model is mostly applied in the evaluation of the direct influence of effect (individual's feeling), facilitating conditions, social influence, job fit on behaviour and perceived consequences.

As a limitation, this model was criticised for being unable to explain computer utilization behaviour in a voluntary context with an explanatory power of 24%.

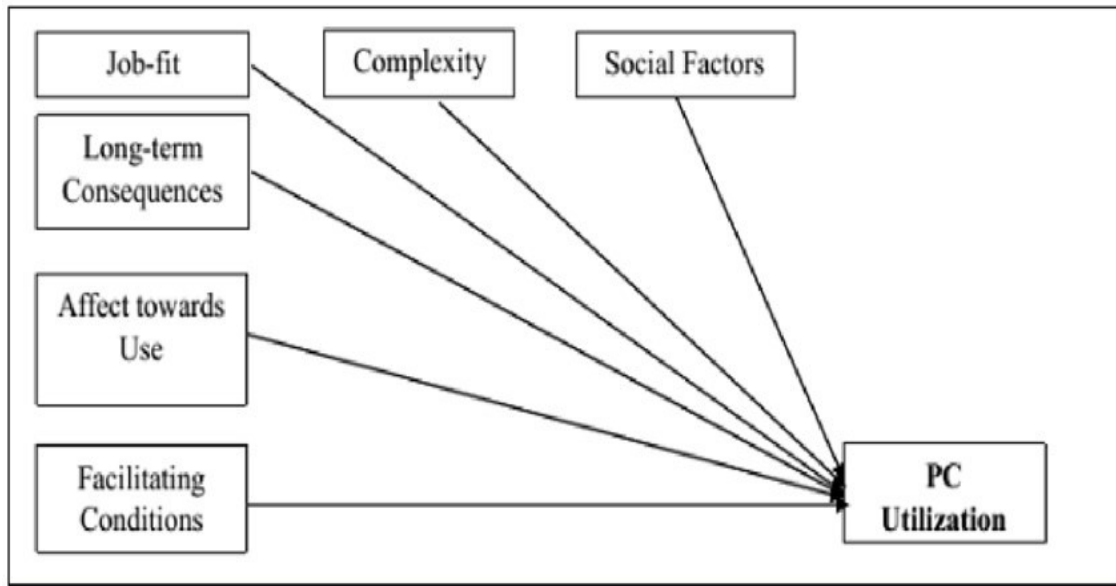


Figure 26: Model of PC Utilization (Thompson, 1991)

The definitions of MPCU constructs are outlined by Thompson (1991):

- Job-fit: refers to “the extent to which an individual believes that using [a technology] can enhance the performance of his or her job”.
- Complexity: is “the degree to which an innovation is perceived as relatively difficult to understand and use”.
- Long-term consequences: described as “Outcomes that have a pay-off in the future”.
- Affect towards use: explains the “feelings of joy, elation, or pleasure, or depression, disgust, displeasure, or hate associated by an individual with a particular act”.
- Social Factors: refer to “individual’s internalization of the reference group’s subjective culture, and specific interpersonal agreements that the individual has made with others, in specific social situations”.

- Facilitating Conditions: refer to "provision of support for users of PCs...may be one type of facilitating condition that can influence system utilization."

#### 4.2.8 Unified Theory of Acceptance and Use of Technology (UTAUT)

UTAUT model is the integration of the contributions made by previous models, which held that the direct determining factors of behaviour and usage intentions were the four key constructs: Effort Expectancy (EE), Performance Expectancy (PE), Social Influence (SI) and Facilitated Conditions (FC), plus four moderators (Gender, Age, Voluntary of Use and Experience, together with two endogenous variables (Behavioural Intention, and Use). Previous research by Venkatesh (2003), Sharma and Mishra (2014), Al-Qeisi, Dennis, and Alamanos (2014) found that Effort Expectancy, Performance Expectancy and Social Influence have a positive effect on the behavioural intentions to use technology, while the use of technology is influenced by the facilitated conditions and behavioural intentions. The four moderators of age, gender, experience and voluntariness of use were created to balance the impact of the four key construct on behavioural intentions (Alwahaishi, 2012).

The UTAUT model is often used by managers in evaluating the "capacity of success" for new technological capabilities and also to better understand the factors of technology acceptance (Sharma and Misha, 2014).

Theory/Model	Constructs (Independent variables)	Moderators
Unified Theory of Acceptance and Use of Technology	Performance Expectancy Effort Expectancy Social Influence Facilitated Conditions	Gender Age Experience Voluntariness

Table 1: Core constructs of the UTAUT Model

Venkatesh et al. (2003) found that the UTAUT model accounts for 70% of the variance in the behavioural intention and 50% in the actual usage. This model fits well within the aims and objectives of this study due to its explanatory power.

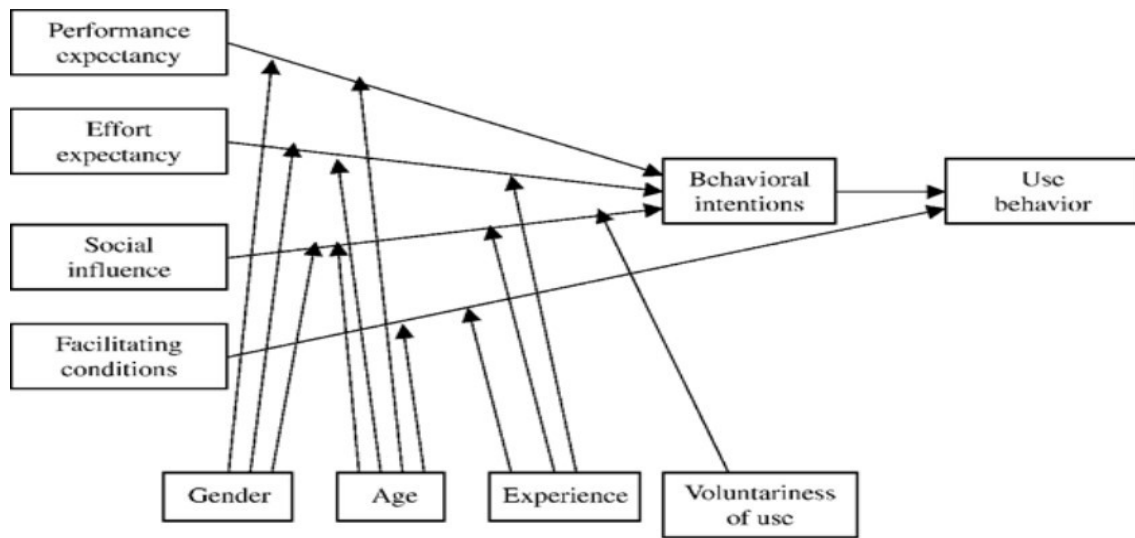


Figure 27: UTAUT Model (Venkatesh et al., 2003)

Table 2 presents summary of the historical evolution of prominent technology acceptance model from innovation diffusion theory (Rogers, 1962) to UTAUT-2 by Venkatesh, Thong and Xu (2012).

<b>Theory /Model</b>	<b>Acronym</b>	<b>Author</b>	<b>Definition</b>
Innovation Diffusion Theory	IDT	Rogers (1962)	Describe as the innovation-decision process.
Theory of Reasoned Action	TRA	Fishbein and Ajzen (1975)	Describe as adaptable behavioural theory and model the attitude-behaviour relationships.
Social Cognitive Theory	SCT	Bandura (1989)	A learning theory derived from the idea that people learn by observing others.
Technology Acceptance Model	TAM	Davis (1989)	A model that involves psychological factors affecting technology acceptance.
Extended Technology Acceptance Model 2	TAM2	Venkatesh and Davis (2000)	TAM2 includes two theoretical processes that cover social influence processes and cognitive instrumental processes to explain the effects of the various determinants on perceived usefulness and behavioural intention.
Theory of Planned Behaviour	TPB	Ajzen (1991)	This theory is to foretell an individual's purpose to seize in the behaviour at a particular time and place.
Model of PC Utilization	MPCU	Thompson, Higgins and Howell (1991)	This model predicts PC utilization behaviour.
Motivational Model	MM	Davis, Bagozzi and Warshaw (1992)	This model is widely used by researchers in psychology.
Combined TAM and TPB	C-TAM-TPB	Taylor and Todd (1995)	This model is determining of influence of social and control factors that are not in TAM but exists in TPB.
Unified Theory of Acceptance and Use of Technology	UTAUT	Venkatesh, Morris, Davis and Davis (2003)	Aims to explain the intentions of the user to use an information system and the subsequent behaviour of users.
Unified Theory of Acceptance and Use of Technology 2	UTAUT2	Venkatesh, Thong and Xu (2012)	UTAUT2 extends the UTAUT with the main objective the new constructs could give a better

Table 2: Summary of prominent technology acceptance model (Ishak, 2015)

Table 3 summarises the limitations of the reviewed model and theories. These limitations led to the development of the next model.

Theories	The Limitations of Reviewed Theories
Innovation Diffusion Theory (IDT)	The theory then explains the results of innovation factors and predicts the rate of innovation, but this theory did not mention how the attitudes affect the decision of acceptance and rejection meaning how innovation influences the decision, this can sum up that this theory does not care about individual resources or social support for new behaviours
Theory of Reasoned Action (TRA)	This resulted in a general model that was not designed for a certain behaviour or related technology, limited to predicting certain behaviours, and also intended to agree on a time for action, target, context, and prediction. In other words, this theory is limited because it fails to mention another variable that is affected by the intention of behaviour
Social Cognitive Theory (SCT)	It is organised irregularly especially when it concerns the study of the relationships between individual behaviour and the environment. Not really good at understanding which of these is more influential than the other. The study originally focuses on the learning process, not on motivation that affects behaviour, without taking past experience and expectations
Technology Acceptance Model (TAM) & Technology Acceptance Model2 (TAM2)	Both theories focus only result from two (2) core constructs without providing other variables that will shoot up the adoption of integration, flexibility, information richness, and dollars in information. The theory did not specify how beliefs influence behaviour
Theory of Planned Behaviour (TPB)	The model did not explain the individual's mechanism and how it relates to the model, the variables explained how other variables influenced behavioural intent and motivation
Model of PC Utilization (MPCU)	The theory explains the success in understanding the behaviour of users using computer behaviour but has not explained the complexity and indirect impact on perceived short-term effects
Motivational Model (MM)	The model applies only to students of motivation, learning and health care but is not effective in applying technology to use and acceptance
Combination of Technology Acceptance and Theory of Planned Behaviour models (combined TAM-TPB)	The combination did not take planning factors for the behaviours of an individual. Though subjective standard added from TPB and discerned ease of use from TAM added, but the theory was not fixed
Unified Theory of Acceptance and Use of Technology (UTAUT)	The theory excludes the subject of variance in behavioural intentions or driver of behaviour. This leads to the theoretical weakness in the most reinforced forecasters that the utility is stylish. Lack of user usage results that cannot measure and focus only on time and effort

Table 3: Summary of limitations on reviewed models and theories (Lee, Kozar& Larsen, 2013)



Figure 28 summarises the evolution of the theories and models that lead to the UTAUT model. The theory of reasons action (TRA) was the first model to be modified in 1975, while UTAUT was extended to UTAUT2 in 2012 by Venkatesh in a consumer context. Additional constructs that were added to the UTAUT model are Hedonic motivation, price value and Habit. Venkatesh et al. (2012) found that UTAUT-2 provided more satisfactory explanatory power than UTAUT.

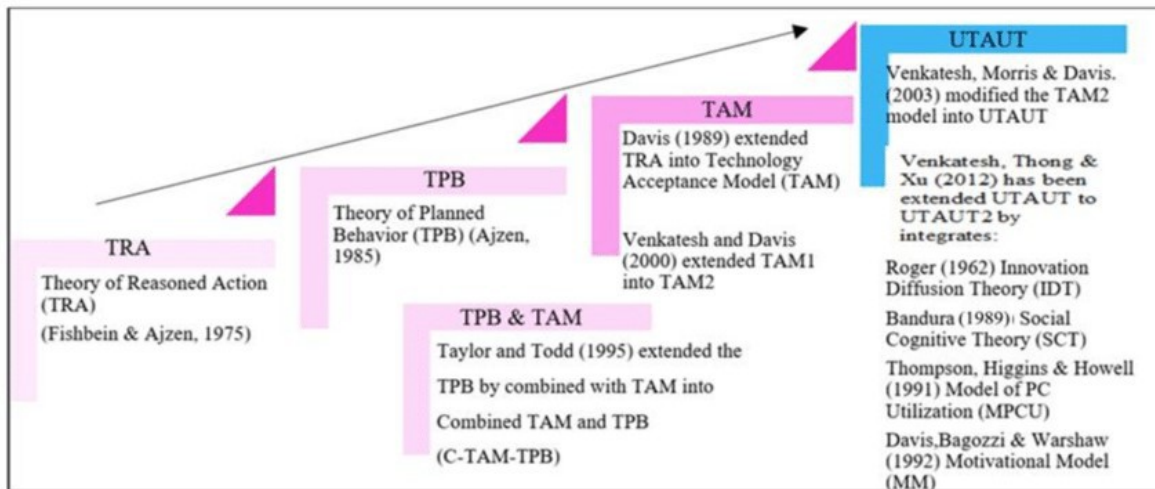


Figure 28: Evolution process between the previous technology models (Researcher's findings, 2017)

### 4.3 Diffusion of innovation theory (DIO)

The DIO theory is mostly used to explain how and why a product, service, or process diffuse through a population or social system. The theory was made popular by Rogers in 1962 when studying the rate of product diffusion. This theory unlike other previously discussed models does not seek to persuade individuals to change, but rather considers change to be the reinvention of product and behaviour (Rogers, 2003) in meeting the needs of individuals and groups. The theory explains how a product innovation gains momentum over time and diffuses through population or a social system. In this study, the product innovation is the set-top box (STB), which is a device that converts video content to digital signal.

Rogers (1995, p. 21) describes innovation as an idea, practice or method that is professed new by consumers. In this research, diffusion refers to how information regarding a particular technology (STB) is transferred to the citizens or consumers of that technology. For example, if an entity wants to communicate information about its new product innovation, it will most probably utilize the media to diffuse the information to the consumers to let them know about the existence of such a product. Initially, the consumer will have doubts about the innovation because it's new, and the degree of uncertainty will exist (Rogers, 1995). Roger continues to state that if the product's position is known, then the diffusion process can be managed by focusing on the people difference. Past research has found that consumers do not adopt a new technological practice at the same rate (Roger, 1995) cited by Mogale, (2012). There are five categories of adopters, and below is Roger's summary of these adopters.

1. **Innovators:** These are people who want to try an innovation first, are interested in new ideas, venturesome and are risk takers. No effort is needed to encourage them to try new innovations.
2. **Early adopters:** This category is representative of opinion leaders and is discreet in their adoption choices than innovators. They acknowledge the need to change and are comfortable adopting new ideas. They exhibit a high likelihood of holding a leadership role in a social system and as a result of that, many people are relying on them for information and advice about technological innovations. They share their subjective evaluation of an innovation through their interpersonal networks. They are a group that has reasonable high social status together with access to finance. Most of the early adopters have high education level and their approach to risk is reasonable. To appeal to this group, a "How to" manual and an information sheet are needed.
3. **Early Majority:** They are the kind of individuals who very seldom display leadership, but tend to adopt new technology before an average consumer. They believe in seeing evidence first that the innovation is working before they can make a decision to adopt. They display deliberate intention to adopt innovation, and are "neither the first not the last" to adopt innovation. It is

believed that 34% of adopters fall under this category. Strategies used for appealing to this group of adopters include listening to success stories and seeing evidence of how effective the innovation is.

4. **Late Majority:** This category of adopters is doubtful of change and would prefer to embrace an innovation long after it has been tried by the majority in the social system. Although they display scepticism about an innovation, peer pressure and economic necessity may ultimately lead them to the adoption of new technology. They are also interested in the number of people who have tried and adopted the innovation successfully.
5. **Laggards:** This group of adopters is mostly conservative and bound by traditional values. They are very critical of new innovations, are sceptical of change and will most likely adopt an innovation once it has become a leading or mainstream technology. They have limited resources at their disposal and lack the awareness and knowledge about the new innovation.

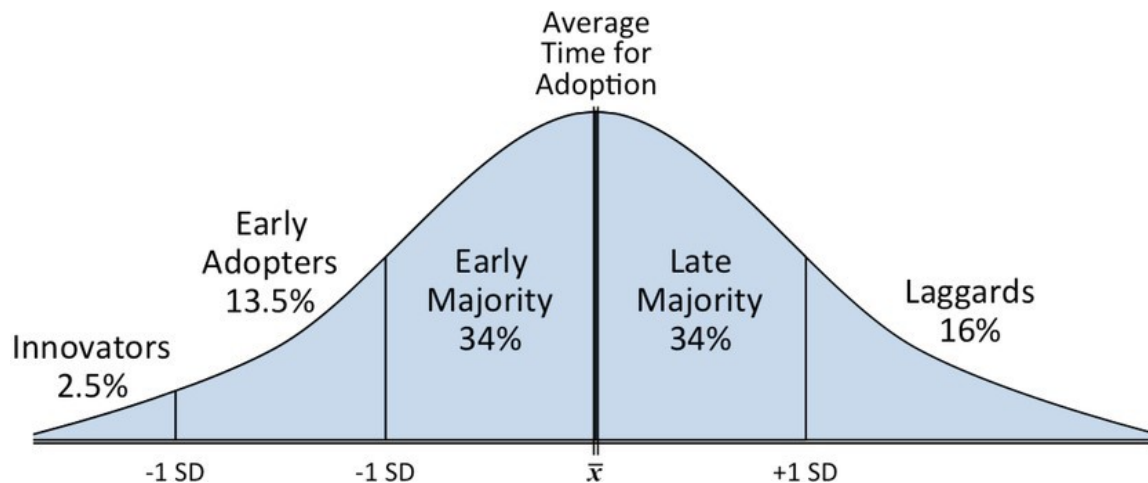


Figure 29: Category of technology adopters (Rogers, 2003)

#### 4.3.1 Product characteristics that affect the rate of technology adoption

The adoption rates of technology are affected by four main product characteristics, as explained by Day and Shoemaker (2000):

- The first is the perceived advantage of the new product relative to the best available alternative. In the case of set-top boxes, successful adoption, the



benefits must outweigh the perceived relative costs by a margin sufficiently compelling to motivate the switch from old technology product to the new one.

- The second characteristic is the risk perceived by buyers because of their uncertainty about performance, fears of economic losses, or concerns about changing standards.
- The third characteristic is the hindrance to adoption. A study conducted by Ball State University revealed three main hindrances to user adoption of new technological innovations. These were identified as scepticism and unreliability of technology, limited or no time to learn a technology, and lastly lack of support from the social system.
- The last characteristic is the opportunity to learn and try new technology. Over and above learning, the product buyer must also be educated about the perceived benefits and advantages of the new products. Some of the benefits and advantages of digital migration have been listed and explained in the first chapter.

## **4.4 Adoption or rejection of technology**

One of the modern roles of technology is that it expands and enhances human capabilities and conveniences (Mani & Murthy, 2013). The absence of technology can limit the individual's participation in society and create missed opportunities. Some technologies are accepted to a varying degree, while others are rejected with no apparent reasons (Selwyn, 2003). The concept of technology adoption has been well researched, while the rejection of it is yet to be understood (Mani and Murthy, 2013).

The “rejection of technology” is a phenomenon wherein a society adept and capable of availing the service of a specific technology, intentionally avoids using it, whether fully or partly. The scalability and configurability of a technology together with the diversity in social systems result in a technology being designed for a particular market (Bruland, 1995). The rejection or acceptance of a technology is determined at an individual, societal and organisational level and is not influenced by how well the technology has been accepted or rejected in other societies. The process of adopting a technology may have an influence on that particular technology's performance over time. Mani and Murthy (2013) focused on technology rejection at an individual level. Selwyn (2003) recognises that the individual's viewpoint is important in “realistic notion of effective technology access for practice”. Intricacies of how technology presents itself to the user should be understood for it serves as a foundation for understanding reasons for technology rejections. Mani and Murthy (2013) have identified several factors discerning technology rejection, discussed next.

### **4.4.1 Technology Fatigue**

This is described as “a state that occurs when a user becomes confused, indecisive, and overwhelmed when selecting technological or digital gadget” (Technopedia, 2018). This technological fatigue may be responsible for technology fatigue.

- Feature fatigue is a result of numerous additional functions that comes with a new technological product. According to Hamilton (2006, p. 99), a normal user does not interface with all functionalities of a sophisticated product. This

is mainly due to the risk of committing an error when using a complex technology and the amount of time spent in learning the product or system.

- Unnecessary technology this may arise as a result of companies overreaching their target market by producing and supplying more than what the market requires and willing to pay (Christensen, 2003). Competition that exists amongst companies often leads to the development of excessive technology, while technology consumers deliberately avoid using its overpowering capabilities.
- Wait-and-watch tendency arises where users are incapable of making a technology choice from the pool of existing technologies and wait for the development of a flawless technology before making an investment.
- Excessive choice effect normally occurs as a result of the thinking affliction on short term memory to recognize the correct choice amongst all the available options, and the risk of purchase regret (Iyenga & Leper, 2000).

#### **4.4.2 Technology Complexity**

This is the magnitude to which users of a technology find it hard to understand and use. Users who experience difficulties in understanding and using technology often end up rejecting the technology. Most users tend to experience a certain degree of anxiety (technological anxiety), fear or even apprehension when they are obligated to integrate a new technology into their routine. Technological efficacy (the belief by users that they effectively execute their task using technology) in this instance may be low. These two factors (anxiety & efficacy) may to some extent affect the users' attitudes and influence their behavioural intention to adopt technology (Davies et al., 1989). Technophobia, which is associated with the fear of using technology, includes apprehension. Apprehensiveness of technology may be as a result of technology familiarity spectrum characterised by under-information or over-information, leading to technology rejection.

#### **4.4.3 Switching cost and loss of aversion**

Shapiro and Varian (2003) describe switching costs as the effort level together with the cost levied on the consumer in moving from one technology to another. Switching cost is negatively related to the adoption of an innovation. Adopters of technology, more often than not, hardly change their habits and the behaviour they are used to because of the effort required of them, the time demanded, anxiety and the uncertainty involved in the change (Mani & Murthy, 2013). According to the observation by Sassen (2002), technology adopters would first derive maximum benefits in the current technology before making a switch to a new technology. Most of the time adopters will evaluate and compare the new innovation with the existing technologies, and if perceived loss of benefits is evident, then potential adopters will develop technology aversion and reject the technology.

#### **4.4.4 Level of flexibility**

Generally, flexibility includes scalability and the level at which technology is amenable to use. For convenience, users of technology would accept and use a technology that is flexible (Raymond, 1999). Technology companies are expected to be agile and adapt to changes on a short notice. Failure to adapt to these required changes may lead to rejection of technology by users. Experienced users of technology prefer a flexible technology at the operational level where it cannot be rendered primitive for its adoption. Currently, the DTT set-top boxes are competing with the new smart set-top boxes which are more flexible than the older DTT set-top boxes.

#### **4.4.5 Altering user base**

This refers to a reconfiguration of a technology user base from individual level to societal and organisational levels. An example is a case where an Android operating system is preferred over a Windows operating system. Rejection of technology may occur when a niche innovation endeavours to become a regime, due to low numbers of potential adopters trying to cross over.

## 4.5 Innovation decision process

Rogers (1995), in his study on technology innovation adoption, described a five-stage process of decision-making in deciding whether to accept or reject technology. These stages are depicted in Figure 31.

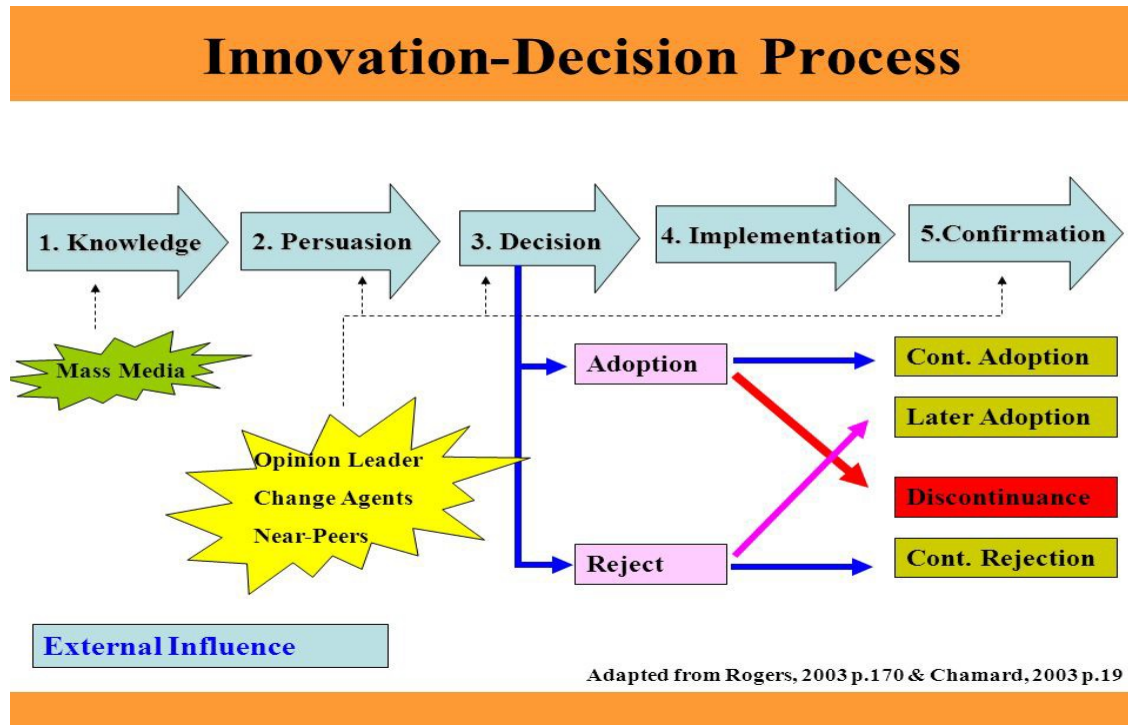


Figure 31: Innovation diffusion process (Rogers, 2003)

The first stage in the innovation diffusion process is the **knowledge** stage, where potential adopters are exposed to an innovation and interact with it to understand how it works. The second stage is the **persuasion** stage. In this stage, the potential adopter receives information regarding the innovation. This information will then be processed by the potential adopter, and an attitude, either negative or positive, will be formed about the innovation. In the third stage, the adopter decides whether to accept or reject a technology based on the product information. Full exploitation of an innovation is associated with adoption while the rejection of an innovation means no adoption (Rogers, 2003). Innovations that have a partial trial basis tend to be adopted quicker because individuals want to test the innovation first before deciding to adopt. The fourth stage, which is called the implementation stage, its where an

innovation is exploited by adopters. During this stage, the adopter may require some technical assistance from others, including the equipment manufacturers to reduce the degree of uncertainty about the consequences that may happen as a result of the implementation (Rogers, 2003). The last stage is the confirmation stage where a decision to adopt or not to adopt has been made already but can be changed if the adopter experienced conflicting messages about the innovation.

#### **4.5 Determinants of the rate of diffusion**

The innovation-diffusion process is described by Roger (2003) as an "uncertainty reduction process", wherein these uncertainties can be reduced by the following five characteristics of innovation:

- Observability
- Compatibility
- Trialability
- Complexity
- Relative advantage

These characteristics are explained in the next section.

##### **4.5.1 Relative advantage (RA)**

RA refers to the extent to which an innovation is professed to be superior to a product it replaces (Rogers, 2003). This theory suggests that the product innovation that has a clear, unambiguous advantage over the previous innovation will be more easily adopted and implemented.

In the case of Set-Top Boxes, these technologies will not be replacing any technology but rather are a new technology. A parallel can be drawn between the Multichoice decoders and the Set-Top Boxes, but it can be said that the latter does not replace the former.

#### **4.5.2 Compatibility**

When a product innovation is stable with the needs, standards and experiences of a likely adopter, it is said to be compatible. TV consumers are interested in a technology that brings many benefits at an affordable cost.

#### **4.5.3 Complexity**

Complexity arises when an innovation cannot be easily understood by the potential adopters. It is not known how complicated the new STB's will become for the users, but as researcher, my thinking is that it should be easy to use to encourage adoption.

#### **4.5.4 Trial-ability**

Trial-ability refers to “the degree to which an innovation may be experimented with on a limited basis” (Rogers, 2003). Trial-ability was found to be positively correlating with adoption rate. In other words, the adoption rate of an innovation tends to be much faster if the innovation trial frequency is high (Rogers, 2003).

#### **4.5.6 Observability**

Observability is when results of a product performance are clearly visible to potential adopters.

In summarizing these characteristics, Rogers (2003) argued that any innovation with these attributes stand a greater chance of being adopted faster than any other innovation.

### **4.6 Adoption process**

A wider interest has been demonstrated in what is now called the smart set-top box which is different from the DTT-set-top box. The introduction of these smart set-top boxes poses a serious adoption challenge to the DTT set-top box, and government

and broadcasters must now identify how the DTT set-top box can best be adopted and used by the citizens of the country.

The process by which the citizens adopt a new system or technology recognises the entire “mental process” experienced by any adopter between the period of first hearing about an innovation, up to a point of deciding to make use of it (Armstrong and Kotler, 2004). Therefore, government should put in place strategies that will encourage the uptake of the DTT set-top box.

Amstrong and Kotler (2004) suggest that there are five stages of the adoption process as described in Table 4.

<b>Stages</b>	<b>Effects</b>
Awareness	Users become aware of the new technology but lacks product information.
Interest	User acquires information about the technology.
Evaluation	Pros and cons of adopting a technology are evaluated.
Trial	User tries a new technology to gauge its value.
Adoption	User makes a decision to make full use technology regularly.

Table 4: The stages of the adoption process (Amstrong & Ketler, 2004)



## **4.7 Chapter Summary**

The chapter began by discussing the evolution of technology acceptance models and theories that led to the conceptual model used in this study (UTAT model). Eight models and theories were modified over time because of their limitations in the predictive power and behavioural intention to accept and use technology. These adaptations led to the improvement of the Unified Theory of Acceptance and Use Technology (UTAUT).

The chapter also discussed the diffusion of technology and different types of technology adopters and discovered that some individuals wait for others to adopt technology before they decide to do so, while others prefer to be the first to adopt. The chapter concludes with the thought process that users go through before deciding to accept or reject technology.

## **CHAPTER FIVE**

### **LITERATURE REVIEW**

#### **5.1 Introduction**

The following sections review the literature relevant to the aims and objectives of this study. This study sought to investigate the factors that have contributed to the slow adoption of DTT in the Ethekezi Municipality, South Africa and the intention of citizens to adopt.

Many researchers explain a literature review in different ways, ranging from “a comprehensive document about the current state of knowledge (Machi and McEvoy, 2009), to a summary of sources in the form of newspaper articles, journals, books and audio plus video clips (Qais, 2017)”. It is also described as a systematic way of collecting and synthesising previously conducted research (Baumeister & Leary, 1997; Denyer, Smart & Tranfield, 2003). The review of literature is typically done to assess the level of knowledge in a specific area of research, and also to identify if there are any gaps in the research (Snyder, 2019). The importance of literature cannot be under-estimated as it familiarises the researcher with past and present work in a particular subject of scholarly interest (Gastel, 2012). A good literature search will also assist the researcher in crafting a good research framework.

This chapter reviews the literature on factors influencing adoption of digital terrestrial television and also examines the nature of the relationship between different constructs of the UTAUT model to evaluate citizens’ intention to adopt DTT.

The study follows a mixed methods approach in that data was collected using a survey questionnaire and interviews. The overall purpose and central premise of mixed methods is that the survey questionnaire and interviews were used as data collection tools and that the participants’ point of view is reflected in the study for both quantitative and quality approaches in research (Cameron & Molina, 2010).

This chapter also reviews the literature on the issues and challenges experienced by other countries during the migration from analogue to digital terrestrial television.

Most of the literature reviewed in this study is from developed countries in Europe, developing countries in Asia and Africa, and the UAE. Research conducted in those countries regarding the factors affecting the migration from analogue to digital shows that every country is affected by either technological factors, social factors or political factors. In some cases, all these factors are applicable, especially in Africa and some ancient countries.

Kanini and Durheim (2002) differentiate between three types of literature reviews, theoretical, thematic and chronological reviews. In a thematic review, sources are discussed in terms of themes or topic relevant to the research objectives. A chronological review groups and discusses sources in terms of in order of their appearance, and if there are changes in the research over that period, those changes are highlighted over time. A theoretical review, on the other hand, looks at the current and existing theories together with their relationships.

The research questions in this study led to the choice of empirical and thematic reviews as the method of choice.

## **5.2 Slow adoption of technology in developing countries**

Many countries worldwide experience different rates of technology adoption, even in cases where the technology is inexpensive. Not only is the cost of technology an impediment to the speed of technology adoption, but as Akonji and Ogwezi (2018) found, when resource reallocation is not restrained, governments and domestic enterprises can quickly incorporate the advances of a rising technological frontier. Studies have shown that different factors are responsible for the slow adoption of technology, and these factors are categorised. Ali, Erfanni, and Sadoughi (2019) have classified these factors as technological, environmental, organisational, and individual (see Figure 5.1). This chapter reviews the literature on individual and technological factors more than any other factor listed.

### **5.3 Factors affecting the adoption of technology**

Past research has revealed that individual factors, technological factors and organisational factors have an impact on the adoption of technology (Borhani, 2016). Each of these factors is discussed next.

#### **5.3.1 Individual factors**

Talukder (2012) describes individual factors as the degree to which users of technology believe that they can benefit from exploiting a technology. These factors represent an opinion by users on how it impacts them. Adoption of technology within a social system can have unintended change in the way users perform their tasks. Sargent et al., (2012) highlights the level training required, departure from current method and procedure, and the level of technology complexity as individual factors directly impacting the adoption of technology. They have listed individual knowledge and skill, while Adriaanse et al. (2010) have observed previous experience of using technology in the participants. The findings of a study by Otieno (2015) also supported the studies of Adriaanse et al. (2010) and Sargent et al. (2012). Mwambia (2015) identified training and previous experiment as factors affecting the adoption of the iTax information system in the workplace. These findings are also in agreement with the outcomes of the previous authors.

#### **5.3.2 Technological factors affecting the adoption of technology**

Few studies have successfully analysed the role of technological factors in the adoption of digital technology by citizens in both developing and developed countries (Lin & Ho, 2018). These studies found that technological factors have a greater influence on the adoption of digital technology. However, the study by Lin and Ho (2018) did not consider all the characteristics of technology adoption while investigating the role of technological factors in the adoption of digital technology. Technological factors such as relative advantage, trialability, compatibility, and complexity, were found to have a greater influence on the adoption of innovation (Kousar, Sabri, & Zafar, 2017).

A study by Lee et al. (2018) found that technology cost and usability were the driving factors influencing the acceptance and use of digital television in Europe. Alam (2020) argued that even though users are more likely to use technology, they take into consideration the cost of acquiring such technology plus the benefits derived from using the technology. Kruger and Moore (2010) highlight television features such as better picture quality and enhanced sound as benefits that consumers are looking for before adopting digital terrestrial television.

The literature from developing countries has consistently shown that the issue of adoption depends on a particular context; for example, Dintoe (2018) found that technology is not always adopted and diffused for use by adopters (citizens). Some reject it purely for socioeconomic reasons. A study by Mnzhebele (2016) on the impact of Compatibility, Trialability and Complexity on the extent of technology adoption, found that only compatibility and complexity have a positive effect on the extent of technology adoption. These findings were found to be in agreement with the outcomes of Moore and Benbasat (1991), and Ramamurthy (1994), while relative advantage was found to influence the users' perception (Igbaria et al., 1996 and Lederer et al., 2000).

## **5.4 Adoption challenges of digital terrestrial television**

Some countries in Europe and America have completed the switch from analogue to digital terrestrial television, while many countries like South Africa are still struggling to complete the process to migrate the citizen to digital terrestrial television. The rate at which each country adopted DTT is different and will remain different for developing countries like South Africa.

This part of the study is examining the literature on challenges in the implementation of the successful digital migration project in South Africa and other countries. It is a known fact that South Africa has consistently failed to meet several deadlines determined by both the ITU and South Africa itself. This failure to meet the analogue switch-off deadlines may suggest that bigger problems and challenges are facing the country. Some of these challenges may be unique to South Africa, while others may be common in other countries.

## 5.5 Qualitative review

A preliminary literature review revealed that political interference, policy inconsistencies, leadership instability, and lack of awareness campaigns are some of the factors affecting adoption of DTT. This section of the study reviews literature that formed part of the qualitative study. This study consists of qualitative and quantitative research and this section of the chapter review literature for the qualitative research.

Governments, and by extension regulators, play a significant role in encouraging the adoption of digital technologies for the greater societal benefits. Regulatory frameworks have been found to lack the agility required to deal with the fast pace of technological developments.

Lesame and Mbatha (2014) investigated some of the factors serving as hindrances to the adoption of DTT in South Africa. Amongst the factors that were identified in their study is the lack of ICT skills in most developing countries. This observation was also supported by Idoko (2010) and amplified by the Minister of Communication at that time (Dinah Pule, 2012), who said that "...the greatest challenge in South Africa was that of narrowing the gap existing between the haves and have-nots, the skilled and the unskilled, as well as bridge new gaps, particularly those created by the digital age". While it is true that South Africa, like many other African countries, suffers from ICT skill shortages, the researcher could not find a link between that argument and the failure to meet the migration deadlines. It must be noted that the digital migration project is a government project, and if the required ICT skill was an issue central to the successful implementation of DTT, then it should have been publicised as such.

A study by McCallum and Jeffrey (2013) investigated the impact of ICT skills amongst a group of students, and their intention to adopt digital technologies. Their study found that lack of/low levels of ICT skills had a direct influence on the intention to adopt digital technology. These results were also supported by another study by Okundaye (2016) on the factors affecting the adoption of technology.

In a 2018 article in the *Business Day* entitled “Politics to blame for nine-year overdue digital migration process”, the Minister of Communications attributed this delay to politics. She blamed political interference and instability at the national government as reasons for the delay. A 2017 report by the Asia-Pacific Institute for broadcasting developments identified infrastructure and financial resources as contributory factors to the slow adoption of DTT. Indonesia, Fiji, and Sri Lanka identified infrastructure upgrade costs and human capital as their main issues. Ekeocha (2018) has identified the following as challenges in Nigeria: poverty, technology awareness, power supply, policies, and technical infrastructure.

According to the ITU report (2018), the penetration of digital technology in developing countries grew slowly, with little change year on year. Very few developing countries have managed a rapid increase in the adoption rates of digital technologies (Hawkin, 2015), and this rapid rise has enabled those countries to realise the technological benefits of digital terrestrial television.

A study by Quico et al. (2015) identified the cost of acquiring set-top boxes and insufficient or lack of information regarding digital terrestrial television as the main barrier to the adoption of DTT. Featherman and Pavlou, (2003), and Lu et al. (2011), also found the cost to be an influential factor in the intention to adopt the technology. Contrary to the findings and expectations of many researchers, Yang, Lu, Gupta, Cao, and Zhang (2012) found cost not to be a determinant factor on the intention to adopt new technology.

A great deal of scholarly work has been undertaken in trying to understand the varied process and patterns of new technology adoption in recent years. However, as Karshena and Stoneman (2008) explained, there is no general agreement reached on a set of determinants that explains the variation in the adoption of new technologies in light of historical and spatial differences. Technology cost is critical to the effective and efficient adoption by citizens (Rashid & Al-Qirim., 2001), and also plays a significant role in the successes and failures of any kind of technology (Neufeld et al., 2007). However, Premkumar and Roberts (2009) make a very stimulating argument that the cost of adopting technology is not a significant factor in determining adoption by citizens. This argument was empirically supported by Tan et

al., (2009) who could not find any significant level of association between technology cost and acceptance and usage of technology.

These contradictions in the findings of other studies strengthen and validate this study. What is emerging from the literature is that the adoption of technology is affected by many factors, some similar to many countries, as discussed in the following sub-sections.

### **5.5.1 Policy and regulation issues**

Policy and regulatory challenges have been found in some study to be a factor in the adoption of technology. Fox and Meyer (1995) define the concept of policy as "the various statements of authority made by legitimate public institutions proposing solutions to deal with issues within policy". Anderson (1997) defined policy as "a proposed course of action of a person, group, or government within a given environment providing obstacles and opportunities which the policy was proposed to utilize and overcome to reach a goal or realize an objective". Looking at the policy definition, it refers to the process of finding solutions to certain obstacles arising in public institutions. The process of policy making, as explained by Arbatani and Labafi (2012), plays a significant role in the way in which communication influences citizens.

According to Van Cuilenburg and Mcquail (2013), public policy is the outcome of a negotiation process between the state (represented by the government) and the public administration, the market players, and civil society. Galperin (2004) asserts that public policy implies institutionalising a decision-making structure with powers over the issues to be addressed. He further states that public policy requires defining a regulatory framework and the suitable control mechanism, coupled with the allocation of resources. Regulations are an instrument of legislative power and are enforceable by law. Armstrong and Collins (2010) identified and analysed several issues that are facing South Africa's migration to digital terrestrial television. Among the issues was that of ICASA's digital migration regulation which was not finalised by 2010. The regulation was supposed to look at the proposed new television channels



by broadcasters, the local content quotas, and the funding of new television programmes by broadcasters. These regulations, if finalised on time and properly implemented, were meant to increase the adoption levels of DTT in South Africa (Lesame & Mbatha, 2016). Lloyd et al. (2010) argue that the whole process of developing the digital migration policy and the regulation was fraught with complication, as the first draft regulations were tabled in 2008 followed by another set of five regulations, before the final Digital Migration regulations were issued in 2012.

### **5.5.2 Policy and the rate of technology change**

The world has experienced astronomical growth in the adoption of ICT and telecommunication technologies (Khanala, 2016). This adoption is uneven across the world, and this unevenness calls for a proactive regulatory framework (Fenwick, Kaal, & Vermrulen, 2017). The current regulatory structures have been found to be too slow in adapting to the ever changing societal and economic circumstance (Eggers & Turley, 2018), and this presents a significant hurdle to the rapid adaptation to the emerging technologies. Patel (2018) argues that a huge gap exists between the speed of technology development, the universal nature of digital technologies and the current policy and regulatory structures and processes. He further argues that the current regulatory approach is not well suited to support the fast-paced technology development. This view is further echoed by the ITU in its Global Summit for Regulators (2018). The regulators in this summit agreed that fast-moving times require fast-moving regulatory responses to effectively keep up with the fast ever-changing rate of technology.

Most governments impose regulations upon economies that are constantly shifting as businesses adapt to changing economic environments, consumer preferences, and technological developments (Pattel, 2019). Given the ubiquitous nature of technology, Pattel (2019) has observed the extreme pressure that governments are constantly experiencing from the market incumbents who feel that they are heavily regulated and would want the regulators to level the playing fields by introducing regulations that are fair and unbiased such as in the case of the set-top boxes in South Africa and other developing countries (Kaal & Vermulen, 2017).

A study by Wilson (2013) found that although economic development and technological environment are important factors influencing the adoption of technology, policy and regulation were found to be critical success factors in some developing countries. It has also been argued by theorists (Bussolo & Round, 2006; and Moller & Pletso, 2008, & Khan, 2010), that technology fails or gets adopted slowly due to lack of user demand, poor marketing, or regulatory policies.

Candel-Suarez (2013) has noted the lack of collaboration between the government and other public institutions in creating a suitable legislative framework for the new scenarios of technological convergence. This is evident in the case of the South African Post Office (SAPO), Sentech, Department of Communications and Digital Technologies, Universal Service and Access Agency of South Africa (USA ASA), South African Broadcasting Corporations (SABC), and the Independent Communications Authority of South Africa ICASA. Firstly, there was an issue between the department of postal services and the department of communications concerning the ownership of the digital migration project. Each of the two departments claimed to be the custodian of the digital migration project, and neither would take instructions from another. This issue created confusion between the other stakeholders leading to the poor collaboration between all of them. In light of all this confusion, what was the policy position of the South African government concerning digital terrestrial television? In 2008, the Broadcast Digital Migration policy was approved by Cabinet, and was very silent on the roles of all the stakeholders involved. There was no congruency between the policy objectives and the roles of the identified stakeholders, which led to the lack of interest in the uptake of DTT.

### **5.5.3 ICT Infrastructure challenges**

Despite the many benefits for individuals and organisations, the uptake of digital technologies still lags in many countries including South Africa. A 2017 OECD report on issues for digital transformation has highlighted quality and the cost of accessing network as an impediment to the adoption of digital technologies.

A study by Zhang et al. (2017) on the digital infrastructure to bridge the digital divide, found that the lack of digital infrastructure and digital skills impact on the citizens ability to access and to acquire digital technologies. Although South Africa is considered to have a better infrastructure than most African countries, underdeveloped infrastructure in its rural areas still poses a major challenge for DTT adoption (Pillay, 2016). This observation by Pillay suggests that lack of infrastructure impacts heavily on technology adoption and is supported by Van den Berg and Van der Lingen (2017). In their study of digital technology adoption in the health sector, Ali, Erfannia, and Sadoughi (2019) found that the lack of proper ICT infrastructure delayed the adoption of cloud technology. This lack of ICT infrastructure was found to be as a result of lack or inadequate financial resources.

#### 5.5.4 Financial resources challenge

The switch from analogues to digital terrestrial broadcasting requires a massive financial resource for broadcasters and governments. Between the period 2005 and 2015, the South African Government had spent just under R9Billion for infrastructure in 10 years (Fraser, 2015) with a further R925 million projected by 2018 (Gedye, 2015). The beneficiaries of the funds were as per Table 5.

Entity	Role	Budget
SABC	Public Broadcaster	R2.3 billion
USAASA	Connectivity for all	R1.6 billion
SENTECH	Signal distributor	R2.3 billion
USAF	Funding of ICT projects	R1.5 billion

Table 5: Budget allocation to entities

Table 5 presents budget amount allocated to the four entities for infrastructure upgrades and other requirements for successful implantation of DTT.

What is not being said is whether these funds were utilised for their intended purpose and if there was proper coordination amongst all these government entities. In the case of South Africa, the author has gathered that not enough financial and human resources were made available in the digital terrestrial television project. The

coordination amongst stakeholders often leads to the achievement of a project goal if, as Barnard (2013) puts it, the stakeholders are willing to communicate with one another, and the same stakeholders are willing to contribute something into action to contribute to a common purpose.

Few researchers (Odendaal, 2012; Wilson, 2015, & Schumann, 2015) have discussed and published work on the migration from analogue to digital broadcasting in South Africa. These articles mostly looked deeper into the political nature of the digital migration rather than the technical nature of it, and none have addressed the issues of set-top adoption, digital divide, and universal access. As Lesame and Mbatha (2015) state, “digital terrestrial broadcasting is important not only for the broadcasting industry but for the development of South Africa’s economy”. There is no denying that the issue of universal access has not been addressed by the digital migration project as the set-top box rollout has hit a snag.

#### **5.5.5 Political interference**

Political interference is defined as the attempt by politicians in high political offices to interfere with the decision-making process of both a government and non-government entities with the view of obtaining a favourable outcome (Jili and Masuku, 2019). This occurs when political leaders interfere with decision making in public administration as well as private entities (Kanire, Mfuru & Sarwatt, 2018). These kinds of interferences in public administration often leave projects incomplete, with a poor quality of work (World Bank, 2004). Flew (2003) warned that if politics is allowed to get in the way of digital terrestrial television to such an extent that consumers largely reject the new technology, then an important opportunity to address the digital divide issue would have been missed.

Dang (2015) found political interference to have had a negative effect in public administration in Nigeria which affected implementations of government programmes like bridging the digital divide. In South Africa, this stands in sharp contrast from South Africa's National Development Plan (NDP), which states that "people must be

active champions of their development and where government works effectively to develop people's capacities to lead the life they desire".

An article by Hans van de Groenendaal (2017) entitled "A comedy of conflicts resolved by the Constitutional Court" highlights a series of examples of political interference by top government officials at the ministerial level. These conflicts relate to interference in the development of the specifications for the set-top boxes (STB), the encryption and the STB standard.

According to Groedendaal, there was a political directive to adopt the Japanese and Brazil STB standard (ISDB-T), which was only tested in those two countries which were against the 2006 policy recommending the European standard (DVB-T) that was tested and adopted by over 120 countries. A political directive of this nature cannot just happen without an ulterior motive, I argue. Brazil, as it has emerged, offered South Africa financial assistance on condition that South Africa abandoned its commitment to the European standard (DVB-T) for digital terrestrial television, in favour of the ISDB-T standard used in Brazil and China. It cannot be denied then that had it not been for political interference, South Africa could have successfully migrated to digital terrestrial television.

There is a vast amount of literature on political interference by politicians from community development projects in municipalities to financial institutions in different countries. Ashraf, Arshad and Yang (2018) studied the impact of political interference in state-owned banks and found that there is a greater amount of pressure that the banks are facing from governing parties in developing countries. This kind of interference led to the erosion of corporate governance in government-controlled banks of Spain, Italy, and Germany (Hallenberg & Markgraf, 2018). These countries reported a high number of executive turnover as a result of political interference. South Africa did experience high executive turnover in the Department of Communication when 13 Ministers were appointed over a decade. This led to instability in the country as each of the Ministers came forward with their own strategy as to how to take the digital migration project forward.

### **5.5.6 Executive instability from 2006 to 2021**

In 2006, South Africa, together with countries under region 1, made a commitment to the ITU's June 2015 deadline to migrate from analogue to digital terrestrial television. The Minister at the time was the late Dr Ivy Matsepe-Casaburri, who was in charge of the Department of Communications. Following her death on April 6<sup>th</sup>, 2009, the president appointed Minister Manto Tshabalala-Msimanga as the acting Minister of communications until May 10<sup>th</sup> 2009. She lasted in that position for just over a month. What could she possibly have done in a month if her predecessor achieved little in over three years?

A day later, General Sipiwe Nyanda was appointed as the Minister of Communication from May 11<sup>th</sup> 2009, until the infamous cabinet reshuffle that saw him replaced by the late Roy Padayachee on October 31<sup>st</sup> 2010. Minister Padayachee served for just under a year and was also replaced by Minister Dina Pule on October 26<sup>th</sup> 2011. She as well lasted for 22 months in the position before she replaced by Minister Yunus Carrim on July 10<sup>th</sup> 2013, who lasted for ten months.

This high turnover of ministers was unprecedented in the Republic of South Africa, and as such it achieved little, if anything at all. These are consequences of poor decision-making by the government in South Africa, which has contributed to the slow adoption of DTT in this country. During the period 2014 to date (2020), the department of communication (DOC) has had five different ministers in the following order: Faith Muthambi, Ayanda Dlodlo, Mmamoloko Kubayi, Nomvula Mokonyane, and Stella Ndabeni. If only these Ministers had put the interest of the country and its citizens first, significant progress could have been made in the successful migration to digital terrestrial television. Some Ministers like Yunus Carrim have cited political interference as the main reason for their removal.

## **5.6 Set-top box adoption for DTT**

In this study, the uptake of set-top boxes is used as a measure of DTT adoption in South Africa. The concept of set-top boxes (STB) dates back to the early 1960s when they were known as the Ultra-High Frequency (UHF) converters. Currently, the

STBs are used as an interface to convert digital video signals transmitted through satellite, cable (in other countries), terrestrial, and IPTV (Mvungi, 2011). The cost of STBs has been an issue for digital migration strategies for terrestrial broadcasting in most countries around the world. In responding to this issue, different strategies were adopted by different countries ranging from free set-top boxes for poor households to partial subsidies and tax relief (Lesame & Mbhata, 2015).

The South African government has planned to distribute around 4,7 million set-top boxes to poor households of income under R3200, but only 511 000 has been distributed between the period of 2014 and 2020 (techcentral, 2020). This slow adoption, according to the IT web (2020), is attributable to slow registration turnout, limited funding for awareness campaigns, party politics, and legal battles.

The world is now moving away from the DTT standard set-top boxes to what is known as the smart set-top box. This device allows the viewer to access both the OTT content online and the satellite channels side by side (satiitv.com, 2020). This STB can connect to the internet and comes with pre-installed applications like Netflix, Amazon Prime, ESPN, Hotstar, and others (Figure 5.1). The smart STB connects easily with the dish allowing the viewer to flip between satellite channels and the OTT content.



Figure 32: Smart STB with a smart TV

According to globenewswire.com (2019), the smart STB market is showing rapid growth globally. This growth, according to researchandmarkets.com (2020), is driven by the growth in internet penetration and digitization in developing countries like South Africa, and the growth in the consumption of hybrid content. Choi, Kim, and Park (2017) have cited the reasons for the growth as the government's mandate for digitization regulations, and increased internet penetration. The available and limited literature indicates that the smart STB market is expected to grow to \$2billion by 2023. The reality is that many people still cannot afford costs associated with migrating from analogue to digital, and unless the STBs are made available to them free, the adoption rate will remain low.



## 5.7 Conceptual framework

An appraisal of different models and theories used by researchers to elucidate users' behaviour in the adoption of digital technologies was presented in Chapter 4. The conceptual framework developed in this study was adapted from the UTAUT model with the addition of moderating variables and an exogenous construct. The developed or proposed conceptual model is used by the researcher to explain different factors influencing the adoption of set-top boxes by the citizens and to understand the phenomena under investigation. At the end of the study, the proposed model will help the researcher to show the impact of the exogenous constructs on the behavioural intention and also the extent to which the moderating variables impact the relationship between the exogenous variables and behavioural intentions.

*Performance Expectancy (PE); Effort Expectancy (EE); Technology Awareness (TA); Social Influence (SI); Facilitated Conditions (FC), Behavioural Intentions (BI); Power Distance (PD); Masculinity (MAS); Uncertainty Avoidance (AU); Individualism (IND)*

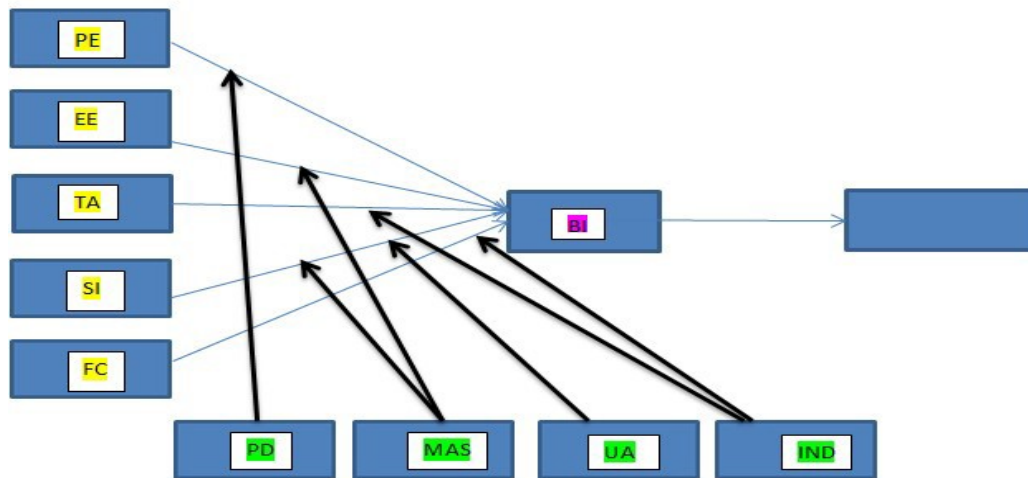


Figure 33: Proposed Conceptual Research Framework

Due to limitations observed in previous models on technology acceptance and use, the UTAUT model was selected with the addition of the relevant constructs in line with the context of this study's objectives. Researchers (Cimperman et al., 2016; Kabra et al., 2017; Khalilzadeh et al., 2017, and Martins et al., 2014) suggested that more external variables should be added in order to increase the predicting power of

the UTAUT model. In line with this suggestion, the following external variables and moderating variable constructs were added: Technology Awareness (TA), Individualism (IND), Uncertainty Avoidance (UA), Power Distance (PD) and Masculinity (MAS). The study explains 3 categories of variables to be tested, the first category is made up of key determinants (independent variables) that may have an effect on BI to adopt DDT. These constructs are PE, EE, TA, SI and FC. The second category includes dependent variable which is BI. The last category includes sets of moderators that may have an impact on the relationships between the key determinants and BI, which integrate Hofstede's cultural dimensions (IND, MAS, UA, and PD) at the individual level.

Therefore, in this chapter, the development of the proposed conceptual model for this research is discussed by elucidating the different factors in more details. It is worth mentioning that the proposed model is trying to obtain a complete understanding of a phenomenon under investigation which requires some. The development of the proposed model is expected to show the extent of influence independent variables have on the value of dependent variables (Mandell, 1987) and will help the researcher to hypothesise and test the relationships between the identified constructs in order to check if the theorised model is valid or not (Tarhini, 2018). However, drawing on the fact that prior models related to acceptance and adoptions of IT have some limitations (see Chapter 2), therefore, the most appropriate approach was to select the relevant constructs related to context of this study from the various models.

Literature review in this section looks at the relationship between the key determinants (Exogenous constructs) and the dependent variable (Behavioural Intention), as well as the influence of the moderating variables on the relationship between the key determinants and the dependent variable. The moderating variables include the cultural dimensions at individual level (Individualism, Power Distance, Masculinity and Uncertainty Avoidance).

Scholars (Malik, 2021 & Senshaw, 2021) have applied the UTAUT model in investigating factors that impact or influence users to adopt technologies. Most studies done on UTAUT model were on e-commerce (Asastani, Harisno, & Warnas, 2018; Kabanda & Brown, 2018; Sim et al., 2018, & Verkijika, 2018); e-learning

(Isaias, Reis, Coutinho & Lencastre, 2017; Khalid, Don & Raman, 2014), and e-banking (Ashfan & Sharif, 2016; Skoumpopoulou, 2018; Baptista & Oliveira, 2015). The lack of literature on digital terrestrial set-top box adoption was a catalyst for this study and has been identified as a gap.

The United Nation Education Scientific and Cultural organisation (UNESCO, 2009) has encouraged governments around the world to embrace adoption of digital technologies to secure equal access to the benefits of using digital technologies. However, recent studies by (Hamidi & Chavoshi, 2018; Kim et al., 2019) have discovered that although many countries have successfully migrated from analogue to digital terrestrial television, citizens' interest and usage of such technology is still below expectations. It thus becomes critical to investigate factors affecting the citizens' intentions to adopt DTT.

#### **5.7.1 The influence of performance expectancy (PE)**

According to Venkatesh et al. (2003), PE is the extent to which a person believes that the system helps them to do things better without fail. In this research, PE represents the benefits that the users will enjoy with a new set-top box. This includes quick response to channel search and interactivity.

Within the scope of this study, performance expectancy (PE) means that the citizens prefer to use set-top box for the perceived benefits it offers and its usefulness in performing its function.

Previous studies by Deng & Gao (2012) and Venkatesh et al. (2003) have shown that when performance expectancy is high amongst users of technology, the intention to use the technology becomes stronger. The willingness of Ethekeeni citizens to migrate from analogue to digital has not been previously determined until now. Chin (2019) examined the users' intentions to accept e-books and found that Performance Expectancy (PE) had no significant influence on the intention to adopt. A similar study by Ayaz and Yanartas (2020) examined the impact of performance expectancy on citizen's intention to adopt document management system. The study

was conducted on 270 respondents, 62% of which were women and 38% were men. The findings of this study confirmed that PE has a positive and significant relationship on user's intention to adopt.

A recent study by Frank and Milkovic (2018) examined the users' intention to adopt electronic programming guide (EPG), which is functionality within a set-top box that provide users with a continuous and updated scheduling of programmes. The study involved 234 respondents. A correlation test was done to determine the nature of the relationship between the exogenous constructs of the UTAUT2 model with the behavioural intention variable. The findings of the study revealed that all the exogenous construct of the UTAUT2 model including Performance Expectancy (PE) had a positive and significant relationship with behavioural intention to adopt EPG.

Other studies by Chen and Lin (2018), Choi et al.,(2018), Dou et al. (2018), Cilliers et al. (2018) and Zhang et al. (2017) all found performance expectancy to a strong and positive predictor of users' intention to accept technology.

#### **5.7.2 Influence of effort expectancy (EE) on intention to adopt**

Many authors define effort expectancy as the ease of using an information system. It is a construct that measures the ease of use when users interact with information technology. According to Rodrigues and Sarabdeen (2016), effort expectancy can be explained as the extent to which individual users of technology perceive that technology to be easy to use. Systems that are easy to use tend to be adopted better than complex systems, which results in reduced acceptance and less adoption by users (Teo, Chang & Parker, 2004, and Fang et al., 2016).

Venkatesh, Xu and Thong (2012) successfully proved that effort expectancy affects users' satisfaction and positively influences the intention to use the system. The influence of effort expectancy on behavioural intentions has been linked by many researchers in their studies, and they found that effort expectancy does affect behavioural intentions. For example, on the intention to adopt banking technology, Luarn and Lin (2005) found that "the higher the individuals effort expectancy, the

greater the behavioural intention to use e-banking services. Bojci and Alsheik (2014) also came to the same conclusion.

Another study by Hogue and Sorwar (2017) cited by Alam, on the adoption of mobile health in Bangladesh, reported a significant positive influence by effort expectancy on the behavioural intention to adopt the system. These findings were consistent with Chao (2019), Venkatesh et al. (2003), Yusof et al. (2017), Hosizah et al. (2016) and Huang (2018).

In this research, EE represents the complexity or the easiness associated with interacting with a set-top box.

### **5.7.3 Social Influence (SI) and Facilitating Conditions (FC)**

An interesting study was conducted by Williams, Saunderson and Dhoest (2021) in two universities (University of Limpopo and University of Antwerp) from two different countries, South Africa and Belgium. The study sought to examine the influence of both SI and FC on students' acceptance and use of social media by applying the UTAUT model. The study population comprised of participants from an urban based University in Belgium and a rural based University in Limpopo, South Africa. On PE, EE and SI, the study reported that PE, EE and SI have a significant influence on students' intentions to accept and use social media. On Facilitated Conditions (FC), the study found that FC did not have an influence on students from Belgium but had a greater significant influence on South African student. This was attributed to the poor infrastructure such access to internet and the university policy in social media usage during University hours.

Another study by Russ (2021) investigated the relationship between technology adoption determinants SI, FC and (BI) to accept and use Software-Defined Networking (SDN). Social influence has to do with ways in which individuals alter their behaviour to meet the demands of their social environment. This includes conformity, peer pressure, obedience and socialisation (Wei, 2019). Cialdini and Goldstein (2004) and Haun et al.,(2013) added that people's opinions and behaviour

tend to change and follow social norms, even though this may go against their personal preference.

Facilitating conditions (FC) gauge the level to which individuals believe that an infrastructure exists that supports the use of a system (Venkatesh et al., 2003). Russ (2021) surveyed 167 respondents, all of whom were system integrators. His study sought to examine the users' intention to use SDN technology. The study reported that (SI) and (FC) were statistically significant, with  $p$  values of ( $p < .01$  and  $p < .001$ ) respectively, while PE and EE were not statistically significant. The results were consistent with Venkatesh et al. (2003), and Omotunde (2017) on acceptance of cloud computing by administrative staff; Palau-Samuel, Forgas-Coll and Sanchez-Garcia (2019) on acceptance of mobile apps for restaurants, and Agyei and Adzobu (2020) on intention to use ICT for undergraduate students.

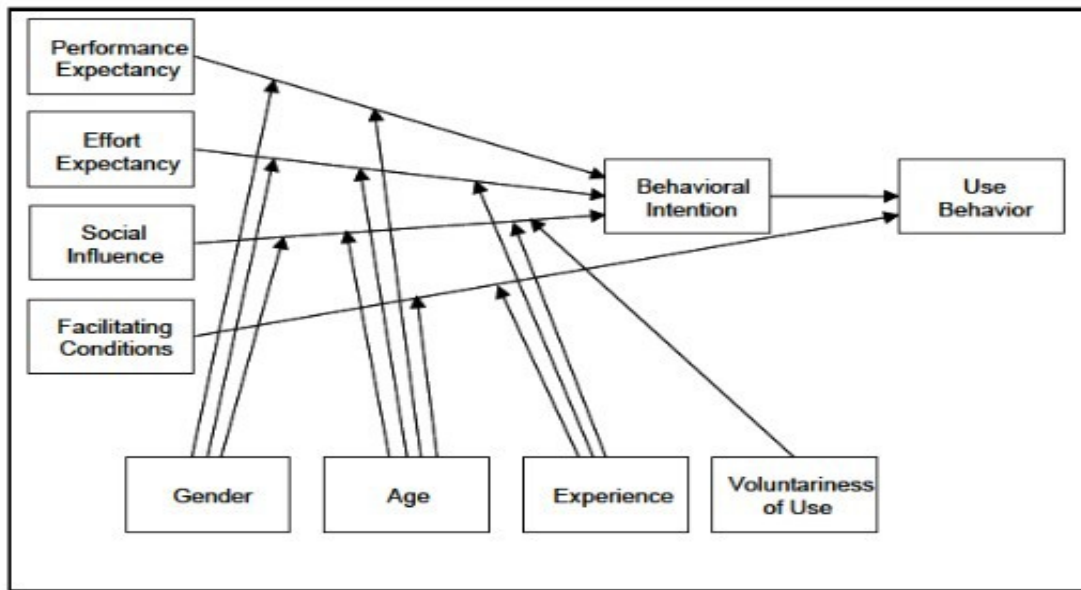


Figure 34: UTAUT Model (Venkatesh et al., 2003)

Construct	Description of Perception	Similar Construct and Corresponding Models
Performance Expectancy	The degree to which an individual believes that using the system will help him or her to attain gains in job performance	Perceived usefulness (TAM/TAM2 & C-TAM-TPB); - Extrinsic motivation (MM); - Relative advantage (IDT); - Job-fit (MPCU); - Outcome expectations (SCT).
Effort Expectancy	The degree of ease associated with the use of the system.	-Perceived ease of use (TAM/TAM2); - Complexity (MPCU); - Ease of use (IDT).
Social Influence	The degree to which an individual perceives that important others believe he or she should use the new systems.	-Subjective norms (TRA, TAM2, TPB/DTPB and C-TAM-TPB); - Social factors (MPCU); - Image (IDT).
Facilitating Conditions	Refer to consumers' perceptions of the resources and support available to perform a behaviour Venkatesh et al. (2003)	-Perceived behavioural control (TPB/DTPB, C-TAM-TPB); -Facilitating conditions (MPCU); - Compatibility (IDT).

Table 6: Description of UTAUT variables and models (Addo and Attuquayefio, 2017:7)

## 5.8 Moderating Effects (Cultural dimensions)

The moderating effects of the four cultural dimensions were examined in this study as part of the objectives. The four independent constructs under investigations are Power Distance (PD), Uncertainty Avoidance (UA), Masculinity (MAS) and Individualism (IND). Moderator variables have been proven to enhance, reduce or alter the direction of the relationship between the predictor variable and outcome variable (Fairchild and Mackinnon; 2009:89).

This study could not find any literature on the impact of cultural dimensions as moderators on the intention to adopt digital terrestrial television. The findings that will emerge from this study on the impact of cultural dimensions as moderators will thus be presented as contribution to the body of knowledge on future technology adoption studies.

The cultural dimensions used in this study were developed by Hofstede, whose work has been criticised on a couple of issues by other researchers such as Shackleton and Ali (1990). Hofstede was criticised for using employees from one organisation in

developing his framework and applying it across national boundaries. Another criticism was that he ignored “within-country” cultural heterogeneity. This study sought to examine the impact of the cultural dimensions as moderators “within-country” and not across national boundaries.

Gaspay et al. (2008) did a comprehensive literature review on how the four cultural dimensions affect the acceptance of technology. The review managed to show an existing relationship between a culture’s value orientation and inclination towards technology acceptance. The study also found that high-power distance (PD) inhibits the adoption and diffusion of technology.

Previous studies have applied these cultural dimensions in comparative studies between countries, institutions and individuals. Huang, Teo, Sanchez-Prieto and Garcia (2019) did a study the intention to adopt technology by teachers from different countries (China and Spain). The study found that individualistic cultural orientation is more prevalent in the Chinese communities than Spanish communities.

Tarhini et al. (2015) found some inconsistencies in the application of cultural dimensions on the UTAUT models and suggested that the moderation effects of cultural dimensions on technology acceptance should be tested further, and that the influence of culture should be considered in future technology acceptance studies. The observed inconsistencies may have arisen as a result of less consideration given to the cultural dimensions in technology acceptance studies, I argue.

In this study, the moderation effects of cultural dimensions on UTAUT model are examined. Signorini and Wiesemes (2009) criticised the application of Hofstede’s cultural dimension, saying that it lacks enough empirical evidence. What has been observed as a problem though is that in many studies of technology acceptance where cultural dimensions were used as variables, these variables did not directly measure the influence on key technology acceptance variables.

The objectives of this study include examining the moderating effects of the four cultural dimensions on the relationship between external variables of the UTAUT model and the behavioural intentions. The following constructs were used as



moderators: uncertainty avoidance, power distance, masculinity and individualism. According to Fairchild and Mackinnon (2009:89), the moderator variable influences the strength and direction of the relationship between a predictor variable and an outcome variable leading to a change in influence of the predictor variable.

Table 6 provides the definitions for espoused cultural values in the South African context.

Construct	Definition based on Hofstede et al. (2010)	South African cultural dimensions
<b>Power distance (PD)</b>	The "extent to which the less powerful members of institutions and organizations within a country expect and accept that power is distributed unequally" (p.61).	While Hofstede's cultural dimensions are indicated for South Africans (Cronjé, 2006), in some research, the following reference (Hofstede, 2019) indicates that it is for White South Africans. It also cautions that these values may not apply to the Black or Coloured South African population. The PD value for White South Africans indicates that they accept a hierarchical order where power is not equally distributed (Hofstede, 2019).
<b>Individualism-collectivism (IC)</b>	Individualism refers to "societies in which everyone is expected to look after him- or herself and immediate family. Collectivism refers to "societies in which people from birth onward are integrated into strong, cohesive in-groups" (p.92).	The IC value for White South Africans indicates that they prefer taking care of themselves and their immediate families only (Hofstede, 2017). This value may be different for closely-knit Black or Coloured families and communities.
<b>Masculinity-femininity –</b>	Masculinity stands for a "society in which emotional gender roles are distinct" (p.519). Femininity is seen as a "society in which emotional gender roles overlap: both men and	White South Africans view South Africa as a masculine society where society is driven by achievement and success (Hofstede, 2019).
	women are supposed to be modest, tender, and concerned with the quality of life" (p.517).	
<b>Uncertainty avoidance (UA) –</b>	"The extent to which the members of a culture feel threatened by ambiguous or unknown situations" (p.191).	There is a low UA value for White South Africans. The value is indicative of a society that is more relaxed and does not fear uncertainty (Hofstede, 2019).

Table 7: Definitions of Espoused Cultural Values (Tarhir, 2017)

**Power Distance (PD)** is associated with the degree to which citizens expect and accept that people have different kinds of power (Hofstede, 2011). The measured traits associated with (PD) include preference for autocratic or paternalistic style and employee fear of expressing disagreement. According to Hofstede (2001), citizens who possess high power distance have the propensity of accepting a hierarchical order. These individuals accept as true that a decision should be deferred to individuals with authority. On the contrary, individuals who possess low power distance are more content to pronounce their thoughts and work towards equalizing the dispersal of power and demanding validation for disparities of power.

Gudergan (2010) did a study on the moderation effect of PD across cultures on intention to adopt technology. The study found that PD significantly influenced the behavioural intention to adopt technology. Recent research by Peterson (2020) also found that PD had a positive influence on the adoption of medical technology in Cape-Town. The study was based on a survey data of 439 respondents using purposive sampling.

**Individualism (IND)** refers to how individuals relate with other people within a culture. The measured traits associated with (IND) include personal time, freedom and challenge. Individualistic cultures are characterised more by independency and self-orientation (Oliver & Lee, 2010) and are expected to focus on themselves and their immediate families.

Citizens from individualist communities tend to build trust in a calculative way (Doney et al., 1989) and will carefully evaluate the risk before adopting an innovation. In technology adoption studies, Flight et al. (2011) contended that individualism plays an important moderating role in the adoption of technology by influencing the behavioural intention. Akour et al. (2006) came to the conclusion that individualism has a positive and significant moderating role on citizen's intention to use internet, while Zhang et al. (2012) confirmed that individualism has a moderating effect on e-commerce adoption. On the moderating effect of individualism on the relationship between technology awareness and behavioural intentions, this study could not find any literature supporting or rejecting the hypothesis. Similarly, the study could not

find any literature on the moderating effect of individualism on the relationship between facilitated conditions and behavioural intentions.

**Masculinity (MAS)** refers to the degree to male values are displayed in society. Cultures with high masculinity are characterised by assertiveness, competitiveness and toughness. According to Kaba and Osei-Bryson (2013), high masculine societies tend to base their adoption decision on cost and benefit than societies with low masculine cultures. Measured traits associate with (MAS) include advancement, earnings and recognition. A recent study by Malquias, de Oliveira and Albertin (2021) on the effect of masculinity on the adoption of e-books, revealed that masculinity and power distance had the moderating influence on decision to adopt e-books. These finding were supported by Hallikainen and Laukkanen (2018), who reported masculinity had a positive moderating effect on decision to use online purchases.

Many studies (El-Masri & Tarhini, 2017; Venkatesh & Zhang, 2015; Dinev, Goo, Hun & Nam, 2009; and Srite & Karahanna, 2006) have investigated relationship between cultural dimensions and technology acceptance at a national or organizational level (Lai et al., 2016), and only scant literature has been published on the effect of cultural dimension at an individual level (Tarhini, Hone & Liu, 2015). Cultural values at a national level cannot be used or applied at an individual level (Hasan & Ditsa, 1999). According to Law et al. (2019), the moderating effect of cultural dimensions on technology adoption have been widely studied from a national perspective, but at an individual level, there is little evidence to suggest that there is an influence by moderators on intention to adopt technology.

Previous studies by Straub et al. (1997) found that technology acceptance models cannot be universally applied across cultures because of the cultural differences that exist amongst different cultural groups. However, Teo and Huang (2018) examined the impact of the four cultural dimensions at an individual level using the UTAUT model. The study reported a positive moderated effect by masculinity and power distance on the lecturer's behavioural intentions to use classroom technology.

The literature revealed Individualism as the most explored moderating technology adoption studies (Lai et al., 2016). Jacobs (2020) found that Power Distance (PD) and Masculinity had significant moderating effects on the intention to adopt technology, while Uncertainty Avoidance (UA) had the least moderating effect. These findings were inconsistent with Tarhini et al. (2017), who found that (PD), (MAS), (UA) and (IND) were significant moderators of the relationships between exogenous variables and the behavioural intentions in the UTAUT model.

According to Tarhini (2017), social influence (SI) is more important in a high uncertainty avoidance (UA) context because the opinion provided by the reference group provides a convenient way for people to reduce the uncertainty linked with the usage of technology. That being the case, several researchers still believe that cultural dimensions need to be included in technology acceptance models because they affect the way individuals use technology (Park, Young, and Lehto, (2007); Im et al., 2011). Baptista (2015) investigated the combined effect of cultural moderators on the acceptance of mobile banking. The study found that individualism (IND) had a strong and positive moderating effect in line with Hofstede (1980), which is not supported by other studies like (Srite and Karahanna, 2006; Yoon, 2009). Uncertainty avoidance (UA) was also found to have a significant moderating effect, while Masculinity was the only dimension found not to have a significant effect on the adoption of mobile banking technology. Power distance (PD) was found to have a strong moderating effect on the use behaviour, which is in line with the findings of (Sriwindono and Yahya, 2012), but in contradiction to the findings of Yoon (2009) and Hofstede, (1980).

The inference that can be drawn from these reviews and studies is that they do not always agree on which dimension produces an effect, and also that the effect of these moderator variables vary through dissimilar countries and residents (Nistor et al., 2014; Udo, Bagchi, and Kirs, 2012).

## **5.9 Knowledge GAPS**

Several studies were done on technology adoption globally, mostly on banking, education, health, the internet and cloud technologies, but not on set-top box (STB) adoption. In this study, the researcher looks at factors having an influence on intention to adopt (STB) in the Ethekewini Municipality.

The reviewed literature could not reveal any study done on the moderating effects of:

- Power Distance on Performance Expectancy and Behavioural Intentions
- Masculinity on Effort Expectancy and Behavioural Intentions
- Uncertainty Avoidance on Social Influence and Behavioural Intentions
- Individualism on Facilitated Conditions and Behavioural Intentions
- Individualism on Technology Awareness and Behavioural Intentions
- Masculinity on Social Influence and Behavioural Intentions, in the adoption of set-top box for digital terrestrial television (DTT).

As has been mentioned before in other studies (Lesame & Mbhata, 2014) and (Collins, 2011), digital migration was progressing at different rates in different countries, and no study has thus far successfully explained the reasons for the different rates of DTT adoption in those countries. South Africa has experienced the slow uptake of STBs and this study reveals possible reasons that can be attributed to the slow adoption of STBs.

## **5.10 Chapter Summary**

This chapter has presented an extensive review of factors influencing the behavioural intentions to adopt technology. The synthesis of literature also revealed that culture plays a major part in the adoption of technology.

Several studies that have been reviewed found that there were varying factors influencing the adoption technology, but very little literature on set-top box adoption was found. The review of the literature also shown multiple research studies conducted on the acceptance and use of technology, that were mostly done on internet adoption, instructional media, cloud computing, mobile technology, mobile

apps, information technology (Oliveira & Martins, 2011), agricultural technology (Doss, 2006; Adesina & Zinnah, 1993) and other forms of technology. Very little research has been done on digital terrestrial television. The studies conducted were either on an individual, technological, or environmental. Most of these studies were limited in scope and found mostly in the Arab countries and European countries.

This chapter also reviewed the literature on other factors that influenced the behavioural intention to adopt the technology. Some of these factors were common in other countries, while others were unique. The common factors identified during the synthesis of the literature, especially in African countries, were technology awareness, cost of acquiring new technology, political interference especially at an executive level, cultural differences, ICT skills, and policy and regulatory regime. Corruption, financial resource, and infrastructure challenges were some of the issues that were also identified as impediments to the adoption of technology globally.

## **CHAPTER SIX**

### **RESEARCH METHODOLOGY AND DESIGN**

#### **6.1 Introduction**

Chapter six presents detailed research process followed in this study. It describes and presents various stages of the research, and information relating to the method that was used in executing this study. What often determines the research methodology and the research strategy is often the nature of the research question and the phenomena under study (Denzin & Lincoln, 2005).

Examining the variables related to technology adoption and their contribution to the progress on the uptake of set-top box, requires a vigorous research approach such as a mixed methods design. This approach will ensure that the subjective views of the respondents and participants on the phenomena in this study are heard, while guaranteeing the objectivity of the research.

Different researchers define and describe research methodology according to their own understanding. In many studies, research methodology is described as a “blueprint” or a “roadmap” used by researchers in conducting their studies towards reaching a logical conclusion (Given, 2008). Wilkinson (2000) defines research methodology as a set of procedures or techniques used in the identification, selection, processing and analysis of information about a research topic.

Section 6.2 in this chapter presents three research paradigms, while Section 6.3 describes the research categories. The selection and justification of the research method are explained in Section 6.4, and the research model and research hypothesis are described in Sections 6.5 and 6.6, respectively. The data collection strategies and the population sample are discussed in Sections 6.7 and 6.8, respectively, while data analysis techniques, reliability and Validity are discussed in Section 6.9, 6.10 and 6.11, respectively. The summary and conclusion of the chapter are provided in Section 6.12.

## **6.2 Research design and process**

Research design refers to procedures that are followed by researchers when data is collected, analysed, interpreted and reported on in a research study (Cresswell & Plano, 2007:58). Three forms of research design are explained and classified by (Robson, 2002) as exploratory, explanatory and descriptive.

According to Saunders et al., (2007), exploratory research is generally conducted when little is known about the research phenomenon and also when the researcher has not clearly identified the problem. Descriptive research is conducted when researchers want to show how things relate to each other in their natural setting. It is suitable for novel research or unexplored research area (Punch, 2005). Explanatory research, on the other hand, is used by researchers if they want to discover and also report on relationships among dissimilar facets of the research area under study. Explanatory research provides proof to back-up or disprove a finding or prediction.

A good research design should have an association between goals and objectives of the research, sampling method that the researcher employs, research questions, and must also align with the source from which data is generated and reliability and validity of the research findings (Bickman & Rog, 2009:11).

Research design in this study addresses the problem of slow adoption of digital terrestrial television in Ethekwini Municipality. The research design for this study is summarised in Figure 34.



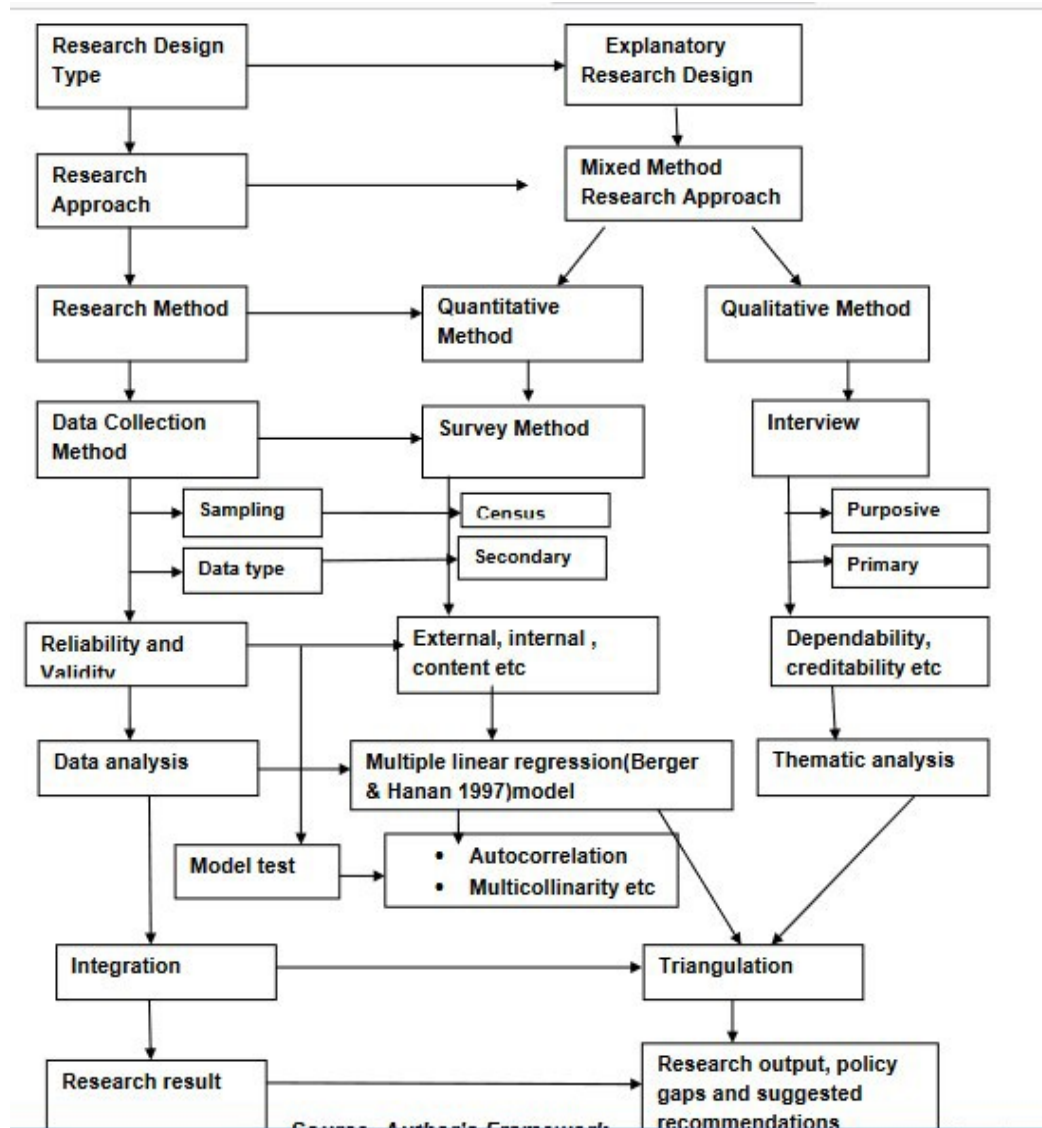


Figure 35: Research design (Adapted from Boru, 2018:39)

Figure 35 provides a summary of factors that are taken into consideration before embarking on a research process. These include data collection methods, research philosophy, research time lines and research strategies.

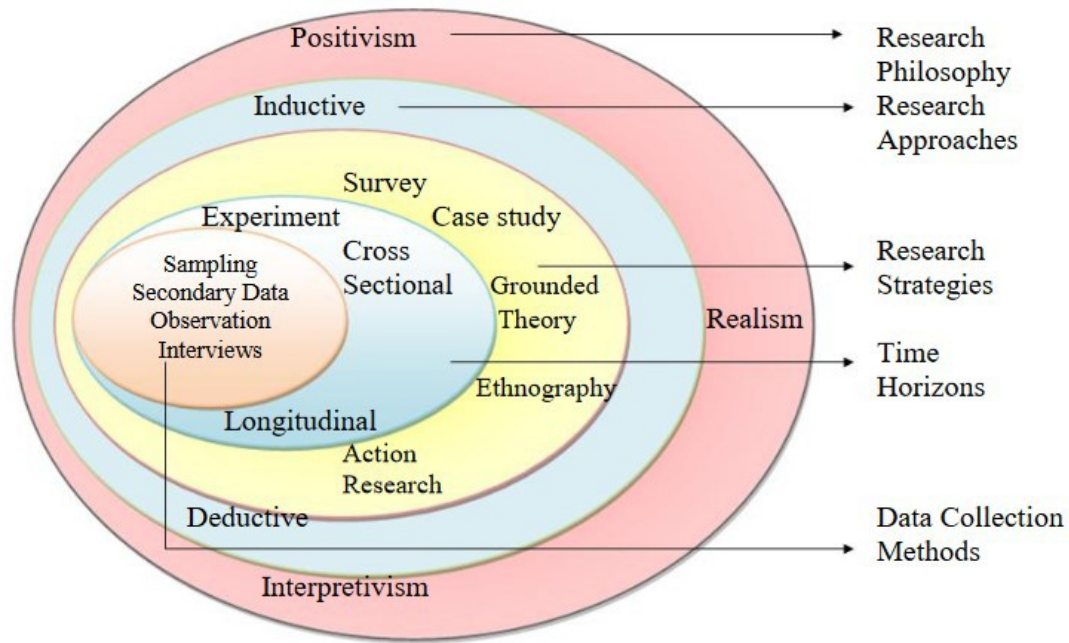


Figure 36: Research Process Onion (Saunders, 2003)

### 6.3 Research paradigm

A research paradigm is a pattern that inherently reflects the beliefs that a researcher has about the world he lives in or want to live in (Lather, 1986). Lincoln (2000) defines paradigm as “a human construction that deals with principles indicating where the researcher is coming from so as to construct meaning embedded in data”. This can be explained as a researcher’s school of thought or shared beliefs (Mackenzie & Knipe, 2006).

Paradigm, according to Kuhn (1962), refers to an “integrated cluster of substantive concepts, variables and problems attached with corresponding methodological approaches and tools”. Oates (2006) describes a paradigm as a shared assumption or ways of thinking about some aspect of the world. Most of the research undertaken in the social and natural sciences is based on the following philosophical paradigms: positivist, interpretive and critical postmodernism (Myers, 1997 & Oates, 2006). These three paradigms are widely accepted in information system research typify, and each symbolises different ways of understanding the world so as to observe,

measure and understand social reality (Myers, 1997). Even though these paradigms are distinct in theory, the distinction in practice is not so apparent.

### **6.3.1 The positivist paradigm**

The positivist paradigm makes the assumption that there is an unbiased realism that subsists independently of humans and can be described, observed, and measured (Neuman, 2006). This philosophical paradigm emerged in the 19<sup>th</sup> century and was employed formally by scientists as a leading scientific technique in the initial part of the 20<sup>th</sup> century. The main goal of positivist research, according to Rehman (2012), is to discover the universal laws and causal relationships in natural and social phenomena.

In this study, hypothesis and research questions are stated as assumptions, and tested empirically under strict conditions.

### **6.3.2 The interpretive paradigm**

Interpretivism usually is "associated with the philosophical position of unrealistic belief in or pursuit of perfection, and is used to group together diverse approaches, including the social constructivism and phenomenology" (Collins, 2010) response to the over-dominance of the positivism paradigm; it defies the belief that a single, provable reality exists independent of our sense (Rehman, 2018). Neuman (2009) stated that "Reality is based on shared meanings created by experiences". In the interpretive researcher's mind, the realism is biased, according to Grix (2004): "In the case of different and well-argued interpretations about a phenomenon, one interpretation cannot be chosen or preferred over the other as acceptable one, but rather as the existence of multiple pieces of knowledge is accepted with the acknowledgement that different researchers bring different perspectives to the same issue". Interpretive research is more concerned with accepting the interpretation of persons about the societal occurrences with which they relate.

The data collected by interpretivism from participants is primarily qualitative and is gathered over a period of time. Blaikie (2000) observed that a gap will always exist

between the collected data and the reality represented by the data. Some of the procedures that produce qualitative data are open-ended interviews and informal conversational interviews. The data analysis approach is more inductive in that the researcher searches for patterns emanating from observed data and then develops theories for those patterns (Grix, 2004). The data generated is mostly verbal and very rarely involves numeric data that is not relied upon.

There has been a varying amount of criticism levelled at interpretive paradigm by researchers such as Grey (2013), Al-Habil (2011) and Grix (2004). According to them, the interpretive paradigm is "soft", and cannot generate theories that are widespread to a greater population; also, the interaction of the investigator with participants often creates lack of objectivity. Richards (2003); Wicks & Freeman (1998) and Richards (2003) hold a different and opposing view. They believe that qualitative research is not "soft" but demands precision and rigour with consideration to details. Therefore, this study employs both the positivist paradigm and interpretive paradigm.

## **6.4 Research approach**

Chetty (2016: 11) defines the research approach as "a plan and procedure that consist of broad assumptions to detail method of data collection, data analysis and interpretation". The research approach consists of three types: a quantitative approach which is more structured; a qualitative approach which is mostly unstructured, and a mixed methods approach, which is a combination of the first two approaches.

At times, researchers will use a concept of triangulation to effect a conscious combination of quantitative and qualitative approaches (De Vos, 2002:366). The justification for triangulation was provided by Denzin (1970; 1979), but the method was used before and after his written justification.

This study, due to its vigour and complexity, employs mixed methods to achieve its objectives and reliability.

#### **6.4.1 Quantitative research approach**

Quantitative research is defined as "research conducted using a range of methods, which makes use of measurement to record and investigate aspects of social reality" (Bless & Higson-Smith, 2000: 156). Mark (1996:6) described quantitative approach as "the study of phenomena using numerical means". In quantitative research, variables are quantified and analysed in order to achieve results. William (2011:14) defines quantitative research approach as steps employed by a researcher in the research journey. Approaches of investigation include trials and surveys to collect data on a survey instrument with predetermine questions. A phenomenon is explained by gathering data in a numerical form and analysed with the aid of statistical tool (Aliaga & Gunderson, 2002).

Quantitative research methods are primarily used in studying naturally occurring phenomena within the natural sciences in order to identify causal relationship (Meyers, 1997). Data is collected in an objective manner through a questionnaire that is outcome-orientated and assumes natural laws and mechanisms. The sample size in quantitative research is generally more significant and aimed at maintaining statistical relevance (Meyers, 1996 & Neuman, 2006).

The research question "What are the factors that have contributed to the slow adoption of digital terrestrial television (DTT) in eThekweni Municipality", required that the qualitative method be applied in seeking answers.

#### **6.4.2 Quantitative research methods**

Research method refers to a "strategy of inquiry which moves from the underlying philosophical assumptions to research design and data collection" (Alshehri, 2012). The method chosen does have an influence on the way in which data is collected by the researcher. Quantitative methods are research techniques used in the gathering of quantitative data or information dealing more with numbers and anything that can be quantified.

Table 8 presents the features of Quantitative and Qualitative research approaches.

Quantitative mode	Qualitative mode
<b>Assumptions</b> <ul style="list-style-type: none"> <li>• Social facts have an objective reality</li> <li>• Primacy of method</li> <li>• Variables can be identified and relationships measured</li> <li>• Etic (outsider's point of view)</li> </ul>	<b>Assumptions</b> <ul style="list-style-type: none"> <li>• Reality is socially constructed</li> <li>• Primacy of subject matter</li> <li>• Variables are complex, interwoven, and difficult to measure</li> <li>• Emic (insider's point of view)</li> </ul>
<b>Purpose</b> <ul style="list-style-type: none"> <li>• Generalizability</li> <li>• Prediction</li> <li>• Causal explanations</li> </ul>	<b>Purpose</b> <ul style="list-style-type: none"> <li>• Contextualization</li> <li>• Interpretation</li> <li>• Understanding actors' perspectives</li> </ul>
<b>Approach</b> <ul style="list-style-type: none"> <li>• Begins with hypotheses and theories</li> <li>• Manipulation and control</li> <li>• Uses formal instruments</li> <li>• Experimentation</li> <li>• Deductive</li> <li>• Component analysis</li> <li>• Seeks consensus, the norm</li> <li>• Reduces data to numerical indices</li> <li>• Abstract language in write-up</li> </ul>	<b>Approach</b> <ul style="list-style-type: none"> <li>• Ends with hypotheses and grounded theory</li> <li>• Emergence and portrayal</li> <li>• Researcher as instrument</li> <li>• Naturalistic</li> <li>• Inductive</li> <li>• Searches for patterns</li> <li>• Seeks pluralism, complexity</li> <li>• Makes minor use of numerical indices</li> <li>• Descriptive write-up</li> </ul>
<b>Researcher Role</b> <ul style="list-style-type: none"> <li>• Detachment and impartiality</li> <li>• Objective portrayal</li> </ul>	<b>Researcher Role</b> <ul style="list-style-type: none"> <li>• Personal involvement and partiality</li> <li>• Empathic understanding</li> </ul>

Table 8: Features of Quantitative and Qualitative Research Approach (Glesne and Peshkin, 1992)

### 6.4.3 Survey

The survey method is commonly used in the collection of data from a large population sample. Such data collected may include demographic information, satisfactory levels, and opinions, and may be carried out via email, post, telephonic or the internet. All participants in a study are asked the same questions to eliminate the element of biasness (Esterby-Smith et al., 2002).

#### 6.4.4 Qualitative research approach

A comprehensive definition of qualitative approach is provided by Philipsen and Vernnoij-Dassen (2007) as a study of “the nature of phenomena, together with their different manifestations, quality and the context in which they appear excluding their range, frequency and place in an objectively determined chain of cause and effect”. It seeks to narrate a story of a particular group’s experiences verbatim (Mohajan, 2017) and employs inductive approach where a researcher collects data and try to develop elucidations from the data.

Creswell (2007) defined qualitative research as “an inquiry process of understanding a human social problem, based on a complex, holistic picture, formed with words, and reporting in a natural setting”. The qualitative approach refers to a array of data collection and analysis technique that uses purposive sample and semi-structured, open-ended interviews (Mohajan, 2017). The purpose of qualitative research according to Mark, (1996:210) is to "provide a description and interpretation of phenomena from the viewpoint of subjects being studied, and also to generate new theories.

Furthermore, qualitative studies are more concerned with non-numeric samples. Qualitative research is characterised by the following principles and characteristics from several research sources:

- It is descriptive in nature, the process, meaning and understanding gained through interviews, field notes, observations and transactions are the subject of interest for the researcher (Yin, 2009; Meyers, 1997).
- The sample is non-random in nature and small as compared to quantitative research (Merriam, 1998).
- Qualitative research is more interested in words rather than numbers, and it also takes into account the participants’ perceptions based on their experiences (Lee, 1999).
- It places focus on understanding a given societal setting, not on making predictions about the social settings (Denzin & Lincoln, 2005)The process of qualitative research is inductive, meaning that conclusions are derived



from a set of observations in which a researcher builds abstractions and concepts and generates theories (Merriam, 1998).

Qualitative enquiry was considered appropriate for this study as it involves industry experts views on the delays in migrating from analogue broadcasting to digital broadcasting. This study is also exploratory as it allows the researcher to discover things for himself.

Table 9 summarises the difference between qualitative and quantitative research.

Criteria	Qualitative Research	Quantitative Research
<b>Purpose</b>	To understand & interpret social interactions.	To test hypotheses, look at cause & effect, & make predictions.
<b>Group Studied</b>	Smaller & not randomly selected.	Larger & randomly selected.
<b>Variables</b>	Study of the whole, not variables.	Specific variables studied
<b>Type of Data Collected</b>	Words, images, or objects.	Numbers and statistics.
<b>Form of Data Collected</b>	Qualitative data such as open- ended responses, interviews, participant observations, field notes, & reflections.	Quantitative data based on precise measurements using structured & validated data-collection instruments.
<b>Type of Data Analysis</b>	Identify patterns, features, themes.	Identify statistical relationships.
<b>Objectivity and Subjectivity</b>	Subjectivity is expected.	Objectivity is critical.
<b>Role of Researcher</b>	Researcher & their biases may be known to participants in the study, & participant characteristics may be known to the researcher.	Researcher & their biases are not known to participants in the study, & participant characteristics are deliberately hidden from the researcher (double blind studies).
<b>Results</b>	Particular or specialized findings that is less generalizable.	Generalizable findings that can be applied to other populations.
<b>Scientific Method</b>	Exploratory or bottom-up: the researcher generates a new hypothesis and theory from the data collected.	Confirmatory or top-down: the researcher tests the hypothesis and theory with the data.



<b>View of Human Behavior</b>	Dynamic, situational, social, & personal.	Regular & predictable.
<b>Most Common Research Objectives</b>	Explore, discover, & construct.	Describe, explain, & predict.
<b>Focus</b>	Wide-angle lens; examines the breadth & depth of phenomena.	Narrow-angle lens; tests a specific hypotheses.
<b>Nature of Observation</b>	Study behavior in a natural environment.	Study behavior under controlled conditions; isolate causal effects.
<b>Nature of Reality</b>	Multiple realities; subjective.	Single reality; objective.
<b>Final Report</b>	Narrative report with contextual description & direct quotations from research participants.	Statistical report with correlations, comparisons of means, & statistical significance of findings.

Table 9: Qualitative versus Quantitative Research (Johnson & Christensen, 2008:34)

## 6.5 Qualitative research Methods

In research, there are various types of qualitative research methods that are used by researchers; next is a discussion of the most commonly used methods.

### 6.5.1 Case study research

Yin (2009:19) defines case study research as “an empirical inquiry that investigates a modern phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clear”. As researchers became more concerned about the limitations of quantitative methods, case study research methods became more recognised and prominent. The case study method allows researchers to go beyond quantitative statistical results and understand behavioural circumstances from the actor's perspective. In most cases, case study method is located in a specific setting like geographical area, business entities and focuses on small individuals as participants (Yin, 2009). Since this study is at a national level and the number of respondents is large, the case study method was deemed an inappropriate method for this study.

### 6.5.2 Grounded theory

This is a well known methodology that is set out to construct a theory from the data generated and analysed systematically using comparative analysis (Tie, Birks & Francis, 2019). Charmaz (2006) defines grounded theory as of systematic inductive methods applied in qualitative research to generate theory. The significance of this method lies in the following:

- It provides explicit and sequential guidelines for conducting qualitative research;
- It legitimizes qualitative research as a scientific form of inquiry;
- It presents strategies for handling the analytical phase of inquiry, and
- It advances the analysis of qualitative data.

This method was introduced by Glaser & Strauss (1967) with the purpose of legitimizing the qualitative research. Although there are as many versions of grounded theories as there were grounded theorists, all of them align to Charmaz's definition of grounded theory. It is characterised by the following features (Mitchell and Noble, 2016):

- The data lead to the discovery of social processes
- Categories are integrated into a theoretical framework
- There is simultaneous gathering and examination of data
- Theoretical sampling is used to refine data

The position of grounded theory was contested by Glaser, Strauss and Corbin (1990, 1994, & 1998). According to Glaser, the grounded theory resembles traditional positivism, assuming an unbiased, outer realism where a neutral observer discovers data. On the other hand, Strauss and Corbin (1994, 1998) position grounded theory closer to post-positivism as it aims toward unbiased data collection by giving voice to the respondents and ensuring that their views and opinions are represented as accurately as possible. The grounded theory principles and characteristics as described fit very well within the objective of this study, and it is therefore applied.

## **6.6 Selection and Justification of the research method**

The objective of this study is to comprehend and ascertain issues that have contributed to the slow adoption of digital terrestrial television, as well as elements that impact the acceptance and use of set-top boxes in South Africa, utilising the explanatory power of the UTAUT model. The study also aims to study and assess the essential associations amongst the suggested research model constructs. To achieve this aim and objective, the investigator must gain divergent opinions and views of industry experts and citizens who are consumers of television. The study employed mixed methods research, taking a positivist and interpretive approach.

### **6.6.1 Justification for using a positivist paradigm**

The goal and objectives of this part of the study was realised by applying the UTAUT model, and using a questionnaire survey to gather the research data. The Positivist paradigm places emphasis on hypothesis testing from current theory and individual actions to confirm the hypothesis (Neumann, 2006). The results that will follow from this approach will display the citizens' viewpoint about elements influencing the acceptance and use of the set-top boxes. This paradigm allows the researcher to gather a large amount of data, use statistics and content analysis to identify fundamental consistencies, hence the approach is also appropriate for this study.

Another part of this study is to test hypotheses associated to the proposed conceptual framework of the extended UTAUT model, along with a number of hypothesised associations that were hitherto established in the original UTAUT model, in order to increase the understanding of the acceptance and use of set-top boxes in South Africa. There is a central theoretical drive and force from the vast body of knowledge in the information technology acceptance research, which is positivist in nature (Alshehri, 2012).

### **6.6.2 Justification for an interpretivist paradigm**

The data in this study was collected from participants via interviews, which are qualitative and interpretive in nature. The data gathered permits the investigator to view the world through the eyes of the participants by following the interpretative paradigm and uses those experiences to conceptualise and infer the understanding from the gathered data. This study draws from the affairs of the industry experts in the fields of television broadcasts in relation to digital migration from analogue to digital terrestrial television.

Although the interpretivist paradigm is not a leading model of enquiry, it is gaining traction because of its ability to accommodate multiple perspective and versions of the truth (Willis, 2007). In this study, the researcher also seeks to understand a particular context, which is congruent to a core belief of the interpretivist paradigm that reality is socially constructed. The data gathered in this study will provide the researcher with multiple perspectives, allows the researcher to be open to change and going beyond the inductive and deductive approach, and will promote participatory and holistic research.

Table 10 summarises different research paradigms.

<b>Paradigm Level</b>	
<b>Interpretivist</b>	<b>Positivist</b>
No universal truth. Understand and interpret from the researcher's own frame of reference. Not committed neutrality is impossible. Realism of context is important	Belief that the world conforms to fixed laws of causation. Complexity can be tackled by reductionism. Emphasis on objectivity, measurement and repeatability.
<b>Ontological Level</b>	
<b>Relativist</b>	<b>Realist</b>
Belief that multiple realities exist as subjective constructions of the mind. Socially transmitted terms direct how reality is perceived and this will vary across different languages and cultures.	Belief that external world consists of pre-existing hard, tangible structures which exist independent of an individual's cognition.
<b>Epistemological level</b>	
<b>Subjectivist</b>	<b>Objectivist</b>
Distinction between the researcher and the research situation. Research findings emerge from the interaction between the researcher and a research situation, and the values and beliefs of the researcher are central mediators.	Both possible and essential that the researcher remain detached from the research situation. Neutral observations of reality must take place in the absence of any contaminating values or biases on the part of the researcher.

Table 10: Summary of Research Paradigms

### 6.6.3 Justification for a mixed methods approach

As a research design, a mixed methods approach was considered for its ability to incorporate both quantitative and qualitative data collection techniques. The mix of quantitative and qualitative research methods aids the investigator to gain a detailed understanding of the research problem and allow for the generalisation of the result (Kaplan & Maxwell, 2005). The justification of a mixed methods design was considered by Green et al. (1989), who recognised five roles assumed by mixed methods: triangulation, complementarity, expansion, development and initiation.

Mixing two methods has a propensity to provide rich insight into phenomena that cannot be fully understood if only one method was used. The objectives of this study necessitated the researcher to utilize this approach the complex nature of the study. Both methods have values that are complementary and sometimes convergent. These values have enhanced the reliability and findings of this study. According to

Giri and Shrestha (2020), mixed methods research is suitable for researchers who want to generalise their findings by widening their inquiry with sufficient depth and breadth. It is the intention of the author of this research to also generalise the results from provincial to national setting.

Another justification provided by (Bergman, 2008:4) for employing mixed methods is that of overcoming the epistemological differences between qualitative and quantitative paradigms, and to deliver a path to true knowledge. It is not the objective of this study to produce findings that are questionable and invalid, hence the used the mixed methods approach.

Using mixed methods allowed the researcher to apply methodological triangulation as a strategy for validation of results obtained by each method. This method showed complementarity and convergence of research findings.

This study utilises the extended UTAUT model as the conceptual framework, which was appraised by means of a sequences of quantitative data enquiry stages to yield a final model that best describes the principal phenomena of the data gathered. Hypotheses in this study are tested with the aim of understanding the effect between the extended UTAUT's constructs. The study uses the survey as a data collection instrument, thus justifying a quantitative approach to be used as a primary approach in this study. Qualitative research, on the other hand, places emphasis upon exploring and accepting "the meaning individuals or group ascribe to a social or human problem" (Creswell, 2014).

The migration from analogue broadcasting to digital terrestrial broadcasting is a relatively new social phenomenon in South Africa, and the choice of interviewing the industry experts to gain an in-depth understanding is, therefore, an appropriate choice that will be supported by a qualitative approach. In determining whether there exists a correlation between the UTAUT's exogenous constructs (effort expectancy - EE, performance expectancy - PE, social influence - SI, facilitated conditions - FC, technology awareness - TA and the dependent variable of behavioural intentions – BI), Pearson correlation was performed. In determining to what extent the moderators (Individualism, Masculinity, Uncertainty avoidance and Power distance)

can affect the relationship between PE, EE, SI, FC, TA and BI, regression analysis was performed.

## **6.7 Population and sampling**

This section presents the population of the study together with the sampling methods used. The recruitment of participants and the calculation of the sample size is also explained.

### **6.7.1 Population**

A population is described as a collection of individual or items which are the main focus of scientific inquiry (Banerjee & Chaudhury, 2010). The population from which the sample was drawn comprises students, professionals, and ordinary members of society. Sekaran (2000; P: 266) defines the population as “the entire group of people, events, or thing of interest that the researcher wishes to investigate”. According to Wood and Harber (2010), “the key point in separating population boundaries is to state them in specific operational terms so that everyone can tell who should or should not be measured”. This means that the measurement processes that describe the confines of the population must be clear and specific.

The population for the quantitative part of this study was drawn from residents in and around Ethekewini Municipality. Included in the population were self-employed individuals, workers and students of mixed races representative of the Ethekewini Municipality citizens, who have a television license or have access to a television set. For the qualitative part of the study, experts were identified based on their industry knowledge and experience on DTT.

### **6.7.2 Recruitment procedure**

To gain access to the targeted population,

- A survey monkey link was sent via email together with the letter of consent to a specific group of participants
- The same link was sent via Facebook and LinkedIn

The recruitment procedure started with the identification of participants that fit the criteria. The first criterion was that participants must be residents of the Ethekekwini Municipality; the second criterion was that they should own a television set or have access to a television set, and the last criterion was that participants should be of a minimum age of 23 years.

The study recruited 280 participants, but only 138 successfully completed the survey.

### **6.7.3 Sampling and sampling procedure**

Sampling is regarded as a method of choosing a group from whom data will be collected from in accordance with the purpose of the study (Brink et al., 2012). The overall aim of sampling, according to Vanderstroep and Johnson (2009), is to choose the members that are representative of the entire population in achieving the research goal.

The sampling procedure involves choosing a part of a population to use to test a hypothesis about the entire population. According to Thompson and Gowan (1998), a perfect sampling method is the one that yields unbiased and accurate estimates at low effort and cost. Sampling in this context refers to the correct use of the methods for the selection of research subjects. The determination of the number of participants to be recruited for the study in order to obtain acceptable results is quite essential.



Malhorta (2004) defines sampling as selection a sub-group of a population designated to take part in a particular study. In quantitative research, which aims to propose generalisation from a set of data (inference), the subjects are called the sample (Graziano & Raulin, 2013).

#### 6.7.4 Sample size

For this study, a 95% confidence level was carefully chosen with a 5% confidence interval for a population size of over 600 000. According to the 2021 SABC database for TV license holders, there are just over 600 000 TV license holders in Ethekewini Municipality. This number represents employed individuals, self-employed individuals and pensioners from Blacks, Whites and Indian communities. The sample size of the study was calculated to be 271 (see Figure 36).

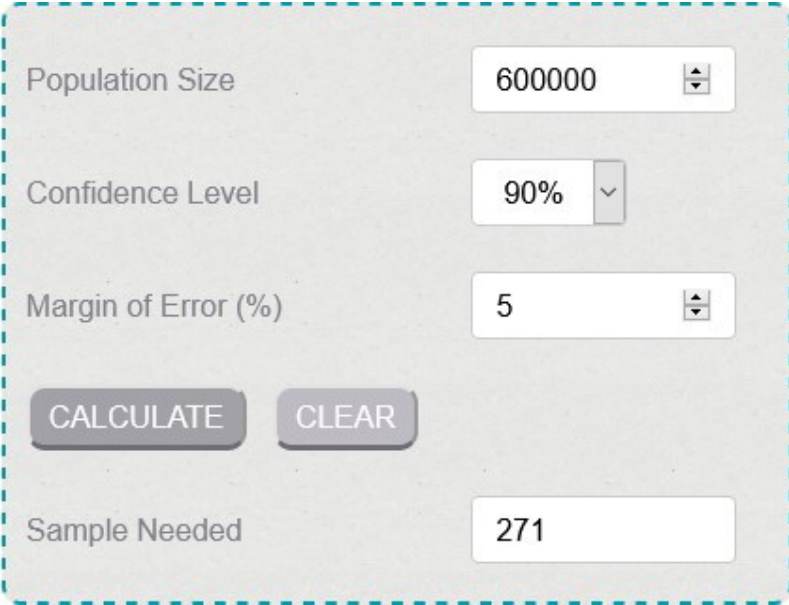
A screenshot of a sample size calculator interface. It features a light gray background with a dashed teal border. The interface includes four input fields: 'Population Size' with the value '600000', 'Confidence Level' with a dropdown menu showing '90%', 'Margin of Error (%)' with the value '5', and 'Sample Needed' with the value '271'. Below the input fields are two buttons: 'CALCULATE' and 'CLEAR'. The 'Sample Needed' field is at the bottom, showing the result of the calculation.

Figure 37: Sample calculator (<https://blog.flexmr.net/sample-size-calculator>)

According to Bless and Higson-Smith (2000:93), the bigger the population, the lesser the percentage (of that population), is required for the sample. This means that if the population is somewhat insignificant, then the sample should comprise a reasonable large portion of the population. The sampling method that was employed in this research was probability sampling for quantitative research and non-bribability for qualitative research.

Figure 37 summarises the sampling process followed in this study.

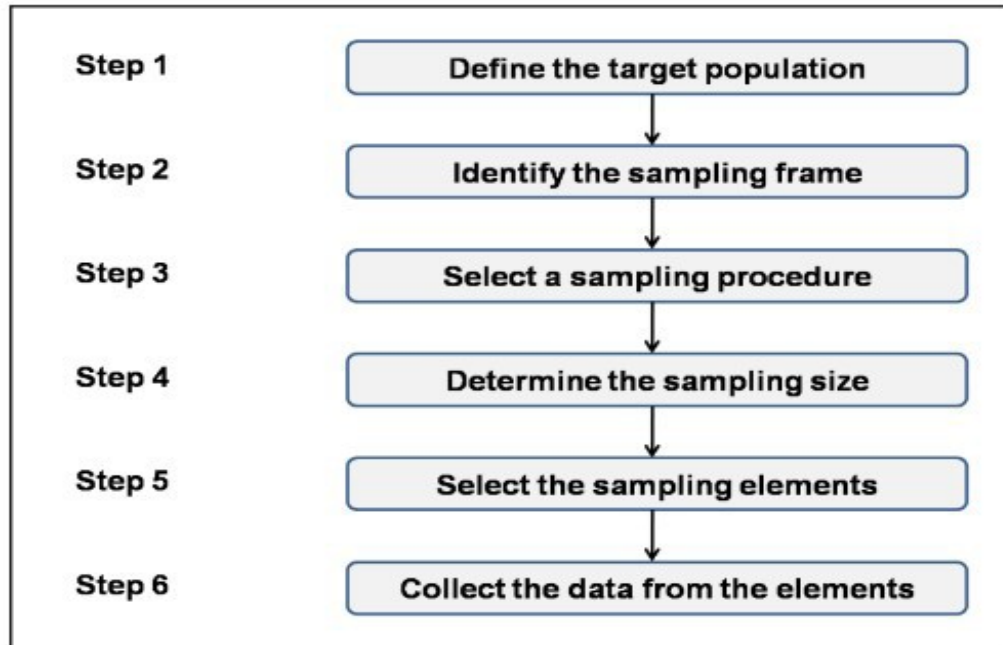


Figure 38: Six step sampling procedure (Cresswell, 2002)

#### 6.7.5 Sampling frame

Macinnon (2020) defines a sample frame as a precise source of respondents from which the sample is selected. This can either be a map from which particular areas are sketched, a social media group contacts, a list of television license holders, or any other source that defines explicitly who will and will not be included in the sample. The map in Figure 38 shows areas where respondents were drawn from, or the target population.



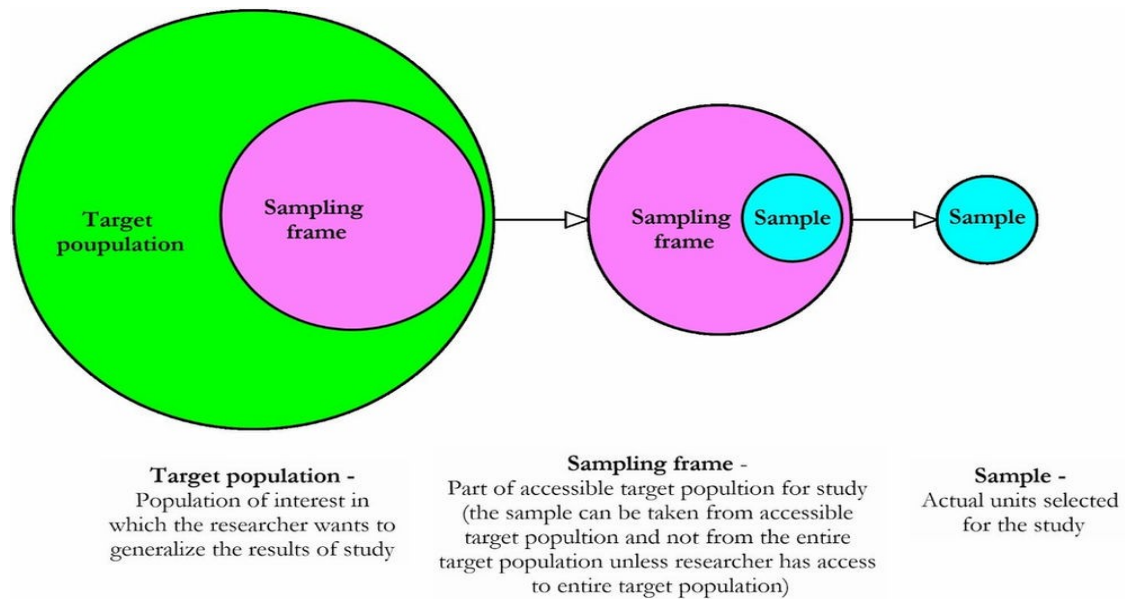


Figure 40: Sampling process

### 6.7.6 Sampling technique

Social research makes a distinction between two types of sampling approaches, random sampling and non-random sampling. In random sampling, all members of a sampling frame have the same probability of being selected as a participant in the study. Every element within the population should be known by the researcher before a sampling method is chosen. Within social research, probability sampling is considered the best form of sampling because of its representativeness of the sampling unit. Random sampling is mostly used by researchers whose objective is to remove bias, and achieve a sample that is inclusive of the target population, in order to make statistical inferences.

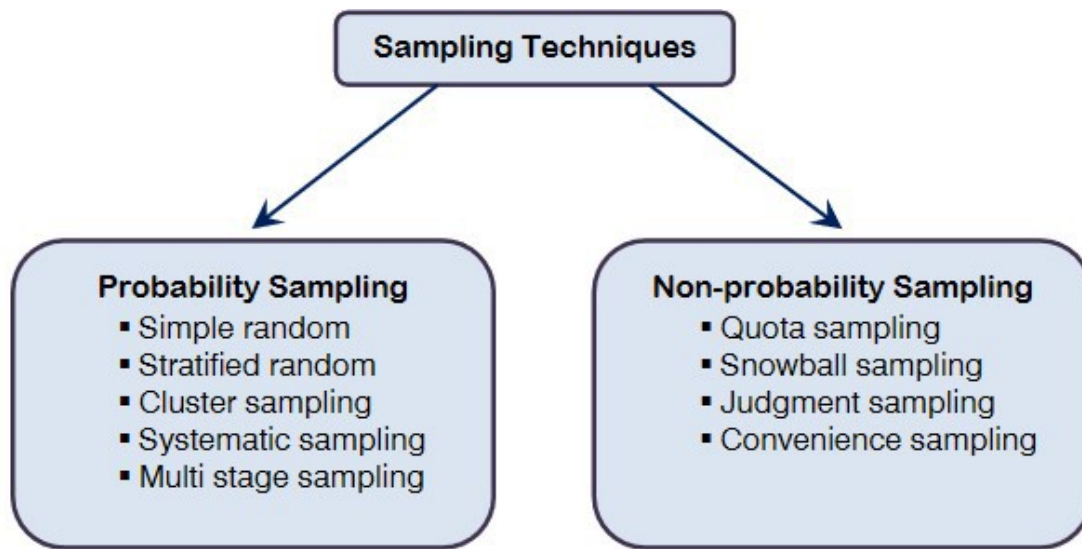


Figure 41: Sampling techniques (May, 2021:17)

In non-probability sampling techniques, participants do not have the same chance of being selected the same way as in a probability sampling. This often results in the selection of subjects that is skewed and susceptible to bias and other sampling errors (Etikan & Abubakar, 2016). Figure 20 highlight examples of sampling techniques (non –probability and probability). Selection of these methods is normally based on researcher preference and discretion.

In this study, non-probability convenience sampling was used for the quantitative study while purposive sampling was used in the qualitative study. According to Smith et al. 2002:41 and Greenfield (2002:189), the use of more than one sampling technique offers more perspectives on the phenomena under study.

The use of purposive sampling was built on the knowledge and understanding that the investigator has in selecting the required sample from the study population. The respondents were chosen based on their suitability to meet the objective of the study. This method was found to be less time-consuming and in meeting the objectives of the study.

The use of convenience sampling was based on accessibility of the respondents that were within reach. The researcher used his background and knowledge to identify

and select industry experts whose knowledge and expertise assisted the researcher in achieving the research goal.

## **6.8 Data Collection Method**

The nature and complexity of the study was such that the mixed methods approach was used. Research data can be collected by way of survey questionnaire, interviews, observations and documentary examination. The emphasis on the data collection survey studies is placed on structured indirect observations, questionnaires and interviews (Brink, 2001:109). The data collection method that was employed in this study was a questionnaire for quantitative data and interviews for qualitative data collection.

### **6.8.1 The quantitative data collection technique**

For the quantitative part of the study, the researcher used a survey questionnaire as a data collection instrument. In a questionnaire, respondents respond to the same set of questions that have been previously determined by the researcher (de Vaus, 2002). A questionnaire design is based on the delivery method to the respondents and how it will be returned. Methods of delivery include electronically (via the app or web based), hand delivery or by post. In this study, electronic method was used to deliver a survey questionnaire to the respondents. This method was selected due to COVID-19 restrictions that were in place at the time the data was gathered.

A consent letter was also attached to the questionnaire as proof that participants consented to participate in the study. The survey comprised of closed-ended questions arranged on a Likert scale of 1 to 5, where one means totally disagrees, and five totally agrees.

### **6.8.2 The qualitative data collection technique**

Qualitative data for this study was gathered using the interview schedule guide, which is described by Holstein and Gubrium (1995:76), as an inquiry form written to guide interviews with the respondents. The objective of using the interview guide was to obtain facts and opinion from respondents about their experiences of the phenomenon being investigated. Qualitative interviews, as defined by Kvale (2001:1), are “an attempt to understand the world from a participant’s point of view, to unfold to unfold the meaning of people’s experiences, and to cover their lived world prior to scientific explanations”.

A list of predetermined questions was drawn up to complete an interview guide and complement the survey questionnaire. This process was followed by a careful selection of participants based on their experiences and their knowledge of the phenomenon being investigated. All the questions were open-ended, allowed the respondents to express themselves freely on a given subject. Open-ended questions are exploratory in nature and offer rich and qualitative data to the researcher.

The interview questions sought information on the part played by the government on the delay of DTT implementation, confusing messages sent to the citizens, the roles of other stakeholders within the DTT value chain, and whether DTT is still relevant for South Africa.

### **6.9 Reliability**

Prior to disseminating the research instrument, the instrument reliability was performed. Mark (2015:17) defines instrument reliability as the degree to which the same outcomes are consistently obtain when using the same instrument repeatedly. Adding to this definition, Brink et al. (2012) suggested that the instrument should be consistent and dependable in measuring a variable. Instrument reliability is normally determined by means of a correlation measure with a value between 0 and 1. According to Tavakol and Dennick (2011), the most widely used estimate of reliability is internal consistency which is measured using Cronbach’s alpha. Researchers

consider a test to be reliable if they can achieve the same results when they repeat the same research with different samples, all conditions remaining the same.

Construct reliability coefficient was computed using Cronbach's alpha ( $\alpha$ ) to determine internal consistency, clarity of questions and overall reliability of the questionnaire constructs. Different researchers consider different reliability values; for example, DeVellies (2003) and Robinson et al. (1990) consider the coefficient value of over 0.7 as acceptable, and over 0.8 as good, and values over 0.9 are deemed excellent.

Table 10 presents the result from reliability test of a survey questionnaire conducted on the test respondents.

<b>Construct</b>	<b>Item construct</b>	<b>Cronbach's alpha</b>
Performance Expectancy	4	0.71
Effort expectancy	3	0.80
Technology Awareness	4	0.72
Social Influence	5	0.95
Facilitated conditions	5	0.82
Attitude towards Use	2	0.77
Behavioural Intentions	2	0.83
Voluntary of Use	2	0.97
Power Distance	3	0.77
Masculinity	1	-
Individualism	3	0.83
Uncertainty Avoidance	3	0.87

Table 11: Cronbach's alpha coefficient values

The reliability coefficient of each of the UTAUT construct in this study was found to be as per Table 11.



Values less than 0.6 are regarded as very poor, and those above 0.8 are considered to be very good, acceptable and reliable. From the test results obtained, the Cronbach alpha for all the constructs were above 0.7 and were accepted, except for the Masculinity construct, which gave a negative value. The questions under Masculinity construct were then revised on the final questionnaire.

## 6.10 Validity of the survey instrument

When a questionnaire is both reliable and valid, researchers will have tremendous confidence in the results obtained using the instrument as a data collection medium.

In identifying the fundamental constructs that elucidate the discrepancies in the measures that reduce numerous items to a lesser number of dormant variables, a Factor Analysis technique is used (McCombs, 2011). This technique is often used by researchers when analysing the weighted items or responses that create factor scores used to determine the reliability and validity of a survey instrument. In this study, only content and construct validity were tested.

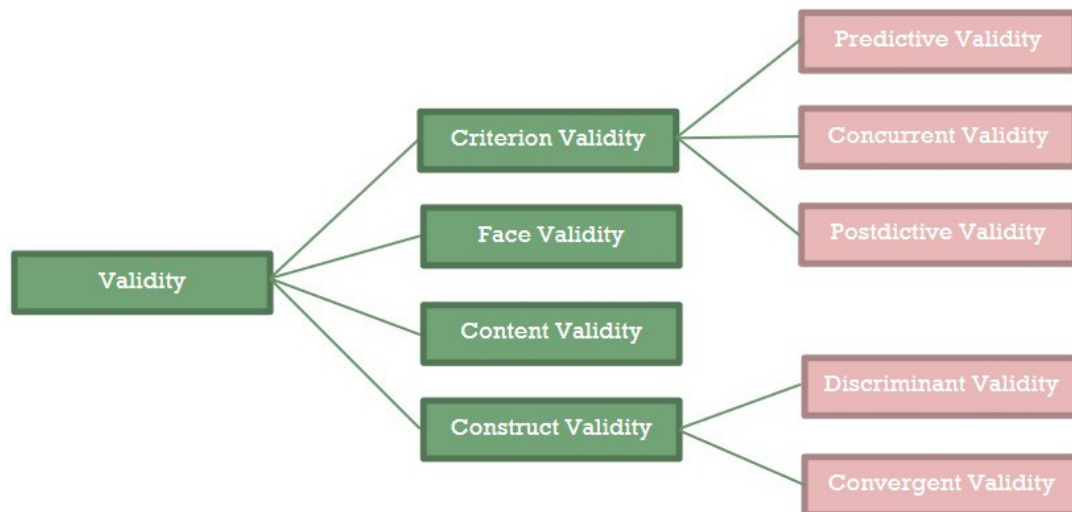


Figure 42: Different types of validity testing

### 6.10.1 Content validity

The interview questionnaire for the qualitative part of the study was validated by using the content validity. Straub et al. (2004) define content validity as “the degree to which items in an instrument reflect the content universe to which the instrument will be generalized”. It is suggested by researchers that one to applies content validity when a new survey instrument is developed. In the case of this study, content validity was not applied in the quantitative part because the survey constructs of the questionnaire were adapted from the UTAUT model which has been tried and tested. In a qualitative content validity method, content experts (in this case Industry experts) makes recommendations based on observing grammar, use of appropriate and corrects words in a proper order on all the items in the interview questionnaire before scoring.

The content of the interview guide was evaluated by industry experts who understood the research area. Questions that were deemed unnecessary were assigned 1, those that were useful but not essential were assigned the number 2, and those that were essential and critical were assigned the number 3. Content Validity Ratio (CVR) was computed and the results are presented in Table 11.

	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6	Expert 7	Expert 8	Expert 9	Expert 10	Expert 11		CVR
Item 1		x	x	x	x	x	x	x	x	x	x		0.818
Item 2	x	x			x	x	x	x		x	x		0.455
Item 3	x	x	x	x	x	x		x	x	x	x		0.818
Item 4	x	x	x	x	x	x	x	x	x	x	x		1
Item 5	x	x	x		x		x	x	x	x	x		0.636
Item 6	x		x	x	x	x	x	x	x	x	x		0.818
Item 7	x	x		x	x	x	x		x	x	x		0.636
Item 8	x	x	x	x	x		x	x	x	x	x		0.818
Item 9	x	x	x	x	x	x	x	x	x	x	x		1
Item 10	x	x	x	x	x		x	x		x	x		0.636
Item 11	x	x			x	x	x	x	x	x			0.455
Item 12	x	x	x	x	x	x			x	x	x		0.636
Item 13	x	x	x	x	x	x	x	x		x			0.636
Item 14	x	x	x	x	x	x	x	x	x	x	x		1
Item 15	x		x	x		x	x	x	x	x	x		0.636
Item 16	x	x	x	x		x	x	x		x	x		0.636
Item 17		x	x	x	x	x		x	x	x	x		0.636
CVR(Critical) for a panel size (N) of 11 is 0.636.												CVI	0.722

Table 12: CVR Scores of Individual Items by Experts

Table 13 depicts the Lawshe critical values for determining content validity.

**Table 1.** CVR<sub>critical</sub> One-Tailed Test ( $\alpha = .05$ ) Based on Exact Binomial Probabilities.

N (Panel Size)	Proportion Agreeing Essential	CVR <sub>Exact</sub> <sup>Critical</sup> Values	One-Sided p Value	N <sub>critical</sub> (Minimum Number of Experts Required to Agree Item Essential)—Ayre and Scally, This Article	N <sub>critical</sub> Calculated From CRITBINOM Function—Wilson et al. (2012)
5	1	1.00	.031	5	4
6	1	1.00	.016	6	5
7	1	1.00	.008	7	6
8	.875	.750	.035	7	6
9	.889	.778	.020	8	7
10	.900	.800	.011	9	8
11	.818	.636	.033	9	8
12	.833	.667	.019	10	9
13	.769	.538	.046	10	9
14	.786	.571	.029	11	10
15	.800	.600	.018	12	11
16	.750	.500	.038	12	11
17	.765	.529	.025	13	12
18	.722	.444	.048	13	12
19	.737	.474	.032	14	13
20	.750	.500	.021	15	14
21	.714	.429	.039	15	14
22	.727	.455	.026	16	15
23	.696	.391	.047	16	15
24	.708	.417	.032	17	16
25	.720	.440	.022	18	17
26	.692	.385	.038	18	17
27	.704	.407	.026	19	18
28	.679	.357	.044	19	18
29	.690	.379	.031	20	19
30	.667	.333	.049	20	19
31	.677	.355	.035	21	20
32	.688	.375	.025	22	21
33	.667	.333	.040	22	21
34	.676	.353	.029	23	22
35	.657	.314	.045	23	22
36	.667	.333	.033	24	23
37	.649	.297	.049	24	23
38	.658	.316	.036	25	24
39	.667	.333	.027	26	25
40	.650	.300	.040	26	25

Table 13:Lawshe Standard Table

## **6.11 Survey dissemination**

The survey questionnaire was translated in isiZulu to ensure that it does not discriminate against Zulu-speaking respondents. Through Survey Monkey, a master survey template was created. Participants received an email of a survey link directly from survey monkey together with a letter of consent. Another group of participants received a link via their Facebook addresses and LinkedIn addresses. An informed consent form served as a cover page for the survey, which also specified that participation was voluntary and anonymous. The questions on the survey questionnaire were adapted from the original UTAUT research questions used by other researchers to fit the context of this study.

The survey questionnaire was divided into three parts:

- Part 1 contained biographical information of the respondents and has six questions.
- Part 2 was split into two sections consisting of 28 questions. The first section measured the respondents' intention to adopt set-top boxes, and the second section measured the respondents' attitude and perception about using the set-top box.
- Part 3 consisted of 9 questions that measured the moderating effects of cultural dimensions on the association between exogenous constructs and the dependent variable.

The survey questionnaire for the qualitative part of the study was sent to broadcasting experts and broadcasting equipment manufacturers for review. All the questions were given approval with a slight modification of grammar and spelling.

## **6.12 Qualitative data analysis**

This section presents the types of qualitative data analysis and the method used in this study for analysing the qualitative data.

### **6.12.1 Thematic analysis of qualitative data**

In simple terms, thematic analysis is a method used in the analysis of qualitative data and involves going over a large data set (such as transcripts from interviews), finding shared patterns across the data (Braun & Clarke, 2006). The data is mostly non-numeric and cannot be analysed through statistical and mathematical calculations. The method is not ideal for examining the distinctive meaning or experiences from a single data item or person, but can be used as a powerful tool when a researcher seeks to comprehend a set of practices (Braun & Clarke, 2012). Varpio and Kiger (2020) are of the view that the use of thematic analysis should be based on the aim and objectives of the study rather than on the “easy-to-follow” method of analysis, as suggested by Braun and Clarke (2017).

### **6.12.2 Inductive Qualitative Analysis**

Thematic Analysis is categorised into two types, inductive and deductive analysis. In inductive analysis, the researcher is open to the themes they wish to explore, and sets the criteria to categories the data as the research progresses. Bingham (2020) describes inductive analysis as an evolving approach that involves the investigator reading over the data and permits codes to surface. Three forms of inductive analysis are identified by Bingham: open coding, n-vivo coding (these are codes developed from participants’ own words), and the last one is the constant comparative analysis. Inductive analysis helps a researcher to make significance of the data, develop themes and findings, identify representative data that support the findings and to explain findings using theory and literature (Bingham, 2020).

<b>Question Sample</b>	Descriptive, process, interpretive: what are the core meanings evident in the text, relevant to research aims.
<b>Sample</b>	Purposeful; may be either contingent or a priori; criteria may be demographic.
<b>Research process</b>	Inductive and usually cyclical moving back and forth among questions, data gathering, and data analysis.
<b>Data analysis</b>	Focus on themes and interpretation comparing cases to each other.
<b>Memos of analysis</b>	Memoing is critical and memos may be of many types.
<b>Criteria for ending data collection</b>	Added data yield little new information or insight.
<b>Design</b>	Develops and becomes increasingly focused during the research process. Goal is interpretation of rich data.
<b>Presentation of findings</b>	Description of most important themes.
<b>Generalisability</b>	Theoretical or cross-population generalisability to like cases.

Table 14: Features of Inductive Approach (Liu, 2016)

In this study, the inductive approach was chosen based on the two reasons. Firstly, the interpretive nature of the inductive approach fitted the research focus. The study aimed to investigate reasons for the slow uptake of digital terrestrial television (DTT), which is a very complex topic in nature as it involved many factors. Secondly, the purpose of the inductive approach is in line with this study's mode of research. As Thomas (2006) puts it, inductive approach allows for the raw text to be condensed into a brief summary format, and also creates a link between the research objectives and the summary's finding. This study's research findings had the same purpose in that the respondent's description of events were summarised into important themes and that a connection between these themes and the research aims was built.

### 6.12.3 Deductive thematic analysis

According to Wilson (2010), a deductive approach is explained by means of a hypothesis derived from the scheme of a theory. Gulati (2009) describes deductive as reasoning from a specific to the broad. Gray (2009) argues that "deductive

reasoning moves towards hypothesis testing to verify, refuse or modify a theory based on empirical data, whereas inductive reasoning seeks to discover a binding principle and to construct generalisations, relationships and even theories by analysing the data collected for this purpose". It offers the researcher the possibility to explain the underlying relationship that occurs between the concepts and variables, the possibility of quantitatively measuring the concepts and the possibility of generalising the findings to a certain extent. Deductive qualitative research differs from other qualitative approaches in that the theoretical proposition derived from the literature review, are applied to the collection and analysis of data (Boyatzis, 1998; Hyde 2000). According to Denis Langley and Pineault (2000), a small proportion of qualitative research has adopted this approach, and there are few examples that can illustrate the application of this study. According to Boyatzis (1998), Fereday and Muir-Cochrane (2006), Deductive Thematic Analysis involves the following steps:

1. Consideration of the sample and design issue
2. The code manual that labels, defines and describes the theme is developed
3. Reliability of the code is validated and tested
4. Data is summarised and initial themes are identified
5. Application of the template codes and additional coding
6. From the codes, themes are identified
7. Finally, the code themes are corroborated and legitimated

The next diagram summarises the difference between inductive thematic analysis and deductive thematic analysis (Figure 45).

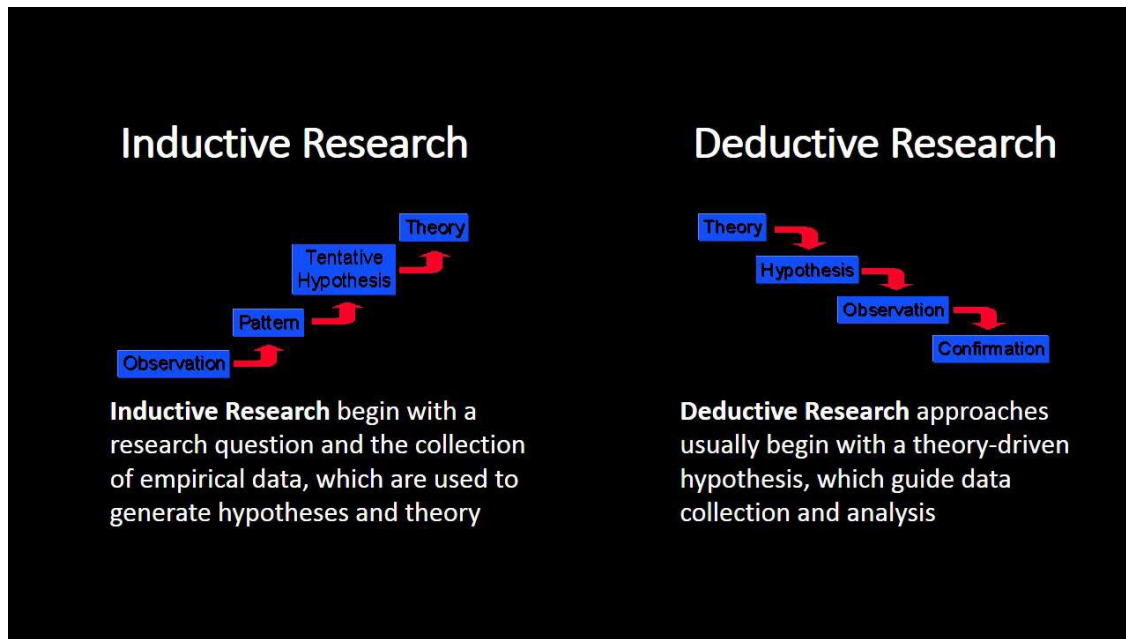


Figure 43: Deductive and Inductive analysis summary

In this study, the collected data was collected from participants by way of audio recording, then transcribed, organised into themes and lastly, analysed, in order to make valuable inferences from the data.

The meaning of themes has been explained in earlier studies (Braun and Clarke, 2006; Vaismoradi et al., 2013) as “codes with a common point of reference and a high degree of transferability through which ideas can be united throughout the study”. It has been argued by (Boyatzis, 1998; Ryan and Bernard, 2000) that the basis of many other qualitative analyses is provided by thematic analysis which cannot be classified as a method in its own right. Nowell, Norris and Moules (2017) disagree with Boyatzis, Ryan and Bernard, by saying that thematic analysis is a method for analysis which is used to generate themes that captures a phenomenon (Daly, Kellehear & Glikman, 1997).

Braun and Clarke (2006) in their research identified a six-step approach for conducting a thematic analysis; these steps may not be approached in a linear fashion, thus permitting the investigator the opportunity to move back and forth between the stages. The steps are described by Braun and Clarke (2006) (YEAR):



1. Firstly, the investigator engages the data by repeatedly reading the data to gain a sense of familiarity.
2. From the observations that may have been made, codes are developed to capture key ideas within the data that are connected to the research questions.
3. Codes are then grouped together to generate themes relating to a particular concept that identifies patterns across the data.
4. The generated themes are then reviewed in relation to the data that has been coded and the general data as a whole. It is ideal at this stage to also use a thematic map to define the relationships between the themes.
5. Themes are finally defined and named.
6. Final analysis is conducted and the report is generated.

### **6.13 Chapter Summary**

Chapter six presented the research design and the methodology applied in this study. In validating and understanding the conceptual framework, both qualitative and quantitative research approaches were found to be appropriate for this study. A synopsis of the underlying epistemology was provided, and both positivist and interpretivist paradigms selected to be the philosophical foundation for this study. This was followed by a discussion on various available research approaches, the justification of the mixed methods research, and the selection of the data collection instrument. A survey and interviews were found to be the best tools for data collection in this study.

The sampling frame consisted of respondents from the Ethekewini Municipality who are permanent residents and those that reside there for employment reasons. These were drawn from LinkedIn, Facebook and various offices across Durban. A random and convenient sample was selected as the best sampling technique. For data analysis, linear regression statistic was used for testing whether a significant relationship exists between the dependent variables and exogenous constructs, while a thematic analysis method was used for the analysis of the qualitative data. The chapter concludes by discussing the validity and reliability of the survey

instrument using Cronbach's alpha and the Content validity ratio (CVR). The following chapter (Chapter 7) will present and analyse the results in detail.

## **CHAPTER SEVEN**

### **QUANTITATIVE DATA ANALYSIS AND PRESENTATION OF RESULTS**

#### **7.1 Introduction**

Chapter seven presents the analysis of quantitative data and the research findings on the citizen's intention to adopt digital terrestrial television (DTT) in Ethekewini Municipality. The data analysis process in this study involved the use of methodical and analytical reasoning to gain information from the data. Quantitative data was analysed using statistical tools such as Spearman's correlation and multiple regression analysis to test the relationship between exogenous constructs of the UTAUT model and behavioural intention, as well as the extent of the mediating effect on the relationship between exogenous constructs and the behavioural intention to adopt DTT.

The primary reason for data analysis in this study was to find meaning in data so that the derived knowledge can be used to answer the research questions and also to verify the interaction amongst variables (Bhattacharjee, 2012:23). The successful analysis of data requires that data be broken down into different components to get responses to research questions and to test research hypotheses (Fouche & Venter, 2002).

The following research questions were addressed by the study:

- Is there a significant and positive relationship between the exogenous constructs of the UTAUT model plus technology awareness as an additional construct and the citizens' behavioural intention to adopting the set-top box for digital terrestrial television?
- To what extent do the Hofstede's cultural dimensions moderate the association between the exogenous constructs in the UTAUT model and the behavioural intentions to adopt technology?

This study applies both quantitative and qualitative data collection approaches. The study employed a survey questionnaire for the collection of quantitative data. A survey questionnaire was used for the quantitative data collection and the interviews were conducted for collecting qualitative data. A coding method was used to code the quantitative data collected through the questionnaire, and analysed using descriptive statistics and the Statistical Package for Social Sciences (SPSS).

## **7.2 Quantitative data preparation**

A summary of individual responses from survey monkey was exported to Excel. The Excel format flagged the missing data before being imported into SPSS.

### **7.2.1 Pre-testing of the research instrument**

The questionnaire was pre-tested with a group of respondents (pilot study) to detect if there were any issues with content, layout or wording that may present difficulty for respondents to understand questions. This was done before the initial phase of the data collection stage to validate the research tool. Before the research instrument (survey questionnaire) was disseminated to the more significant sample, it was tested on a sample of few individuals who were not part of the actual study but were willing to participate in testing the research instrument.

Ten questionnaires for the quantitative part of the study were sent out to the test group, and only nine were returned (90%). From the nine that came back, only one responded partially completed the survey due to a lack of understanding of some of the terminology used. This was taken as positive feedback aimed at improving the questionnaire. It must be said though that all the questions used in the questionnaire were drawn from the literature and adapted for this study. These questions were also quoted as being “reliable and valid” to be used in measuring the construct of the phenomena they intend to measure (Tarhini, 2013). These questions were developed and tested in similar context to this study hence they are applicable to this study as well.

### **7.2.2 Data screening**

Questionnaires developed and used in this study were screened for any missing information before the data was captured. In ensuring the accuracy of the data, a thorough check for descriptive statistic was conducted for each construct.

### **7.2.3 Missing Data**

Kang (2013:2) defines missing data as “the data value that is not captured for a variable in the observation of interest”. Many researchers have been confronted with the problem of missing data as this is relatively common in most studies (Graham, 2009:60). If not addressed properly, missing data will present problems for researchers and this will result in reduced statistical power wherein the test reject the null hypothesis when it is false; also, the representativeness of the sample can be reduced. This problem becomes even more critical in the structural equation model when using AMOS. For example, the computation of fit measures such as Goodness of Fit index, the modification indices and Chi-Square becomes impossible if there is any missing data in the sample (Arbuckle, 2009).

The survey questionnaire had 43 questions and some of the questions were not answered by all the respondents. Table 13 summarises the responses from 138 respondents.

The observations from Table 13 show that at the beginning of the questions, respondents answered all the questions until Question 6. As they continued to answer the questionnaire, more questions were skipped. On average, 29.8% of respondents partially completed the survey questionnaire; this is inconsistent with the results of the pre-testing of the research instrument which revealed that only 10% of the respondents partially completed the test questionnaire.

According to Hair and Anderson (2010), missing data is acceptable if it is between 0.4% and 10%, while Schumacker and Lomax (2004) regard 5% as acceptable. In this study, missing data accounted for 15.9%, which is more than the recommended 10%. To overcome the problem of the missing data, a mode imputation was

performed on SPSS to fill out the missing data. Mode imputation is a process of replacing missing values of a “categorical variable by the mode of non-missing cases of that variable” (Xu, 2020).

#### **7.2.4 Outliers**

Hair et al. (2006:73) define outliers as “observations having unique combination of characteristics identifiable as distinctly different from other observations”. It thus becomes critical to detect and treat outliers to avoid affecting the normality of the data and distorting the statistical tests (Tabachnick & Fidel, 2007). Several researchers have suggested that extreme outliers should be deleted and only mild outliers can be retained in the model.

SPSS AMOS version 27 was used to identify multivariate outliers which are a test involving observation and analysis of more than one statistical outcome variable at a time. In this study, the Mahalanobis d-squared measure was used to identify the multivariate outlier. According to Samah (2013), there are three measures that can be used to check for outliers. The first one is the High Mahalanobis d-squared; the second measure is achieved by dividing the d-squared by the degree of freedom (df), and the last measure is comparing Mahalanobis d-squared against chi-squared critical. All the records that had p1 value  $<0.05$  were considered influential outliers, and in total, 34 multivariate outliers were detected. However, these outliers were retained by the researcher since they were not found to be problematic and were included in further analysis (Hair et al., 2010).

Observation number	Mahalanobis d-squared	P1	P2		Observation number	Mahalanobis d-squared	P1	P2
37	69.481	0	0		21	26.677	0.224	0
42	65.209	0	0		94	26.228	0.242	0
119	63.262	0	0		135	25.679	0.266	0.002
40	54.731	0	0		14	25.205	0.287	0.006
33	53.803	0	0		84	25.085	0.293	0.005
115	52.534	0	0		93	24.991	0.298	0.004
122	52.532	0	0		137	24.808	0.306	0.005
2	52.514	0	0		73	24.637	0.315	0.006
9	51.324	0	0		54	23.522	0.373	0.108
65	51.217	0	0		28	23.183	0.391	0.17
100	51.209	0	0		55	23.17	0.392	0.133
64	50.169	0.001	0		134	23.158	0.393	0.103
107	47.205	0.001	0		96	23.141	0.394	0.078
25	45.26	0.002	0		63	22.515	0.43	0.233
75	44.501	0.003	0		77	21.877	0.467	0.498
32	44.435	0.003	0		101	21.875	0.467	0.431
60	43.646	0.004	0		128	21.82	0.471	0.395
36	42.635	0.005	0		8	21.537	0.488	0.487
16	42.573	0.005	0		66	21.025	0.519	0.704
82	42.474	0.005	0		12	20.461	0.554	0.884
50	42.397	0.006	0		104	20.323	0.563	0.89
112	42.204	0.006	0		127	20.223	0.569	0.886
45	41.94	0.006	0		71	19.721	0.6	0.963
95	41.64	0.007	0		48	19.305	0.626	0.988
86	41.318	0.008	0		15	19.048	0.642	0.993
61	40.952	0.008	0		59	17.696	0.724	1
35	39.597	0.012	0		133	16.817	0.773	1
26	37.441	0.021	0		106	16.456	0.793	1
98	37.221	0.022	0		110	15.892	0.821	1
22	37.172	0.023	0		88	14.56	0.88	1
20	36.594	0.026	0		68	14.322	0.89	1
52	36.216	0.029	0		47	13.289	0.925	1
56	35.931	0.031	0		62	12.909	0.936	1
102	35.848	0.032	0		53	12.756	0.94	1
129	35.686	0.033	0		58	12.511	0.946	1
44	35.543	0.034	0		57	12.435	0.948	1
74	35.266	0.036	0		83	12.322	0.95	1
13	35.011	0.039	0		109	11.829	0.961	1
89	34.061	0.048	0		10	11.762	0.962	1
29	33.686	0.053	0		138	11.342	0.97	1
116	33.37	0.057	0		78	11.331	0.97	1
113	32.75	0.065	0		41	10.659	0.979	1
4	31.151	0.093	0		46	10.052	0.986	1
136	30.903	0.098	0		81	9.9	0.987	1
79	30.767	0.101	0		31	9.603	0.99	1
24	30.616	0.104	0		17	9.269	0.992	1
30	30.483	0.107	0		49	8.465	0.996	1
1	28.922	0.147	0		92	8.464	0.996	1
103	28.572	0.157	0		51	7.779	0.998	1
23	27.974	0.177	0		18	7.742	0.998	1

Table 15: Multivariate Outliers

### 7.2.5 Test for normality

A test for normality could be conducted using either the K-S test (Kolmogorov-Smirnov) or SW test (Shapiro-Wilk). Other graphical methods such as the box-plot, histogram and probability-probability (P-P) plots are used in some areas of research. Both tests assume that the data is normal, and K-S test is normally recommended for large samples, whereas S-W is recommended for small samples. Testing for normality is significant in multivariate analysis because if the data is not normally distributed, reliability and validity of the results may be affected.

In this study, the K-S test was used to check if the data is distributed normally. A positive kurtosis value is indicative of a peaked distribution, while a negative value point to a flatter distribution (Pallant, 2010). The symmetry of the distribution is indicated by the skewness value; a negative value means the distribution is shifted to the right, while a positive value implies that the distribution is shifted to the left. A skewness value of between -2.0 and +2.0 is deemed acceptable and normal (George and Mallery, 2010), while a kurtosis value of between -3.0 and +3.0 are acceptable (Kallner, 2018)

In this study, all items in the data set were found to be normally distributed with the skewness, that is, within the acceptable range of  $\pm 2$ . Items EE01, SI05 and FC01 were found to have higher Kurtosis which may indicate the potential of outliers. Other than this, the data did not show any non-normality issues. Table 15 presents the K-S test results for normality.



<b>Variable</b>	<b>Min</b>	<b>Max</b>	<b>Skew</b>	<b>CR</b>	<b>kurtosis</b>	<b>c.r.</b>
<b>BI01</b>	1	5	0.594	2.849	0.118	0.284
<b>BI02</b>	1	5	1.567	7.516	2.282	5.471
<b>FC01</b>	1	5	-1.923	-9.221	5.561	13.334
<b>FC02</b>	1	5	-1.29	-6.188	2.338	5.607
<b>FC30</b>	1	5	-1.138	-5.457	2.173	5.21
<b>FC05</b>	1	5	-1.321	-6.335	2.74	6.571
<b>SI01</b>	1	5	-0.344	-1.65	0.739	1.772
<b>SI02</b>	1	5	-0.374	-1.791	0.209	0.502
<b>SI03</b>	1	5	-0.479	-2.298	0.425	1.02
<b>SI04</b>	1	5	-0.582	-2.79	1.549	3.714
<b>SI05</b>	1	5	-1.517	-7.276	4.9	11.75
<b>TA01</b>	1	5	-0.999	-4.793	1.438	3.448
<b>TA02</b>	1	5	-1.084	-5.199	1.456	3.491
<b>TA03</b>	1	5	-0.383	-1.839	-0.117	-0.281
<b>TA04</b>	1	5	-0.869	-4.169	0.46	1.102
<b>EE01</b>	1	5	-1.434	-6.876	3.129	7.503
<b>EE02</b>	1	5	-1.633	-7.831	4.35	10.431
<b>EE03</b>	1	5	-1.147	-5.501	2.209	5.298
<b>PE01</b>	1	5	-0.833	-3.996	1.516	3.636
<b>PE02</b>	1	5	-1.163	-5.577	2.34	5.612
<b>PE03</b>	1	5	-0.753	-3.611	1.818	4.36
<b>PE04</b>	1	5	-1.205	-5.781	2.658	6.373
<b>Multivariate</b>					266.744	48.214

Table16: Normality Test Results

### 7.2.6 Multicollinearity

Multicollinearity often arises when two or more variables correlate extremely with each other. A Linear regression test was run on SPSS version 27 to detect the presence of multicollinearity using the Variance Inflation Factor (VIF) values and tolerance values. The results of the test are presented in Table 16.

Coefficients <sup>a</sup>								
		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	1.800	0.498		3.616	0.000		
	Mean PE	-0.433	0.130	-0.329	-3.324	0.001	0.663	1.508
	Mean EE	-0.073	0.128	-0.058	-0.569	0.070	0.620	1.612
	Mean TA	0.110	0.123	0.101	0.895	0.472	0.513	1.948
	Mean SI	0.210	0.170	0.161	1.237	0.018	0.386	2.588
	Mean FC	0.362	0.186	0.244	1.950	0.043	0.415	2.407

a. Dependent Variable: Mean BI

Table 17: Multicollinearity Test Results

Tolerance value greater than 0.1 and VIF value less than 3 indicates that multicollinearity does not exist amongst the independent constructs. All the independent constructs had a VIF of less than 3 and a tolerance value greater than 0.1. These results indicate the lack of multicollinearity.

### 7.3 Structural Equation Modelling (SEM) and Model testing

In the previous section the statistical analysis and results indicating that the research model established satisfactory validity and reliability were presented. In this section the test for structural model, including the theoretical hypothesis and relationship between latent constructs is tested. The structural equation modelling (SEM) was employed to test the modified UTAUT model. This according to Kline (2005) “provides the basis for testing hypothesis by estimating the path coefficients of the essential associations of the linear relationships amongst unobserved and observed variable”. He further argued for SEM as a better choice for explanatory analysis of non-experimental data. SEM is defined by Blunch (2008:13) as a “statistical technique used for testing causal relationships that are based on non-experimental data. It consist of measurement model that specifies how measured variables come together to represent latent factors, and structural model that specify how construct are related to each other in the model.

### 7.3.1 Analysis of the measurement model

In analysing the relationship that exists between the constructs of the proposed research model, confirmatory factor analysis (CFA) was employed to assess the construct's validity and to test the model fit. Next, the structural equation modelling (SEM) technique was utilized to test the hypothesised relationship between the independent and dependent variables. The application of these two models assisted the researcher in ensuring that only constructs that have good measures are retained (Hair et al., 2010).

This study has employed AMOS version 27 in testing the relationship amongst the variables.

Confirmatory factor analysis (CFA) was applied to examine the relationships that exist amongst different variables. When applying CFA, it is not necessary to distinguish between independent and dependent variables except in the model testing stage. The two-headed arrows represent the covariance, and the single arrow represents the causal relationship from a construct to an indicator. The measurement model was assessed using the goodness-of-fit tests (GOF). Hair et al. (2006) recommends using relative Chi-squared ( $\chi^2/df$ ) test, Standard Error of Approximation (RMSEA), Comparative Fit Index (CFI) and Goodness-of-Fit Index (GFI) to measure the goodness of fit, and that the factor loading should be more than 0.5. The model is deemed to fit the data if the fit index values are within the threshold as indicated in the measurement model assessment criteria in table 18.

The results of the measurement model are presented in figure 43, while fit indices are presented in table 20-23. The measurement model in figure 43 was drawn up using AMOS version 27.

As presented in table 18, table 20-23, the model showed as acceptable level of fit (CMIN/DF = 1.887, RMSEA = 0.79, CFI = 0.918, NFI = 0.983), and the significant loading of  $>0.50$  ( $p < 0.001$ ) for all the factors on their respective constructs.

<b>Construct</b>	<b>Loading</b>	<b>CR</b>	<b>AVE</b>
<b>Performance Expectancy (PE)</b>		<b>0.817</b>	<b>0.533</b>
PE01	0.55		
PE02	0.72		
PE03	0.81		
PE04	0.79		
<b>Effort Expectancy (EE)</b>		<b>0.877</b>	<b>0.704</b>
EE01	0.81		
EE02	0.9		
EE03	0.8		
<b>Tech Awareness (TA_</b>		<b>0.893</b>	<b>0.682</b>
TA01	0.95		
TA02	0.91		
TA03	0.62		
TA04	0.8		
<b>Social Influence (SI)</b>		<b>0.866</b>	<b>0.577</b>
SI01	0.82		
SI02	0.93		
SI03	0.91		
SI04	0.51		
SI05	0.52		
<b>Facilitated Conditions (FC)</b>		<b>0.75</b>	<b>0.512</b>
FC01	0.61		
FC02	0.89		
FC03	0.97		
FC04			
FC05	0.036		
<b>Behavioural Intentions (BI)</b>		<b>0.711</b>	<b>516</b>
BI01	0.76		
BI02	0.63		

Table 18: Measurement model results

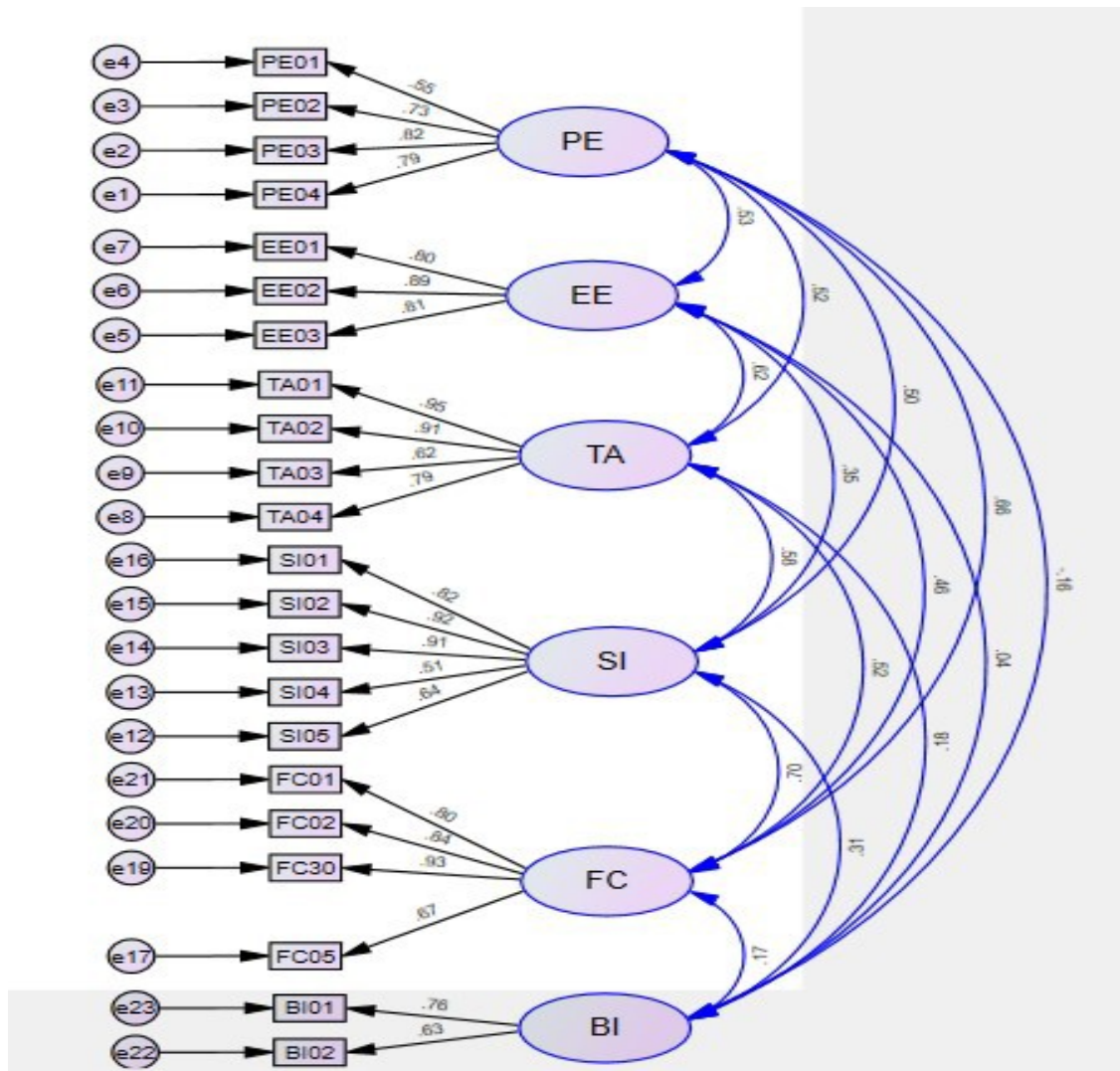


Figure 44: The measurement model

Standardized factor loadings in Figure 43 were used in the hypothesized model for 23 items. The 24<sup>th</sup> item (FC04) was removed due to a low factor loading of less than 0.4.

### 7.3.2 Goodness-of-fit indices

The goodness-of-fit index (GFI) is a sign indicating that a specified model can be used to reproduce the observed covariance matrix among indicators (Hair et al., 2010: 664-665). A GFI value of 0.9 and above indicates a good fit while values between 0.7 and 0.9 indicate a fair fit. Hair et al. (2010) recommend that researchers

should compare at least two or three model fit indices, and according to Kenny (2020), a good fit model is not necessarily a valid model.

Categories	Index Name	Accepted Index Value
Absolute Fit	Chisq	> 0.05
	RMSEA	< 0.08
	GFI	> 0.90
Incremental Fit	AGFI	> 0.90
	CFI	> 0.90
	TLI	> 0.90
	NFI	> 0.90
Parsimonious Fit	Chisq/df	< 5.0

Table 19: Model-Fit Criteria and Interpretation (Steiger, 1990)

This study compared three fit indices to determine the model fit and the results are presented in the tables which follow. The first index, CMIN, revealed the CMIN/DF value of 1.887 which is within the acceptable range of <5. Figure 18 presents the CMIN results.

Model	NPAR	CMIN	DF	P	CMIN/DF
<b>Default model</b>	63	358.455	190	.000	1.887
<b>Saturated model</b>	253	0.000.000	0		
<b>Independence model</b>	22	2280.880	231	.000	9.874

Table 20: CMEAN Values

RMSEA is regarded as an absolute index that assesses how far the hypothesized model is from a perfect model and its application is heavily dependent on a set of cut-off measures (Xia & Yang, year). According to MacCallum et al. (1996), an acceptable RMSEA is less than 0.08 and this study achieved a RMSEA of 0.079, thus indicating that the model does fit the data.

Model	RMSEA	LO 90	Hi 90	PCLOSE
Default model Default model	.079	.068	.093	.000
Independence model	.255	.245	.264	.000

Table 21: RMSEA Values

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.983	.809	.919	.900	.918
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Table 22: Comparative Fit Index (CFI) values

The comparative fit index achieved in this study is 0.918, which is greater than the recommended 0.9, thus indicating a good fit.

## 7.4 Full Structural Equation Model Assessment

The structural model was assessed after the assessment of the measurement model in order to test the relationship between its constructs. The causal arrows represent the hypothesized relationships between the constructs as represented in figure 44. In the assessment process of the structural model, inspection of the model fit indices and standardized path coefficients were done to explore which hypothesized relationships are supported or not. Hypothesized relationships that are at a significant level  $P > 0.05$  with a standardized path coefficient of greater 0.3 are supported (Byrne, 2001).

Table 23 presents the fit indices obtained.

<b>FIT indices</b>	<b>Threshold value</b>	<b>Authors</b>	<b>Results obtained</b>	<b>Decision</b>
GIF	>0.9	Tabachnik and Fidell (2007)	0.957	Acceptable
AGFI	>0.8	Tabachnic and Fidell (2007)	0.835	Acceptable
CFI	>0.9		0.918	Acceptable
RMSEA	<0.08	Hu and Bentler (1999)	0.790	Acceptable
NFI	>.095	Bentler (1990)	0.983	acceptable

Table 23: Model Fit Indices

#### 7.4.1 Structural model results

All the path coefficients (hypotheses) were found to be statistically significant with values ranging from 0.16 to 0.4

	Standardized path coefficient	Sig.	Hypothesis testing results
PE--> BI (H1)	0.16	0.01	Supported
EE--> BI (H2)	0.40	0.07	Supported
TA--> BI (H3)	0.18	0.04	Supported
SI--> BI (H4)	0.31	0.08	Supported
FC--> BI (H5)	0.17	0.03	Supported

Table 24: structural Model Results

The standardized path coefficients presented in table 24 indicates that Performance Expectancy has a positive and significant association with Behavioural Intentions at  $p < 0.05$ . Effort Expectancy emerged as the strongest predictor of intention with a path coefficient of 0.4. The remaining constructs (Technology Awareness, Social Influence and Facilitated Conditions) all showed significant and positive association with Behavioural Intentions. These results are consistent with Venkatesh (2003). The results are also captured in the SEM on figure 45.



Figure 44 represent a hypothesized model with results on figure 45.

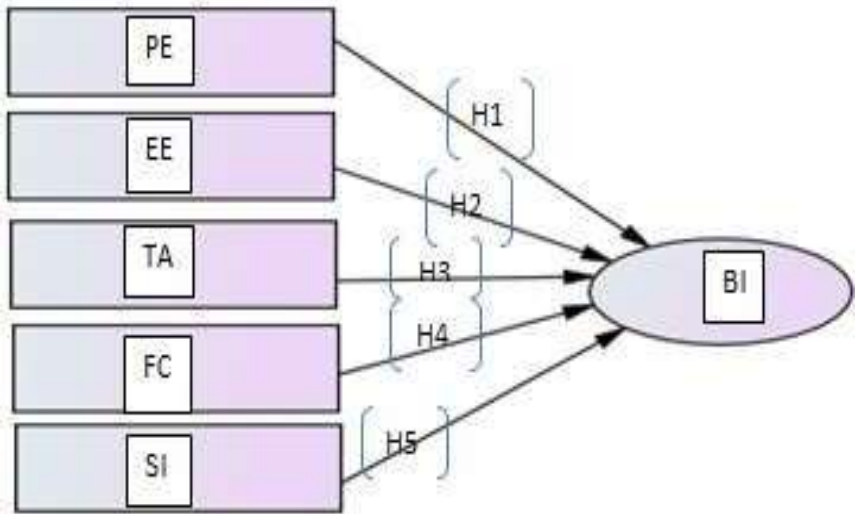


Figure 45: Hypothesized Structural Model

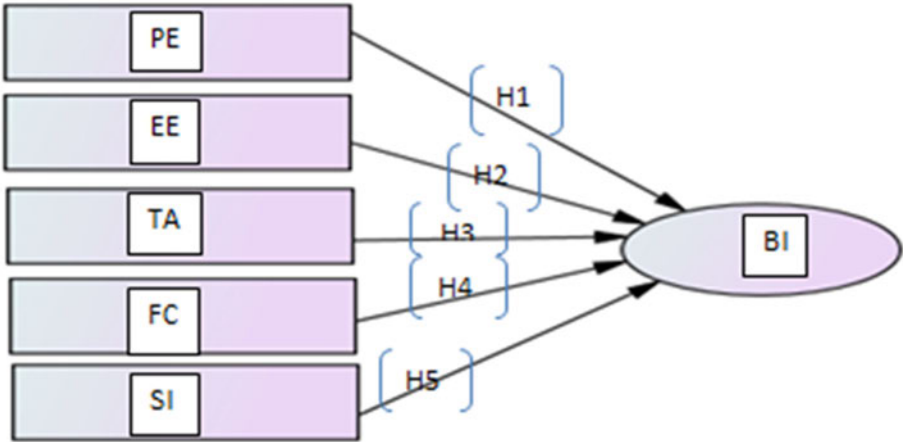


Figure 46: Full SEM results

The estimated coefficients of the full model are captured along the paths and are stated in Table 23. The full SEM results are consistent with the regression results of a positive correlation.

## 7.5 Analysis of the quantitative results

The analysis of quantitative data obtained from surveys is normally done by descriptive and inferential statistics (Saunders et al., 2009). According to Given (2008), descriptive statistics “summarizes the data collected and allows the researchers to provide another context, a richer picture or enhanced representation in which to examine the phenomenon of interest”.

For a more profound understanding of the behavioural intention to use STBs by the citizens of Ethekewini Municipality, descriptive exploration was conducted for the demographic information collected in the questionnaire. Inferential statistics, on the other hand, is the way of making inferences about population-based samples, and draws conclusions that cannot be derived from descriptive statistics.

### 7.5.1 Biographical data of respondents

The requisite sample size for this study was 269, but only 138 participants answered the survey questionnaire. This gave a 51% response rate, which is slightly higher than the average response rate of 40% from other studies. The data for the quantitative part of the study was collected from Ethekewini citizens.

Answer choices	Responses (%)	Respondents
Yes	63.04	87
No	36.96	51
Total	100%	138

Table 25: Respondents Residency

From 138 respondents, 63% of the respondents were permanent residents of Ethekewini Municipality, while 37% were from other provinces but employed in Ethekewini Municipality. They reside there for employment purposes. Since they spend most of their time in Ethekewini Municipality areas, they were included as part of the Ethekewini Municipality citizens.

Answer choices	Responses (%)	Respondents
Male	48.55	67
Female	51.45	71
LGBTQ	0	0
Total	100%	138

Table 26: Respondents Gender

From the 138 respondents, 51.4% were female while males accounted for 48.6%. Previous studies have seen more men adopting technologies than women (Wood and Li, 2005). For example, Li, Records and Fougere (2004) reported that it is less likely for female student to choose an information technology than their male student colleagues. Table 24 provides a breakdown of the respondent

Answer choices	Responses (%)	Respondents
Employed	70.29	97
Self employed	18.12	25
Unemployed	7.25	10
University/College student	4.35	6
Total	100%	138

Table 27: Respondents Employment Status

In terms of employment, 70.29% of the respondents said they were employed, while 18.12% of the respondents said they were self-employed. Only 7.25% of the respondents said they were unemployed. 88.4% of the respondents have an income, and this places them in a position where they can afford to buy a set-top box. If the willingness to adopt STB is there, these respondents will find it easy to adopt.

## 7.6 Research questions and hypothesis

In answering the research question and hypothesis, a UTAUT survey responses with 43 questions was analysed using the following categories: a) *strongly disagree*, b) *disagree*, c) *neither disagree nor agree/Neutral*, d) *agree*, e) *strongly agree*. 6 questions were based on respondents' biographical data, 30 questions were on the UTAUT constructs testing the citizen's intention to adopt, and 7 questions were on

moderators. Statistical tests such as the Spearman rank correlation, linear regression, and descriptive statistics were employed to respond the research questions and hypothesis.

The hypotheses for this study were formulated from the research questions. There were 11 hypotheses that were tested in this study and the results are explained in the next section. Hypotheses one to five tested the users' intention to adopt, and the results showed that the citizens of Ethekewini Municipality have the intention to adopt DTT.

#### **7.6.1 Descriptive Statistics of construct items**

The descriptive statistics and the Mean Standard Deviation of the construct items used in the proposed model including are presented in the next table. Descriptive statistics in its very nature is not a strong predictor, but an indicator of a possible trend. A stronger statistical measure is used to perform a stronger analysis. All the means are greater than 3, which indicate that the majority of the participants conveyed an affirmative response to the constructs that were measured in this study. Power distance and Masculinity were the only constructs that had a mean less than 3 (2.70 and 1.89 respectively). This was based on a 5-point Likert scale in the survey questionnaire.

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
PerfromExpect	138	1.00	5.00	3.7091	.66698
EffortExpc	138	1.00	5.00	3.6814	.69919
TechnlgyAwareness	138	1.00	5.00	3.4211	.80243
SocialInflnce	138	1.00	5.00	3.1471	.74908
FacilitatedConditions	138	1.00	5.00	3.3245	.62892
Attitide	138	1.00	5.00	3.7650	.68736
BehavaivIntention	138	1.00	5.00	3.6041	.81148
Voluntary	138	1.00	5.00	3.0893	.61169
PowerDistance	138	1.00	5.00	2.7041	.83017
Masculinity	138	1.00	5.00	1.8980	.98522
Individualism	138	1.00	4.67	3.2449	.56176
UncertainAvdnce	138	1.00	5.00	3.0172	.57010
Valid N (listwise)	138				

Table 28: Descriptive Statistics for UTAUT Construct Items

### 7.6.2 Pearson correlation analysis

A Pearson correlation test which measured the strength of the linear relationship between exogenous variables (PE, EE, FC, SI and TA) and behavioural intentions (BI) was performed. The range of values for Pearson correlation coefficient ( $r$ ) is between +1 and -1, with zero values expressing no association. Values less than zero express a negative association, and values greater than zero indicating positive association (Laerd statistics, 2015).

		Correlations							
		PerformExpect	EffortExpc	TechnlgyAwar eness	SocialInflnce	FacilitatedCo nditions	Attitide	BehavaivInten tion	Voluntary
PerformExpect	Pearson Correlation	1	.430**	.383**	.338**	.320**	.620**	.522**	.203*
	Sig. (2-tailed)		<.001	<.001	<.001	<.001	<.001	<.001	.017
	N	138	138	138	138	138	138	138	138
EffortExpc	Pearson Correlation	.430**	1	.550**	.307**	.380**	.467**	.398**	.213*
	Sig. (2-tailed)	<.001		<.001	<.001	<.001	<.001	<.001	.012
	N	138	138	138	138	138	138	138	138
TechnlgyAwareness	Pearson Correlation	.383**	.550**	1	.545**	.579**	.531**	.409**	.344**
	Sig. (2-tailed)	<.001	<.001		<.001	<.001	<.001	<.001	<.001
	N	138	138	138	138	138	138	138	138
SocialInflnce	Pearson Correlation	.338**	.307**	.545**	1	.532**	.592**	.603**	.518**
	Sig. (2-tailed)	<.001	<.001	<.001		<.001	<.001	<.001	<.001
	N	138	138	138	138	138	138	138	138
FacilitatedConditions	Pearson Correlation	.320**	.380**	.579**	.532**	1	.511**	.499**	.407**
	Sig. (2-tailed)	<.001	<.001	<.001	<.001		<.001	<.001	<.001
	N	138	138	138	138	138	138	138	138
Attitide	Pearson Correlation	.620**	.467**	.531**	.592**	.511**	1	.683**	.521**
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	<.001		<.001	<.001
	N	138	138	138	138	138	138	138	138
BehavaivIntention	Pearson Correlation	.522**	.398**	.409**	.603**	.499**	.683**	1	.357**
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	<.001	<.001		<.001
	N	138	138	138	138	138	138	138	138
Voluntary	Pearson Correlation	.203*	.213*	.344**	.518**	.407**	.521**	.357**	1
	Sig. (2-tailed)	.017	.012	<.001	<.001	<.001	<.001	<.001	
	N	138	138	138	138	138	138	138	138

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

Table 29: Pearson's Correlation Coefficients

The significant values of Performance expectancy, Effort expectancy, Social influence, Facilitated conditions and Technology awareness were all found to be positive and lower than 0.05, which means they have a significant predictive ability for the dependent variable.

A standard beta coefficient is defined as the degree of change in the outcome variable for every 1-unit of change in the predictor variable. It is used to compare the magnitude of the effect for each individual independent variable to that of the dependent variable. High beta coefficient indicates strong effect, and if the beta coefficient is positive then it can be interpreted that for every 1-unit increase in the predictor variable, the outcome variable will increase by the beta coefficient value.

From the results obtained in the correlation analysis, it can be seen in Table 18, that all the exogenous constructs have a relationship with the dependent variable since their coefficient values are not equal to 0. This means that the direct association

required to proceed with the multiple linear regression analysis does exist. Also, the Pearson correlations for all exogenous constructs are positive, which points to a positive relationship amongst the exogenous variables and the endogenous variable.

### 7.6.3 Multiple linear regression analysis

Results from the UTAUT survey questionnaire were imported to SPSS before the multiple linear regression analysis was performed. Several missing Values were identified and imputed using the mean imputation method on SPSS. If missing data are not properly handled, the inferences may be compromised. Many authors have noted the presence of bias in almost all the imputation methods, but the use of mean imputation was motivated by the low count of missing data.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations		
		B	Std. Error	Beta			Zero-order	Partial	Part
1	(Constant)	-.300	.336		-.895	.372			
	PerfomExpect	.202	.091	.166	2.215	.028	.522	.190	.127
	EffortExpc	.104	.084	.089	1.229	.221	.398	.107	.071
	TechnlgyAwareness	-.151	.084	-.149	-1.793	.075	.409	-.155	-.103
	SocialInflnce	.334	.085	.308	3.931	<.001	.603	.325	.226
	FacilitatedConditions	.195	.098	.151	1.999	.048	.499	.172	.115
	Attitude	.422	.106	.357	3.979	<.001	.683	.328	.229

a. Dependent Variable: BehavaivIntention

Table 30: Multiple Regression Coefficients

The multiple regression analysis was performed and the output obtained, as represented in Table 28. An exogenous construct with a higher beta coefficient has the strongest impact on the dependent variable. Social influence was the exogenous construct with the highest beta coefficient of 0.308. Technology awareness was found to be the only exogenous construct with a negative beta coefficient, thus indicating a negative relationship with the dependent variable.

**Model Summary<sup>b</sup>**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	Change Statistics			Sig. F Change	Durbin-Watson
						F Change	df1	df2		
1	.753 <sup>a</sup>	.567	.547	.54622	.567	28.561	6	131	<.001	2.254

a. Predictors: (Constant), Attitude, EffortExp, FacilitatedConditions, PerformExpect, SocialInflnce, TechnlgyAwareness

b. Dependent Variable: BehavaivIntention

**Table 31: Model Summary**

The ( $R^2$ ) in the model summary in Table 29 indicates the percentage of the variance in the exogenous construct that a dependent variable explains. According to Saunders et al. (2009), the value of  $R^2$  in multiple regression analysis is not the measure of the suitability of the model; instead, an adjusted  $R^2$  is a preferred measure of the variance. According to Unwin (2013),  $R^2$  value rises if the predictor increases more than it would be anticipated by chance. This means that the adjusted  $R^2$  measures the fraction of the total variability in the exogenous construct (Behavioural Intention), which is elucidated by the exogenous constructs of the model. The computed  $R^2$  as reflected in the model summary table is 0.547 or 55%. This result tells us that 55% of the variability in the behavioural intention to use set-top box is elucidated by the model's independent factors.

**ANOVA<sup>a</sup>**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	51.129	6	8.522	28.561	<.001 <sup>b</sup>
	Residual	39.085	131	.298		
	Total	90.215	137			

a. Dependent Variable: BehavaivIntention

b. Predictors: (Constant), Attitude, EffortExp, FacilitatedConditions, PerformExpect, SocialInflnce, TechnlgyAwareness

**Table 32: Anova Test Results**

In understanding whether the model can significantly predict the dependent variable, the ANOVA test was conducted to compute the p-value. P-values of less than 0.05 means the model can significantly predict the dependent variable. From the ANOVA



table, the p-value is less than 0.01, which is less than 0.05. There is clear evidence that the model does have explanatory powers and that the exogenous constructs can help to predict the dependent variable.

#### **7.6.4 Construct validity and reliability**

Before testing the hypothesis of the proposed model in this study, it is vital to test the validity and reliability of the measures to avoid biasness of the results (Hair et al., 2010). Validity and reliability are two separate tests that are closely related and their importance cannot be under-valued. Holmes-Smith (2011) has noted that a measure can have very high reliability (consistency) but lack validity, and a measure can have high validity (accuracy) but lack reliability. Both validity and reliability can be measured by using Average Variance Extracted (AVE), Composite Reliability (CR), Average Shared Variance (ASV), and Maximum Shared Squared Variance (MSV). AVE is a measure of the amount of variance captured by a construct in relation to the amount of variance due to be measurement error (Fidell, 2007). Composite Reliability (also called construct reliability) measures the internal consistency in scale items just like Cronbach's alpha (Netemeyer, 2003). CR indicates the shared variance amongst the observed variables that are used as indicator of a latent construct (Fornell & Lacker, 1981).

Discriminant Validity measures the extent to which items in a construct differ from items in another construct (Hair et al., 2017). The constructs correlations were compared with the square root of the average variance estimates when determining the Discriminant Validity. As indicated in table 33, all the diagonal loadings were greater than the vertical loadings indicating that the all items in the constructs measured discriminately from other constructs. This implied that Discriminant Validity has been achieved.

The following formulae were used to calculate CR and AVE because of the limitations with AMOS.

$$AVE = \frac{\sum_{i=1}^n \lambda_i^2}{n}$$

$$CR = \frac{(\sum_{i=1}^n \lambda_i)^2}{(\sum_{i=1}^n \lambda_i)^2 + (\sum_{i=1}^n \delta_i)}$$

CR value greater than 0.7 indicates reliability has been established and AVE greater than 0.5 suggests that convergent validity has been established.

	CR	AVE	MSV	ASV	FC	PE	EE	TA	SI	BI
FC	0.758	0.512	0.475	0.258	0.671					
PE	0.817	0.533	0.368	0.236	0.607	0.730				
EE	0.877	0.704	0.347	0.181	0.417	0.528	0.839			
TA	0.893	0.682	0.347	0.240	0.475	0.517	0.589	0.826		
SI	0.866	0.577	0.475	0.251	0.689	0.488	0.322	0.578	0.760	
BI	0.711	0.516	0.106	0.042	0.222	-0.158	0.035	0.166	0.326	0.696

Table 33: Convergent validity, Discriminant Validity and Reliability

The entire factor loading for average variance extracted was greater than 0.5 and above 0.711 for CR. This indicates that convergent validity has been achieved. Factor loadings for both MSV and ASV were found to be less than average variance extracted, thus indicating that discriminant validity has been achieved.

After observing the goodness of fit indices together with validity and reliability, the refined model resulted in the deletion of FC4.

### 7.6.5 Hypotheses testing

After establishing reliability, discriminant validity and convergent validity, the next section presents the hypothesis test results for the hypotheses that were stated in

the beginning of the chapter. The study sought to answer the following research question:

What is the nature of the relationship between the exogenous variables (PE, EE, SI, FC and TA) and the endogenous variable (BI) to adopt STB?

Past researchers have found a positive and significant relationship exists between exogenous and endogenous variable of the UTAUT model. The study makes and test the following hypotheses each exogenous variable.

#### **7.6.6 Performance expectancy and behavioural intention**

The results in Table 18 answer both the research question and the hypothesis.

*H<sub>01</sub> - there is no significant and positive relationship between performance expectancy and behavioural intention to use STBs.*

*H<sub>a1</sub> - there is a positive and significant relationship between performance expectancy and behavioural intention to use STBs.*

The Pearson correlation results indicate positive correlation between performance expectancy and behavioural intention. The average Pearson correlation of 0.522 indicates a moderate positive relation between PE and BI. The p-value of performance expectancy is 0.028 which is less than 0.05. The results indicate that the relationship between performance expectancy and behavioural intention is significant. **Therefore, the null hypothesis (H<sub>01</sub>) of no correlation is rejected.**

#### **7.6.7 Effort Expectancy and behavioural intention**

*H<sub>02</sub> - there is no significant and positive relationship between effort expectancy and citizens' behavioural intention to use STBs.*

*H<sub>a2</sub> - there is significant and positive relationship between effort expectancy and citizens' behavioural intention to use STBs.*

The correlation coefficient of Effort Expectancy is 0.398 indicating the weak to moderate positive relationship between the independent and dependent variable.

The  $p$ -value of Effort Expectancy was found to be 0.221 which is higher than the significant value of 0.05. The results suggest that the relationship that exists is not at a significant level. ***The null hypothesis (H<sub>02</sub>) is therefore accepted.***

#### **7.6.8 Social influence and behavioural intentions**

*H<sub>03</sub> - there is no significant and positive relationship between social influence and citizens' behavioural intention to use STBs.*

*H<sub>a3</sub> - there is a significant and positive relationship between social influence and citizens' behavioural intention to use STBs.*

The correlation coefficient of Social Influence is 0.603, indicating a moderate to strong positive relationship between the independent and dependent variable. The  $p$ -value of Social Influence is  $<0.01$  which is less than the significant value of 0.05. The results suggest that the relationship that exists is at a significant level. ***The null hypothesis (H<sub>03</sub>) is rejected.***

#### **7.6.9 Facilitating conditions and behavioural intentions**

*H<sub>04</sub> - there is no significant and positive relationship between facilitating conditions and the citizens' behavioural intention to use the STBs.*

*H<sub>a4</sub> - there is a significant and positive relationship between facilitating conditions and the citizens' behavioural intention to use the STBs.*

The correlation coefficient of Facilitating Conditions is 0.499 indicating a moderate positive relationship between the independent and dependent variable. The  $p$ -value for Facilitating Condition is 0.048 which is less than the significant value of 0.05. The results suggest that the relationship that exists is at a significant level. ***The null hypothesis (H<sub>04</sub>) is rejected.***

#### **7.6.10 Technology Awareness and behavioural intentions**

*H<sub>05</sub> - there is no significant and positive relationship between technology awareness and the behavioural intention to use STBs.*

*H<sub>a5</sub>* - there is a *significant and positive* relationship between technology awareness and the behavioural intention to use STBs.

The correlation coefficient of Technology Awareness is 0.409 indicating the weak to moderate positive relationship between the exogenous variables and endogenous variable. The *p*-value of Technology Awareness is 0.075 which is more than the significant value of 0.05. This indicates that there is a significant relationship between Technology Awareness and Behavioural intention. ***The null hypothesis (H<sub>05</sub>) is rejected.***

The results of the hypothesis test for the exogenous constructs of the UTAUT construct showed that there is a relationship between PE, SI, FC and TA, thus rejecting the null hypothesis. Null hypothesis two is the only one that is accepted.

<b>Null Hypothesis</b>	<b>Results</b>
<i>H<sub>01</sub> - there is no significant and positive relationship between PE and BI to use the STB</i>	Rejected
<i>H<sub>02</sub> - there is no significant and positive relationship between EE and BI to use the STB</i>	Rejected
<i>H<sub>03</sub> - there is no significant and positive relationship between SI and BI to use the STB</i>	Rejected
<i>H<sub>04</sub> - there is no significant and positive relationship between FC and BI to use the STB</i>	Rejected
<i>H<sub>05</sub> - there is no significant and positive relationship between TA and BI to use the STB</i>	Rejected

Table 34: Summary of Null Hypotheses

### 7.6.11 Effects of moderators

This section discusses the moderating effects of the four cultural dimensions (PD, UA, IND, PD) at an individual level on the relationship between the exogenous (PE, EE, TA, SI, FC) and the endogenous (BI) constructs. The effects of moderators on the research model are presented in this section. Moderators are described as variables that have an effect on the strength or weakness, and direction of the relationship between exogenous variables and endogenous variable in a research model (Serenko & Yol, 2006:37).

Many researchers have defined and described moderators in the context of research and Table 33 provides a brief summary of the definition and description of moderator variables. This study investigated the moderation effect of Individualism (IND), Power Distance (PD), Masculinity (MAS) and Uncertainty Avoidance (UA) using multiple regression analysis. Alshehri (2021) has noted the effect of exogenous constructs as a function of moderator variables, implying that the relationship between endogenous and exogenous variables can be weakened or strengthened by the effects of moderators.

Citation	Definitions of the moderator term
Baron and Kenny (1986)	[...] a Moderator variable is a [...] variable that affects the direction and/or strength of the relation between an independent or predictor variable and a dependent or criterion variable
Cohen et al. (2003)	Thus two variables $x$ and $z$ are said to interact in their accounting for variance in $y$ when over and above any additive combination of their separate effects, they have a joint effect
Cortina (1993a, b)	A moderation exists when, “the effect of one variable, $x$ , on another variable, $y$ , depends on the level of some third variable, $z$ .”
Jaccard et al. (1990)	Moderation occurs when the relationship between $x$ and $y$ depends on $z$
James and Brett (1984)	[...] a variable $z$ is a moderator if the relationship between two (or more) other variables, say $x$ and $y$ , is a function of the level of $z$
Schmitt and Klimoski (1991)	[...] a moderator variable affects the nature of the relationship between two other variables

Table 35: Definitions of Moderator Items

Regression coefficient is normally used in determining the impact of the moderators, but according to Massholder, Kermery and Bedeian (1990), the negative or positive sign of the regression coefficient may not mean anything but the direction of moderation. Even though that may be the case, Anguinis (2004) and Fraizer et al. (2004) still believe that moderated regression analysis is the most appropriate method that can be employed both for continuous and categorical predictor and moderator variables respectively.

Research questions 6 to 11 sought to determine the moderation effects of Cultural dimensions. The following variables were used as moderator variables: Power Distance, masculinity, Uncertainty Avoidance, and Individualism. The following UTAUT variables were used as exogenous constructs: Effort Expectancy, Performance Expectancy, Technology Awareness, Social Influence and Facilitated Conditions.

The following hypotheses were tested:

*H06 - PD does not moderate the relationship between performance expectancy and behavioural intention to use STBs.*

*Ha6 - PD moderates the relationship between performance expectancy and behavioural intention to use STBs.*

Results are summarized in table 44,

Model Summary <sup>b</sup>									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	Change Statistics			Sig. F Change
						F Change	df1	df2	
1	.645 <sup>a</sup>	.416	.403	.66251	.416	31.844	3	134	<.001

a. Predictors: (Constant), Interaction\_Variable, Power Distance, Performance Expectancy

b. Dependent Variable: Behavioural Intentions

Table 36: Model Summary PD/PE

Regression Coefficients <sup>a</sup>					
Model		Unstandardized Coefficients		Standardized Coefficients	Sig.
		B	Std. Error	Beta	
1	(Constant)	-.191	.431		.658
	Power Distance	.223	.066	.234	.001
	Performance Expectancy	.851	.095	.665	.000
	Interaction_Variable	.002	.041	.003	.965

a. Dependent Variable: Behavioural Intentions

Table 37: Regression Coefficient PD/PE

The results of the regression coefficient for the interaction variable indicate that the relationship between Performance expectancy and Behavioural intention is not significantly moderated by Power Distance. The R-squared value which represents the proportion of the variance for a dependent variable that is explained by an exogenous construct was found to be 0.416. This means that 41.6% of the observed variations are explained by the model. The p-value of the interaction variable was found to be 0.965 which is more than the significance value of 0.05. The  $\beta$  coefficient of .003 indicates a very weak to no correlation effect. **The null hypothesis ( $H_{a6}$ ) is accepted.**

RQ7: To what extent does masculinity moderate the relationship between effort expectancy and behavioural intention to use the STB?

$H_{07}$  - Masculinity does not moderate the relationship between Effort expectancy and Behavioural intention to use the STB.

$H_{a7}$ - Masculinity does moderate the relationship between Effort expectancy and Behavioural intention to use the STB.



**Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	Change Statistics			Sig. F Change
						F Change	df1	df2	
1	.459 <sup>a</sup>	.210	.193	.89846546	.210	11.905	3	134	<.001

a. Predictors: (Constant), Moderator\_EE\_Masc, Zscore: Masculinity, Zscore: EffortExpc

Table 38: Model Summary MAS/EE

**Coefficients<sup>a</sup>**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	3.603	.062		58.041	<.001		
	Zscore: Masculinity	.146	.063	.180	2.337	.021	.990	1.010
	Zscore: EffortExpc	.341	.063	.420	5.412	<.001	.980	1.021
	Moderator_EE_Masc	-.067	.042	-.125	-1.605	.111	.971	1.030

a. Dependent Variable: BehavaivIntention

Table 39: Regression Coefficient MAS/EE

The results of the regression coefficient for the interaction variable indicate that the relationship between Effort expectancy and Behavioural intention is insignificantly and weakly moderated by Masculinity. There was a weak to no moderation effect observed, and the R-squared value which represents the proportion of the variance for a dependent variable that is explained by an exogenous construct was found to be 0.210. This means that 21% of the observed variations are explained by the model. The p-value of the interaction variable was found to be 0.111 which is more than the significance value of 0.05, while the standardized  $\beta$  coefficient of -0.125 indicates a negative and weak correlation effect. **The null hypothesis ( $H_07$ ) is rejected.**

RQ8: To what extent does uncertainty avoidance moderate the relation between Social influence and Behavioural intention to use the STB?

*H<sub>08</sub>* -Uncertainty avoidance does not moderate the relationship between Social influence and Behavioural intention to use the STB.

*H<sub>a8</sub>* - uncertainty avoidance moderate the relationship between Social influence and Behavioural intention to use the STB.

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	Change Statistics			Sig. F Change
						F Change	df1	df2	
1	.631 <sup>a</sup>	.398	.385	.78443119	.398	29.548	3	134	<.001

a. Predictors: (Constant), Moderator\_SocInfl\_UnctAvoid, Zscore: SocialInflnce, Zscore: UncertainAvdnce

Table 40: Model Summary SI/UA

The results of the regression coefficient for the interaction variable indicate that the relationship between Social influence and Behavioural intention is not moderated by uncertainty avoidance. The R-squared value, which represents the proportion of the variance for a dependent variable that is explained by an exogenous construct, was found to be 0.398. This means that 39.8% of the observed variations are explained by the model. The standardized  $\beta$  coefficient indicating the strength of the moderation effect was found to be -0.99 indicating a strong and negative moderating effect. The p-value of the interaction variable was found to be 0.141 which is more than the significance value of 0.05, indicating that the moderation is insignificant.

**The null hypothesis (*H<sub>08</sub>*) is rejected.**

### Coefficients<sup>a</sup>

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.032	.070		.454	.651		
	Zscore: UncertainAvdnce	.171	.075	.171	2.279	.024	.799	1.252
	Zscore: SocialInflnce	.529	.075	.529	7.059	<.001	.799	1.252
	UnCtavoid_SocInfl	-.072	.049	-.099	-1.479	.141	.997	1.003

a. Dependent Variable: Zscore: BehavaivIntention

Table 41: Regression Coefficient SI/FC

RQ9: To what extent does Individualism moderate the relationship between Facilitated conditions and Behavioural intention to use the STB?

*H<sub>09</sub>*-Individualism does not moderate the relationship between Facilitated conditions and Behavioural intention to use the STB.

*H<sub>a9</sub>* - Individualism moderates the relationship between Facilitated conditions and Behavioural intention to use the STB.

### Coefficients<sup>a</sup>

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	3.583	.062		57.853	<.001		
	Zscore: Individualism	.212	.073	.261	2.910	.004	.653	1.532
	Zscore: FacilitatedConditions	.304	.071	.375	4.252	<.001	.678	1.475
	Moderator_Indv_Faci_Cond	.038	.036	.081	1.050	.296	.882	1.134

a. Dependent Variable: BehavaivIntention

Table 42: Regression Coefficient FC/IND

The results of the regression coefficient for the interaction variable indicate that the

relationship between Facilitated conditions and Behavioural intention is not moderated by Individualism. The p-value of the interaction variable was found to be 0.296, which is more than the significance value of 0.05 and a  $\beta$  coefficient of 0.081 thus indicating an insignificant and weak to no moderation at all. **The null hypothesis (*H09*) is accepted.**

RQ10: To what extent does Individualism moderate the relationship between Facilitated technology awareness and Behavioural intention to use the STB?

*H<sub>0</sub>10* - Individualism does not moderate the relationship between Technology awareness and Behavioural intention to use the STB.

*H<sub>a</sub>10* - Individualism moderates the relationship between Technology awareness and Behavioural intention to use the STB.

Coefficients <sup>a</sup>							
		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics
Model		B	Std. Error	Beta	t	Sig.	Tolerance VIF
1	(Constant)	3.603	.061		59.141	<.001	
	Zscore: TechnlgyAwareness	.241	.063	.297	3.816	<.001	.893 1.120
	Zscore: Individualism	.285	.065	.351	4.395	<.001	.844 1.185
	Moderator_Indv_TechAwa	.004	.043	.007	.092	.927	.940 1.064

a. Dependent Variable: BehavaivIntention

Table 43: Regression Coefficient TA/IND

The results of the regression coefficient for the interaction variable indicate that the relationship between Technology awareness and Behavioural intention is significantly moderated by Individualism. The p-value of the interaction variable was found to be 0.927 which is more than the significance value of 0.05. The beta coefficient of the interaction variable was found to be 0.007 thus indication a very weak to no moderation effect at all. **The null hypothesis (*H<sub>0</sub>10*) is accepted.**

RQ11: To what extent does Masculinity moderate the relationship between Social influence and Behavioural intention to use the STB?

*H<sub>0</sub>11* - Masculinity does not moderate the relationship between Social influence and Behavioural intention to use the STB.

$H_{a11}$ -Masculinity moderates the relationship between Social influence and Behavioural intention to use the STB.

**Coefficients<sup>a</sup>**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	3.632	.056		64.358	<.001		
	Zscore: SocialInflnce	.485	.058	.598	8.401	<.001	.909	1.101
	Zscore: Masculinity	.050	.062	.061	.801	.425	.783	1.278
	Moderator_Mascl_SoclInfl	-.092	.044	-.153	-2.079	.040	.854	1.171

a. Dependent Variable: BehavaivIntention

Table 44: Regression Coefficient SI/MAS

The results of the regression coefficient for the interaction variable indicate that the relationship between Social influence and Behavioural intention is significantly moderated by Masculinity. The p-value of the interaction variable was found to be 0.040 which is less than the significance value of 0.05 thus indicating a significant effect. The beta coefficient was found to be -0.153 indicating a negative weak moderation effect. **The null hypothesis ( $H_{o11}$ ) is rejected.**

#### 7.6.12 Hypotheses summary of moderating variables

Moderator	Reject/Accept Null Hypothesis
Power distance on Performance expectancy	Accepted
Masculinity on Effort expectancy	Rejected
Uncertainty Avoidance on Social influence	Rejected
Individualism on Facilitated conditions	Accepted
Individualism on Technology awareness	Accepted
Masculinity on Social influence	Rejected

Table 45: Summary of Hypotheses - Moderating Variables

The given hypotheses were tested with use of sample data. Acceptance in these tests does not mean that the null hypothesis is accepted; it means the sample did

not strongly oppose it. Strongly opposing it does not necessarily mean that the sample has strongly supported the hypothesis, as the support of the sample in favour of the hypothesis cannot be established. The acceptance of the null hypothesis does not provide researchers with a strong decision, but rather an opportunity to conduct further investigations. The null hypothesis means in this study that there is no effect or relationship between exogenous variables and endogenous variables, while the alternate hypothesis states that the relationship exists.

Hypotheses six and eleven are the only two hypotheses rejected in the test for moderation effect. The implications of these outcomes will be explained in the discussion section of this thesis.

Hypotheses six to ten have all been rejected. Hypothesis 11 was accepted. The implications for these outcomes are explained in the discussion section in the next chapter.

## **7.7 Chapter Summary**

Chapter Seven presented quantitative data analysis and quantitative findings. The chapter began with model testing to test for outliers and multicollinearity. Several outliers were identified in the data but were found not to be problematic. Further tests revealed lack of multicollinearity and also the fit indices confirmed that the model does fit the data. For the exogenous variables of the UTAUT model (PE, EE, TA, SI, FC) the null hypotheses were rejected as there was a positive and significant relationship with behavioural intentions (BI). The summary of the hypothesis tests is presented in table 32 and table 42.

## **CHAPTER EIGHT**

### **QUALITATIVE DATA ANALYSIS**

#### **8.1 Introduction**

This chapter describes the qualitative analysis of data and the practical steps that were followed in the analysis. The data is analysed into themes and how these themes overlap, is also discussed.

The following research question was addressed by the study:

- What are the factors that have influenced the slow adoption of digital terrestrial television in Ethekewini Municipality?

#### **8.2 Participants profile**

The respondents are classified as experts in the field of digital technologies, broadcasting regulations and digital broadcasting. Like in any other study, achieving the correct sample size is very important for the validity of the study (Curtis et al., 2000). Qualitative samples are relatively smaller than quantitative ones and generate much data to help the researcher achieve the research aims (Creswell, 2013). There were nine respondents in total, and all were interviewed on different days and different times. According to Morse (1998), Patton (2002) and Padget (2012), there is no formula for determining the sample size in qualitative research.

In keeping up with the COVID-19 regulations in the country, all the interviews were conducted online with the respondent's permission to record the interview. This method proved to be successful as some of the respondents were based in different provinces within South Africa. Although the interviews were conducted on a relatively small sample, the amount of data generated was of a high quality since all the respondents were high-level experienced professionals and executives who shared their insights into the industry. Their honest opinions helped the researcher to answer the research questions and provided clarity on other aspects of the qualitative study



Participants	Gender	Company	Position	Background	Experience
1	Male	Multichoice	GM Technical	Broadcasting	17 years
2	Male	GIBS	Head of digital technologies	Broadcasting and Project Management	28 years
3	Female	Multichoice	GM: Regulatory	ICT Policy and regulation	14 years
4	Male	ICASA	Councillor	Engineer	21 years
5	Male	ICASA	Councillor	Trade unionist and lecturer	35 years
6	Male	Self employed	Consultant	Broadcasting and technical	20 years
7	Male	Unemployed	Retired	Broadcasting	39 years
8	Female	Multichoice	Head of content	Broadcasting	26 years
9	Female	e.tv	Executive	Broadcasting	19 years

Table 46: Participant's Profile (Mabaso, 2021)

Table 45 present the participant's gender, their expertise and their years of experience in the field of television broadcasting. The 10<sup>th</sup> participant who comes from the equipment manufacturing sector could not avail himself for an interview despite several reminders.

### 8.3 Thematic analysis of the participants' responses

This study employed the thematic analysis as a method for the qualitative data analysis. This method is theoretically flexible and was found useful in summarising key features of a large data set. The data was collected via interviews from industry experts and, as Braun and Clarke (2017) argue, the selection of this method should be based on the goals of the research itself more than the desire to select an easy to follow method of analysis. The data collected through the interviews were transcribed into word-processed texts and then arranged into themes before a

thematic content analysis was performed. A theme is an “implicit topic that organizes a group of repeating ideas, it enables researchers to answer the study question” (Ryan, 2003:16). Yang (204:2) define Thematic content analysis (TCA) as a research method used to describe and analyse qualitative textual data taken from interview and focus group transcripts , and may take the form of identifying patterns in meaning across the data

This study’s goal was to hear from the industry experts in their own voice, their opinion on possible reasons for the slow adoption of DTT. According to Braun and Clarke (2017), this powerful method is appropriate to use when a researcher seek to understand a set of experiences, thoughts, or behaviours across a data set. The method is also useful for examining shared or common meanings emerging from the study. The data analysis followed Braun and Clarke’s approach on Thematic Analysis of qualitative data.

Firstly, the recorded interviews were transcribed by the researcher in this study. The transcribed data was read repeatedly so that the researcher can familiarise himself with the data, and identify common themes and patterns. The transcription of data, according to Flick and Kvale (2009), is an important step in the analysis of qualitative data.

The second step began with the researcher taking notes on potential data items of interest and making connections between data items and preliminary ideas. This led to the generation of codes and not themes.

Thirdly, in keeping with Braun and Clarke’s thematic analysis, the researcher collated all the codes from which the themes were developed. The codes were thoroughly examined by the researcher in search of potential themes. In explaining codes and themes better, Braun and Clarke use the house analogue that a code would be the bricks and tiles, while the theme is likened to the wall and roof. In this study, themes were derived from the coded data, which makes the themes to be related to the data. For example, the code **Challenges** in this study was generated, and from this code, the following potential themes were generated: *Possible reasons for failures to migrate* and *the country has failed consistently to meet the ITU*

*deadline*. To some extent, thematic maps were used by the researcher to show cross-connections between concepts and main themes (Braun & Clarke, 2006).

Figure 45 illustrates the use of thematic maps for analysing the participant's responses. The map reveals the emerging themes from the qualitative data. Leadership instability and litigation amongst broadcasters emerged as the more dominating themes from the qualitative data.

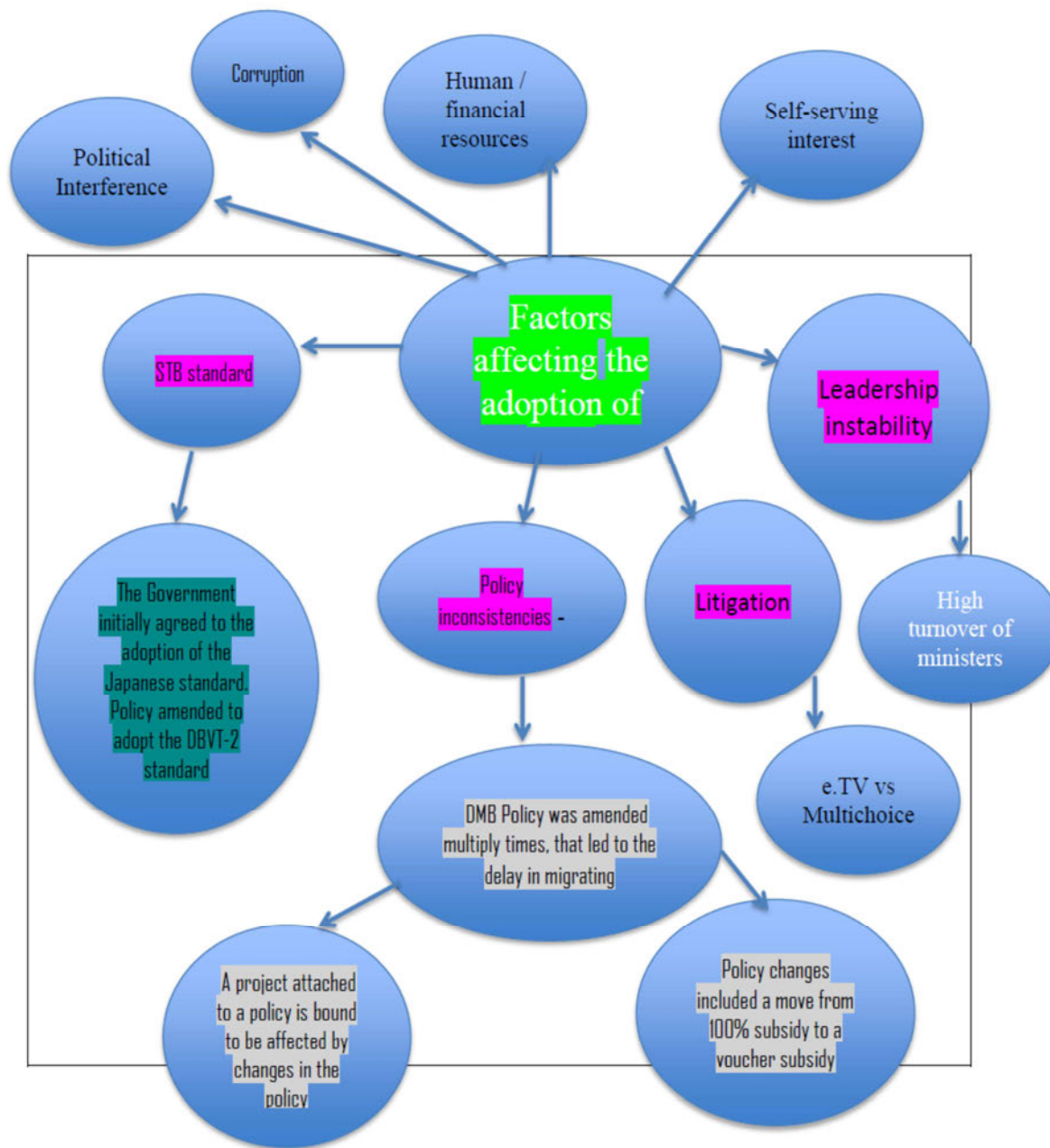


Figure 47: Thematic Map

The research continued with the analysis by following Braun and Clarke's thematic analysis where the researcher re-looked at the coded data within each theme to ensure that there is a proper fit. This was done by reviewing all the code and ensuring the all the themes have supporting data. According to Attride-Stirling (2001)

all data contained in each stream should be coherent and have adequate commonality, and the data within each theme should be distinct enough to warrant separation.

Phases	Description of the process
1. Familiarising yourself with your data	Transcribing, reading and re-reading the data, noting down initial ideas.
2. Generating initial codes	Coding interesting features of the data in a systematic fashion across the entire data set, collating data relevant to each code.
3. Searching for themes	Collating codes into potential themes, gathering all data relevant to each potential theme.
4. Reviewing potential themes	Checking in the themes work in relation to the coded extracts (Level 1) and the entire data set (Level 2), generating a thematic „map“ of the analysis.
5. Defining and naming themes	Ongoing analysis to refine the specifics of each theme, and the overall story the analysis tells; generating clear definitions and names for each theme.
6. Producing the report	The final opportunity for analysis. Selection of vivid, compelling extract examples, final analysis of selected extracts, relating back of the analysis to the research question and literature, producing a scholarly report of the analysis.

Table 47: Six steps for Thematic Analysis (Bruan and Clark, 2006)

### 8.3.1 Thematic analysis findings

The research question “What are the factors that have contributed to the slow adoption of Digital Terrestrial Television (DTT)?” was answered by respondents who participated in the study, on agreeing to be interviewed. The interview questions are attached as Appendix 2 and were answered as per the extracts presented next.

**Question 1: Could you kindly give us your background with regard to your work and your involvement in the Digital Migration project?**

The background of the respondents was provided in Table 27. The profile of the respondents included broadcasters, regulators and consultants who all of them have been involved and some are currently involved in the Digital Migration projects. Their experiences range from 15 years to 38 years in the broadcasting space.

**Question 2: In 2006, the ITU issued a resolution that all members countries in the region 1, of which South Africa is a member, should migrate from analogue broadcasting to digital broadcasting by June 2015. To date, South Africa has not migrated fully to digital terrestrial broadcasting. In your professional opinion, what are the possible reasons that could have led to the failure to meet the deadline?**

All the respondents answered this question elaborately and, while some provided similar reasons, others provided some quite unique. For example, respondents 1, 2, 4, 6 and 7 provided the following reasons for the delay: Policy inconsistencies, leadership instability, litigation by broadcasters and self-serving interest by broadcasters and equipment manufactures. *To quote; Changes in the digital migration policy contributed immensely in the delay to roll-out set-top boxes (Respondent 1).* According to Respondent 7, *“Any project attached to a policy is bound to be affected if there are changes made to that policy, and the DTT project was no exception.*

When it comes to leadership instability, reference was made to chopping and changing of Ministers in the Department of Communications. All the respondents were convinced that changing of Ministers before their end of term has resulted in the delay to migrate. *When a new minister is appointed, there is no time for hand over and each minister comes with their own plans regarding the implementation of the DTT project (Respondent 3). These changes often lead to delays as Ministers need to familiarise themselves with their new role,* said Respondent 4.

Another major factor that contributed to the delays in migrating citizens from analogue to digital terrestrial television is the litigation amongst broadcasters. Reference was made to the famous case between e.tv and Multichoice for encryption of the Set-Top Boxes (STBs). According to Respondent 2, *the case delayed the project by two years and the delays benefited Multichoice more than it did for the public broadcaster and e.TV.*

Respondents 5,3,8 and 9 provided the following reasons as being responsible for the delay in migrating: *The splitting of the Communications Department into Telecommunications & Postal Services and the Department of Communications (DoC); financial resources; availability of STBs; STB standard; leadership instability and exclusion of the industry players from the project implementation.*

Respondent 7 described the painful process of splitting the Communications Department into the Department of Telecommunications and Postal Services and Department of Communications (DoC): *The decision to split the department was not well thought through by the government and the National Treasury was not given time to find the money to finance the new department.*

Respondent 5 said: *The decision to split the ministry was announce in 2014, while the analogue switch off (ASO) was planned for June 2015. It was not clearly identified at the time as to who is responsible for the ASO. This created further delays to migrate our citizens from analogue to DTT.*

Other respondents (2, 3, 8 and 9) cited the availability/unavailability of set-top boxes as another reason for the slow adoption of DTT: *At that time, it was not clear who the manufactures of the set-top boxes were and also how and where to get a set-top box,* said Respondent 8.

Another issue that was common amongst most respondents was that of the set-top box standard: *The government initially agreed to the Brazil and Japanese set-top box standard called the ISDB-T (Integrated Services Digital Broadcasting) standard. In 2011, the then Minister of communications Mr Roy Padayachee announced that South Africa will adopt DVB-T 2 standard that was used in Europe from December 2012* (Responded 9).

Two respondents (4 and 9) from the regulator cited the global shortage of microchips for the set-top boxes: *Currently, there is a global shortage of microchips for the manufactures of set-top boxes* (Respondent 4); *...this shortage may delay roll-out of set-top boxes by a further 2 years* (Respondent 9).

Respondent 8 was the only one who cited human and financial resource as contributing factor to the problem of migrating to digital: *...not enough financial resources were made available for the successful completion of the DTT project. Only few people who worked on the project understood what was required and what needed to be done.*

**Question 3: South Africa has previously set itself some deadlines for migration but has consistently failed to meet any of those deadlines. To what can you attribute these failures?**

The answer to this question was already provided by the respondents in Question 2. Responded 1 added the following information: *Self-serving interests by the broadcasters and the equipment manufactures was part of the reason South Africa could not migrate on time to the new digital terrestrial platform. The case of e.tv and Multichoice is a perfect example of broadcasters serving their own interests rather than that of the citizen. Also, you had manufactures of set-top boxes trying to influence Ministers so as to win the tender for manufacturing of set-top boxes. All of these I regard as self-serving.*

**Question 4: Should the SA government be held responsible for the failure to meet the migration deadline? if so, why?**

The majority of the respondents believe that the government should not be the only ones held responsible for such failures, broadcasters as well together with the set-top box manufactures should all be held responsible. The litigation amongst broadcasters was again cited as a major reason for the delay in migrating and also the Leadership instability at the Department of Communication as failures by government: *Why should the government be the only ones held responsible when you have broadcasters litigating amongst each other?* (Respondents 6 and 9) and *Like in any company, a change in top leadership delays the implementation of the strategic objectives. How do you explain a turnover of 10 ministers in 10 years?* (Respondents 4 and 3). Respondents 2, 3, 5 and 8 said yes, the government should be held responsible without providing more details.



**Question 5: From 2006 to 2019, South Africa has had over 10 Ministers of Communications. How do you think this has contributed to problem of failing to meet the deadline?**

Again this question was answered by some respondents previously. There was a overall agreement by the respondents that the chopping and changes of ministers created a problem for the country and the department itself. Respondent 8 said: *Each new Minister who takes over from the previous Minister brings his or her own influence into the direction the department is taking, and often than not this influence creates delays in the execution of the department's strategy.* Respondent 7 said: *Ministers tend to influence the policy direction of the department thereby creating unnecessary delays in the implementation of the digital migration project.* These sentiments were also shared by Respondents 2 and 5. It was clear from responses gathered from the respondents that such high turnover of Ministers was unfortunate and could have been avoided had the interest of the country prevailed over the interests of the individuals.

**Question 6: As an expert in this field, do you think that the government has done enough to create awareness about DTT?**

There was a mixed response to this question by the respondents. Some respondents felt that the government did not do enough public awareness to educate the public about DTT. Coffman (2002:2) defines public awareness as “the media, messaging, and an organized set of communication activities to generate specific outcome in a large number of individuals and in a specific period”. Public awareness campaigns and education should be done concurrently or else the exercise will be rendered ineffective (Doeven, 2007).

Respondent 1 said: *How do you do awareness campaigns without measuring the success of that campaign? Was it purely done as a box ticking exercise or was it done to achieve a particular objective?* asked respondent 1. This was in reference to the Ministerial Imbizos where the Minister of Communication was criss-crossing the country to engage citizens on the benefit of DTT. Respondent 7 said: *The government has failed the people of this country by trying to popularise DTT without*

*educating the citizens about it. You cannot expect the citizens to adopt something that they know is coming but don't know what it is.*

The other respondents (2, 4, 5, 8 and 9) felt that the government did enough to create DTT awareness: *Yes, I think in my view the government did enough to create public awareness. There were radio ads, television ads and also newspaper ads* ((Respondent 5). Other respondents (2 and 6) believe that the Minister's visits to different townships were an effort to increase awareness.

**Question 7: In your opinion, should South Africa still be focusing on DTT or rather be focusing on other innovations like OTT streaming (VOD, SVOD, IPTV etc.)?**

South Africa has invested a considerable amount of money on the digital migration project and after 10 years, it has nothing to show for it except a few households with set-top boxes. This created a debate in the industry of whether to continue investing in DTT or on other OTT platforms. The majority of respondents (1, 2, 4, 6, 7, and 9) said that DTT should still be the focus for government as its target market is different from that of OTT consumers. *DTT is free to air and consumers will not pay to access DTT services*, said Respondents 1 and 4. For consumers to watch OTT services, they need to have data which is not cheap. *This is precisely the reason the government should focus on DTT so that the indigent people in this country should not be left out of the digital television*, according to Respondent 9.

The main purpose of digital migration was to clear the radio frequency spectrum which is presently occupied by broadcasters to permit the delivery of wireless mobile broadband services and other innovative applications. It will make no sense for the government to abandon the digital migration project before achieving its main objective especially after investing so much money. While this is noted, other respondents (3 and 8) believed that the government should completely abandon the DTT project and focus on Direct-To-Home (DTH) platform instead. DTH is a satellite platform providing universal access services through the digital broadcasting to those communities in the most remote areas of the country.

Respondent 5 from the regulator argued: *DTT made sense then when it was introduced, but now over two-thirds of the country's population is on digital satellite, it would make sense to go the DTH route.* Another respondent (1) also from the regulator, said: *DTT is no longer the cutting edge technology. Satellite has overtaken DTT and broadcasters are no longer focusing on DTT.*

**Question 8: Do you think that politics had to do with the current state of DTT in South Africa? If so, please explain in detail the perceived political interference and the impact it had on the failure to migrate on time.**

The general feeling amongst respondents was that to some extent, politics played a part in the current state of DTT in the country. Some respondents (2, 4, and 5) cited *removal of Ministers from their post before their end of term*, while others (Respondents 1, 3 and 9) accused the Ministers of *benefiting by favouring other players*. The issue of *policy changes and leadership changes at the top* was again cited by Respondents 2, 4, and 6 as part of political interference.

Only Respondent 8 from the broadcasters disagreed with the notion of political interference. According to him *there is a difference between interference and intervention. Like in any company, if things are not done correctly then top management will intervene not interfere and this is exactly what government did, they intervened...to some extent, yes, politics played a role justifiably so but not political interference; remember that politicians provide political leadership.*

In general, all respondents agree somewhat that politics played a role but differed on the issue of political interference.

**Question 9: There has been some confusion around the issue of set-top box subsidy, initially set-top boxes were to be given for free to indigent households (100% subsidized), and now we're told that only vouchers will be given to the poor households (partial subsidy). Do you think that this confusion has played a role in the slow adoption of DTT?**

All the respondents agreed with a big *YES* and *Absolutely*. The government introduced the scheme of ownership support in 2009 meant to subsidise the poor household communities. The idea of a subsidy was later abandoned by government in favour of a voucher system. These changes seemed to have created some level of confusion amongst the citizens as there was no clear communication regarding the mechanics of how and where to get the voucher.

**Question 10: There have been amendments to the broadcast digital migration policy, in your opinion, how have these policy amendments contributed to the delays in migrating to digital terrestrial television?**

There was a general agreement amongst respondents that policy amendments did contribute massively to the delay in migrating. Respondents 1 and 3 said: *...policy amendments take anything between 6 to 12 months before they could be implemented which then result in the delay*. Other respondents (2, 4 and 7) cited *policy changes in STB standard* as having contributed in the delays. Some of the respondents (5 and 8) again raised the issue of *Ministers removal before their end of term, which ultimately affected the policy implementation*.

**1. Question 11: Smaller countries like Namibia and Malawi have successfully completed the migration process from analogue to digital. How do you think they got it right with limited budget compared to South Africa?**

All the respondents answered this question with ease. Respondents 3 and 6 said: *Namibia cannot be compared to South Africa in terms of population size. That country has just fewer than 3 million people as compared to South Africa with an estimated population size of just fewer than 60 million*. The general response from respondents to this question was more on population size than other aspects. The respondents found it easier to roll out set-top boxes in a country with a smaller population than in a country with a bigger population like South Africa.

**Question 12: Looking at the skills required to successfully delivering on the DTT project, do you think that South Africa has the required skills and expertise?**

All the respondents agreed that South Africa has all the skills and expertise required to execute a project like DTT: *...in this country, we have broadcasting skill, engineering skills as well as manufacturing skills and capabilities* (Respondents 2, 5, 7 and 8). Other respondents said *YES, we do have the skills required*.

**Question 13: There are different stakeholders involved in the DTT project (Sentech, DoC, ICASA, SAPO, the Broadcasters, Set-Top Box manufacturers, USAASA), Do you think that the roles for each stakeholder were clearly identified, and that every stakeholder did their best to deliver? Please provide a detailed explanation.**

For the first part of the question, all respondents agreed that roles were clarified for each stakeholder. For the second part of the question, some respondents thought that stakeholders did their best to deliver on the digital migration project, while others said it was difficult to evaluate the contribution made by each stakeholder. According to Respondent 3, *ICASA's role is a regulatory one, SAPO's role was that of storage and distribution of set-top boxes, SENTECH is the signal distributor, USAASA was responsible for procuring of set-top boxes, and the Manufactures roles was to manufacture the set-top box, so yes, the roles were clearly identified*. Respondent 4 said: *It was difficult for other stakeholders to play their role due to financial requirements even though their roles were clearly identified*. He was referring to the SABC which was supposed to upgrade their infrastructure at a massive cost but could not do that on time.

**Question 14: To what extent do you think the OTT players like Netflix have contributed to the slow adoption of DTT?**

Majority of the respondents (1, 2, 4, 6 and 9) believed that there has been little or no impact at all on DTT by OTT players. Respondents 2 and 4 said: *...the evolution of technology has seen an uptake of Netflix but for those who have money for data. DTT services are free and no impact at all from Netflix*. Respondent 8 said: *OTT platform and DTT platform are targeting different markets*. Respondent 7 said: *...there has been a great significant shift from traditional linear television to OTT platform, but this shift only occurred in affluent areas where people could afford*

*expensive data. In rural areas, not much of an impact has been felt as many people in those areas are still relying on traditional television, said Respondent 9.*

**Question 15: In your own view, do you think that DTT is still relevant to the South African TV consumers, amidst the ever-growing consumption of OTT content such as Netflix, Hulu, Amazon Prime, Apple TV and others?**

There was a mixed response from respondents on this question, with some saying DTT is no longer relevant while others that DTT is still relevant in South Africa. According to Respondent 3, *DTT should have been dumped long time ago in favour of DTH.* Another respondent (6) said: *...both OTT and DTT platforms can co-exist because they cater for different markets.* Respondent 5 said: *DTT is a project of national importance and should not be allowed to fail. Its successful adoption will provide our own people with job opportunities, more entertainment and more television channels to choose from.*

Respondent 2, 4 and 8 simply answered: *YES, DTT is still relevant to South African television consumers.*

**Question 16: Taking into account everything that we have discussed, what do you think should be done to finally get it right?**

The importance of this question cannot be underestimated, for it serves as recommendations to government. The respondents suggested amongst other things that *government should delegate some of the responsibilities to the industry players and stop being a one man show*” (Respondent 7). This was in reference to government being the regulator, the procurer of set-top boxes, the distributor and the installer of set-top boxes. Another respondent (4) said: *I am not sure if we will ever get it right, let's make do with what we have.*

The following suggestions were made by Respondent 6: *...the government should evaluate the current Minister's deadline for migrating as this is too short. Also, the focus should be on getting more set-top boxes into the retail stores and deal with the problem of global shortage on chips.* The current Minister of Communications and

Digital Technologies has given the country 5 months to complete the analogue switch-off and respondents believe that the new deadline is too ambitious. They said: *...we as a country failed in 10 years and we cannot do in 5 months what we couldn't do in 10 years.*

Another respondent (9) suggested that *government should develop a competitive landscape, socialise the benefits of DTT, implement as soon as possible and push the public broadcaster (SABC) to launch the sport channel so that it can compete with Multichoice.*

**Question 17: Is there anything more you want to add that we may have omitted?**

This question was asked by the researcher to ensure that the study covered everything related to the slow adoption of DTT. Most respondents said the questions had covered everything relevant to the slow adoption of DTT. Only a few of the respondents added the following suggestions:

- **Better project management** – It is the view of Respondent 6 that the digital migration project was not managed properly and that government must ensure that this project is adequately resourced.
- **Get a buy in from stakeholders** - Before implementing any changes to the digital migration plans, government should consult and get a buy-in from stakeholders (Respondent 2).
- **Communicate better** – Communication regarding what is DTT, where to get STBs, and the benefits of migrating to DTT should be consistent, aggressive and targeted at the right audience (Respondent 6).
- **Clear deadlines and commitment** – The government should revise the deadline and commit to that new date (Respondents 1 and 7). The government has since revised the analogue switch-off date to early 2022.
- **Awareness campaigns** – The awareness campaigns should not be done as a box-ticking exercise (Respondent 8). The message should reach the intended target market and all languages (Respondent 4).

- **Agreement with regional countries regarding interference** – South Africa is no longer protected from signal interference due to the failure to meet the ITU deadline (Respondent 9). To protect our frequencies from interference, the government is advised to have agreements with cross-border countries regarding interference with our frequencies.
- **Improve on the quality of service** – Households that have been migrated to DTT and DTH do not get the required level of technical support in case of connection failures (Respondent 2).

## 8.4 Summary of the qualitative findings

Global Theme	Organising theme	Basic themes	Codes
Challenges/Issues	Failure to meet the migration deadlines	<ul style="list-style-type: none"> <li>• High turnover of ministers</li> <li>• Frequent changes to policies</li> <li>• Individual benefits over citizens</li> <li>• Technology availability</li> <li>• Battle for Set Top Box control</li> <li>• Technology availability</li> <li>• Stakeholder contribution</li> <li>• Resource allocation</li> <li>• Political interference</li> <li>• Perceived instability</li> </ul>	<ul style="list-style-type: none"> <li>• Leadership instability</li> <li>• Policy inconsistencies</li> <li>• Self-serving interests</li> <li>• Availability of boxes (STBs)</li> <li>• Litigation by broadcasters</li> <li>• Availability of chips</li> <li>• Stakeholder roles and responsibilities</li> <li>• Availability of resources</li> <li>• Interference v/s intervention</li> <li>• Splitting of the department of communications</li> </ul>
	Awareness/communication	<ul style="list-style-type: none"> <li>• Campaigns</li> <li>• Campaigns</li> </ul>	<ul style="list-style-type: none"> <li>• Ministers imbizo</li> <li>• Awareness through media</li> <li>• Yes</li> <li>• No</li> </ul>
	Growth of OTT platforms	<ul style="list-style-type: none"> <li>• Target market</li> <li>• Technology cost</li> </ul>	<ul style="list-style-type: none"> <li>• Different target market</li> <li>• Data price</li> <li>• Indigent communities</li> </ul>



		<ul style="list-style-type: none"> <li>• Target market</li> </ul>	
	Skills and expertise	<ul style="list-style-type: none"> <li>• Technological Skills base</li> </ul>	<ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> <li>• Sufficient</li> <li>• Provide leadership in Africa</li> </ul>
	BDM Policy	<ul style="list-style-type: none"> <li>• Frequent changes to digital migration policy</li> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>• Policy inconsistencies</li> </ul>
Success in smaller countries	Migration in Namibia, Malawi and others....		<ul style="list-style-type: none"> <li>• Population size</li> <li>• Proportional allocation of resources</li> </ul>
Getting it right		<ul style="list-style-type: none"> <li>• Clear commitments</li> <li>• Inclusivity</li> <li>• Communication</li> <li>• Inclusivity</li> </ul>	<ul style="list-style-type: none"> <li>• Making bold commitment and sticking to them</li> <li>• Involvement of industry players</li> <li>• Improve for better communication and awareness</li> <li>• All hands-on-deck approach</li> </ul>

Table 48: Summary of Qualitative Findings

## 8.5 Chapter Summary

Chapter eight presented qualitative findings which revealed no less than ten factors that are mainly responsible for the delays in migrating from analogue to DTT. Thematic analysis was applied to extract common themes and the results of the analysis are presented in table 47.

## **CHAPTER NINE**

### **DISCUSSION OF QUANTITATIVE AND QUALITATIVE FINDINGS**

#### **9.1 Introduction**

Chapter nine presents an analytical discussion of both quantitative and qualitative outcomes which are in line with the research objectives of this study. The discussion looks at the findings with respect to the research questions and hypotheses. The objectives that shaped this study included an investigation into the probable explanations for the slow or delayed adoption of the digital terrestrial television in Ethekwini Municipality, the citizens' behavioural intention to adopt DTT, and developing a framework for DTT adoption.

The study employed a mixed methods approach which draws from the two methods their strength and perspective, thereby recognising the importance of the natural and physical world, together with the significance of reality and influence on the human experiences (Ostlund et al., 2011:340). Mixed methods research involves combining or mixing qualitative and quantitative techniques, concepts, approaches or even languages into a single study (Onwuegbuzie & Johnson, 2004: 17).

In this study, the quantitative analysis preceded the qualitative analysis phase and the findings from the initial phase added to the subsequent phase.

#### **9.2 Discussion of the qualitative findings**

This section discusses the qualitative findings and applies the triangulation method to identify contribution of the qualitative data to the research model that has emerged from the study.

### 9.2.1 Reasons for the slow adoption of Digital Terrestrial Television (DTT)

The study sought to investigate factors that led to the delay in the adoption of DTT in the Ethekwini Municipality. For this part of the study, 10 experts were identified as participant for the study but only 9 were available to be interviewed. The first objective of this study is to ascertain reasons that led to the slow adoption of digital terrestrial television. The interview questionnaire had 16 questions which were aimed at answering the first objective

Several factors were listed by participants as possible reasons that led to the delay in migrating from analogue to digital terrestrial television. Several factors were listed by participants according to their experience in relation to the digital migration project: leadership instability, policy inconsistencies, litigation amongst broadcasters, self-serving interests, poor awareness campaigns, corruption in the procurement of set-top boxes, changes in the set-top box standards, human and financial resources. These factors were listed in order of frequency, for example, almost all respondents cited leadership stability as the main or key factors while human and financial resources were least cited by respondents.

This section will discuss each factor as listed by the participants.

The first factor listed by participants which is the dominant factor is ***the leadership instability at the top***. This is in direct reference to the high turnover of Ministers in the Department of Communications. Ministers are accountable to the National assembly for their actions and that of their departments, and “must act in accordance with the government policy”. They provide political leadership and ensure the implementation of government programmes and policies. There is no doubt that government has failed to implement the digital migration project in the last 10 years and leadership instability is cited as part of the problem. Past studies by Blasco and Teruel-Carrizosa (2018), Amankwa-Amoah (2016) and Zang (2015) indicate that such failures are as a result of frequent changes in management teams. Ministers have influence over policy and any project that is linked to a policy will be affected by any changes in the policy. In addition, Nwezi and Omonona (2020:34) observed that government policies will always be “influenced by the prevailing political culture”.

William (2017) notes that a politically stable nation will make business-friendly decisions that will stimulate local economy while an unstable nation threatens the government capability to ensure effective execution of projects like the digital migration. The department of communications and digital technologies, formally known as the Department of Communications (DoC), has had over 13 Ministers in the last 12 years and this was identified as a big factor.

***Litigation amongst broadcasters*** is another factor that was identified by participants as having led to the delay in migrating from analogue to digital terrestrial. This is in reference to a case between e.TV and Multichoice, together with the Minister of Communications Faith Muthambi regarding the encryption of set-top boxes. e.tv wanted the STBs to be encrypted and argued that the lack of encryption would hinder high-definition broadcast and risk non-compliant STBs receiving digital broadcast.

The argument by the Minister was that adding encryption on the STB's will cost the country significantly more in the long run, in terms of actual broadcast implementation, the physical implementation and the license fee per STB (Fraser, 2016). In 2015, e.tv lost the case when the Gauteng High Court ruled in favour of the Minister of Communication and Multichoice. e.tv's application in the High court sought to review aspects of the Broadcast Digital Migration Policy which was amended by the Department of Communications. These amendments ensured that STBs will not have the capabilities to encrypt broadcast signals for subsidized boxes. e.tv launched an appeal with SCA and won the case in 2016, but that victory was short-lived, as the Constitutional Court ruled in favour of Multichoice and the Minister of Communications in 2017. During this period of litigation, the country's digital migration project was on holding for a period of about 3 years.

Fast track to 2021, e.tv is again challenging the government expedited digital migration process. This is after the new Minister Khumbudzo Ntshavheni gave a new deadline to complete the digital migration process which was approved by Cabinet. The Minister gave the country 5 months to complete the process before switching-off the analogue signals. e.tv is of the view that the expedited migration will affect its

business as a free-to air broadcaster as many households will be switched-off from the analogue signal. This is expected to create another delay as the court case may run for a lengthy period.

The third factor that was identified by respondents was the ***policy inconsistencies*** with regard to set-top box encryption, frequency plan, set-top box standard and set-top box subsidy. Digital migration has triggered the formulation of policy designed to manage the transition from analogue to digital broadcast and according to Berger (2010:34), the delay in the finalisation of the frequency plan by ICASA contributed to the delay in launching the digital migration. The Broadcast Digital Migration Policy was not clear on many aspects of STBs like the frequency plan, STB standard, STB encryption and STB subsidy (Berger, 2010). All the broadcasters need frequency for their channels and the absence of a frequency mean broadcasters may not be able to launch new channels, thus further delaying the digital migration project.

Set-top boxes are a key component of the digital migration project and debate on whether to encrypt them or not will affect the manufacturing process. This implies that while the debate is still ensuing, policy cannot be finalised and no set-top box can be manufactured.

Another policy issue that has contributed significantly to the delay of the digital migration project is the subsidy of the set-top box. This study found that the confusion surrounding the subsidy of the STB's has contributed to the delay. The issue of STB subsidy was first mooted in the 2008 Broadcast Digital Migration Policy where 5 million, needy, TV-owning households were to be given subsidies by the end of 2013. In 2014, that had not been achieved and the government issued a new qualifying criteria for low or no income families. This was not properly communicated to the beneficiaries of the subsidy and created confusion, uncertainties and further delays (Hawkes, 2014). In 2018, government announced that it will now give vouchers to the indigent households to buy STBs from any supplier of their choice. Again, this was not properly communicated to the citizens, and this resulted in the slow uptake of the STBs.

On the question of **political interference**, this study found that there was some level of interference by some Ministers. The case in point is the former Minister Faith Muthambi's interference with governance at SABC and issue of encryption of set-top boxes. The study by Lyer and Mani (2012) showed how politicians affect the process of bureaucratic assignment across public organization. The findings were found to be consistent with a finding by Dang (2015) that politicians interfere in the affairs of local governments. At a Municipality level, Mngomezulu (2020) also found that a high degree of political interference by politicians in the Umlalazi Local Municipality hinders the administration of government programmes and service delivery.

Another debate on **DTT standards** created policy amendments after the country had made an initial decision to go with the DVB-T standard after a recommendation from the SENTECH in the year 2000, Digital Broadcasting Advisory Body (DBAB) in 2001, Southern African Digital Broadcasting Association (SADIBA), The National Preparatory Task Team in 2004, Digital Broadcasting Migration Working Group in 2005, and the Digital Broadcast Migration Policy, which was approved by Cabinet in 2008.

In 2010, a policy decision of 2008 to adopt DVB-T was reversed in favour of the Integrated Services Digital Broadcasting for Terrestrial (ISDB-T) standard, which was adopted in Japan and Brazil. This reversal of the decision meant that the policy formulation process had to be restarted again resulting in a 3-year delay. That decision didn't last as new the new Minister of Communication Roy Padayachie announced that the country would adopt the DBV-T2 standard which is an extension of the DBV-T1.

**Corruption in the manufacturing of set-top tender** was cited by some participants as a major factor affecting the adoption of DTT. This finding is supported by Mbatha and Lesame (2014), who highlighted the issue of corruption as a factor delaying the implementation of government programmes. This is also supported by an article in the Sunday Times date 6<sup>th</sup> August (2017), which reported that a son of a former President has been implicated in the bribery scandal related to the tender of the digital TV decoders (STBs). As a result of these claims, the Universal Service and Access Agency of South Africa (USAASA), which is the agency of government

responsible for the procurement of STBs instructed the manufactures to suspend the production of STB until further notice, thus adding to the delay.

***Self-serving interest*** by broadcasters and manufacturers of set-top box may have led to a delay in that these entities lobbied Ministers in the communications department to effect policy changes in their favour. It is estimated that policy amended may take anything from 6 months to 2 years before their implementation.

**Human and financial resources** as a factor was least cited by respondents as a contributing factor. This meant that certain milestones were delayed from being achieved as a result of under-funding. Documentary evidence from government reveal an amount of R9billion was spent on digital migration but nothing much came of it.

With regard to ***stakeholders' roles in the digital migration projects and the level of skills required to deliver on the digital migration projects***, the study found that all stakeholders knew their roles and that some did their best but was limited by other factors beyond their control. The study also found that South Africa has the skill and expertise required to successfully execute the digital migration project. There could not have been delays arising from stakeholder roles and skills & expertise.

On whether the ***government should still be focusing on DTT or on platforms like Over-The-Top (OTT)***, the study found that both OTT and DTT are different platforms targeting different consumers and that there is a place for both platforms to co-exist. The study also found that the rise in OTT uptake could not have contributed to the delay in migrating from analogue to DTT, since OTT was introduced late, around 2016. The majority of the citizens to whom DTT is targeting still cannot afford the price of data to access OTT services, so they continue to rely on free-to-air services such as the public broadcaster (SABC) and e.tv.

### 9.3 Citizens intention to adopt DTT

This study has proposed five hypotheses in relation to the citizen's intention to adopt Digital Terrestrial Television (DTT). The following constructs were used to answer the hypotheses; performance expectancy, effort expectancy, technology awareness, social influence and facilitated conditions, and in total, 21 questions were used.

This study did not measure the actual use of the set-top boxes as there were not many households with a DTT set-top box adopted. All the five constructs are hypothesized to have a positive influence on the behavioural intention to adopt of set-top boxes. Furthermore, this study did not investigate the effect of gender, age and experience on the behavioural intention to adopt DTT STBs. Voluntariness of use was also removed from the study because the use of STBs was not investigated due to few households having received the set-top boxes.

#### 9.3.1 Discussion on the quantitative findings

This section discusses the quantitative findings in relation to the objectives that sought to determine the citizens' behavioural intention to adopt DTT. For the quantitative part of the study, a survey questionnaire was distributed to over 271 respondents, out of which only 138 responded to the questionnaire, thus providing a response rate of 51%.

The quantitative findings confirmed a significant correlation exists between all the exogenous construct of the UTAUT model and the behavioural intentions, indicating a relationship between behavioural intentions to adopt and the exogenous constructs (EE, PE, TA, SI, and FC). The current study adapted the existing UTAUT model by including Technology Awareness (TA) construct as an exogenous construct, and introduced the four cultural dimensions of Individualism (IND), Masculinity (MAS), Uncertainty Avoidance (UA) and Power Distance (PD) as moderator variables.

**Social influence (SI)** emerged as the strongest predictor of intention behaviour amongst other construct. This result indicated that participants in this study, who are citizens of Ethekewini Municipality, would prefer to see set-top boxes being used by other members of the community before they can adopt the technology. Elek et al.



(2006) argued that the behaviour demonstrated by most people tend to influence an individual's own behaviour. In other words, users tend to believe that some behaviour make sense when others are doing it.

**Performance expectancy (PE)** emerged as the second of predictor intention behaviour by rank amongst the other constructs. In this research, the results indicate that citizens will adopt a technology that can make their life better, can assist in bridging the digital divide and can provide more functionalities than its previous version. These findings are consistent with the results of previous studies by Ari and Mayurina (2018); Sutanto (2018); and Andika and Heryanto (2017), on the acceptance of e-learning and financial systems.

**Facilitated conditions (FC)**, which refers to the extent to which users of technology believe that the existing infrastructure can sufficiently support the use of technology, emerged as the third strongest predictor of intention behaviour. This study found that a significant correlation existed between FC and BI, which is inconsistent with Venkatesh's (2003) findings. Venkatesh found that FC does not affect BI but affects only the use behaviour. In this research, facilitated conditions include technical and financial support from the government. The results of the survey questionnaire indicate that 55% of the respondents believe that there is adequate infrastructure to allow for the adoption of STB's. This is a clear indication of the intention by the eThekwini citizens to accept STB's. While this may be true, a further 28% believe that there is no financial and technical support from the government, and this may affect their decision to adopt STBs.

**Technology Awareness (TA)** emerged as the fourth strongest predictor of intention behaviour. In this research TA refers to the knowledge about DTT as a platform, STB and a technology (product), where and how to get this product, and the benefits of using the technology. The importance of technology awareness is highlighted by Abubakar and Ahmed (2013) in their study on adoption of e-services by organization. Their findings that technology awareness has a direct and significant relationship on the user's behavioural intention are consistent with the finding of this study. The result from the survey questionnaire indicates that 62% of the respondents are aware of the product (STB) but do not know how and where to get the product from.

**Effort Expectancy (EE)** emerged as the least ranked predictor of intention behaviour with a significant correlation. In this research, EE refers to the ease of using the STB by the citizens and was found to have a significant and positive relationship with BI. These findings are consistent with Venkatesh (2003); Giesing (2003) and Nyesiga et al. (2017), who found that there was a significant positive relationship between EE and behavioural intentions. The survey questionnaire result indicates that over 65% of respondents think that using an STB will be an effortless exercise and they would not need any assistance to interact with STB.

<b>Construct</b>	<b>p-value</b>	<b>Spearman correlation</b>	<b>Relationship type with BI</b>	<b>Significant / insignificant</b>
Performance expectancy	<0.01	0.522	Positive relation	Significant
Effort expectancy	<0.01	0.398	Positive relation	Insignificant
Social Influence	<0.01	0.603	Positive relation	Significant
Facilitated conditions	<0.01	0.499	Positive relation	Significant
Technology Awareness	<0.01	0.409	Positive relation	Insignificant

Table 49: Relationship Summary between Exogenous Constructs and Behavioural Intentions

Table 47 provides a summary of the relationship between exogenous constructs of the UTAUT and behavioural intentions. These results are captured in the adapted UTAUT model that emerged from this study (Figure 44).

### 9.3.2 Hypothesis of the study

The exogenous construct constructs of the UTAUT (PE, EE, TA, FC, SI) have all shown a positive correlation with BI indicating that UTAUT constructs plus technology awareness as an extension to the original UTAUT constructs are important factors to consider when investigating the citizens' intention to adopt STB. The Pearson correlation indicated a strong, significant positive relationship between all the independent constructs and BI.

**Hypothesis 1** stated that there is a positive relationship between performance expectancy (PE) and behavioural intention (BI) to adopt. PE in this study refers to the expectations and benefits that users of STBs will derive from it. This study found the hypothesis to be true since the **null hypothesis was rejected**. The p-value of performance expectancy is 0.028 which is less than 0.05. The results indicate that the relationship between performance expectancy and behavioural intention is significant. These results are not surprising in that they are consistent with Sumak and Sorgo (2016), Hoque and Sorwar (2017), Khalilzadeh et al. (2017) and Venkatesh et al. (2003). These studies collectively found that PE is a direct determinant of BI. These studies were not done on user acceptance of set-top boxes (STB), and their findings may not necessarily be applicable to the adoption of STB. Most studies reviewed on the acceptance of technology focused on educational, health and e-commerce technologies. The Pearson correlation was found to be 0.522 which indicated a moderate positive relationship between performance expectancy and behavioural intention.

PE has yielded a standardized regression *beta coefficient* of 0.166 which compares the weight of the influence of every single exogenous variable to the endogenous variable. If the absolute value of a beta coefficient is high, then the effect will be stronger. A beta coefficient of 0.166 means the strength of the effect of PE on behavioural intention (BI) is low, even though a significant association exists between the two variables. The possible reason for a low standardized beta coefficient is the missing data, which in this case was corrected by data imputation method, and the low response rate in the quantitative study.

**Hypothesis 2** stated that there is a significant and positive association between effort expectancy (EE) and behavioural intention (BI) to adopt. EE in this study refers to the expectations by potential users of STBs to use minimum or no effort in interacting with a set-top box. The study found the hypothesis to be true since the **null hypothesis was rejected**. The p-value of effort expectancy is 0.221 which is more than 0.05. The results indicate that the relationship between performance expectancy and behavioural intention is not significant at  $p = 0.221$ .

The regression beta coefficient for effort expectancy was found to be 0.398, which is closer to zero implying that the strength of the effect of EE on behavioural intention (BI) is low. In this research, EE does not have predictive power in explaining the intention behaviour. This result is consistent with Danish and Sair (2018), who found that EE significantly influence the behavioural intention to adopt. Chou et al. (2018) also found that EE significantly influence behavioural intention to adopt technology, even though their study focused on mobile commerce.

**Hypothesis 3** stated that a relationship exists between social influences (SI) and behavioural intention to adopt STB. Social influence in this research refers to the influence of a person's beliefs, opinions or behaviour by members of the community to adopt or not to adopt set-top box. In other words, the social influence refers to the pressure emanating from external environment surrounding the individuals which ultimately may affect their perceptions and behaviours (Davis, 1989). The study found the hypothesis to be true since the **null hypothesis was rejected**.

The Pearson's correlation coefficient of 0.603 suggests a moderate to strong positive relationship between social influence and behavioural intentions. The beta coefficient of 0.308 at  $P < 0.075$  indicates that the relationship is significant and that SI has low to medium predictive power in explaining the intention to use STBs. These finding are consistent with Venkatesh and Zhang (2010); Tarhini et al. (2013); Kershawani and Bisht (2012); Nurkhin (2020), Abdekhoda, Javad & Misraeed (2016), who investigated the impact of Social influence on intention to accept financial systems in the workplace, educational technologies and internet. All of these studies supported the empirically supported the positive relationship of social influence on the user's intention to use the technology. In this study, Social Influence was found to be the strongest predictor variable amongst the other variables. This means the events in the community will have the greatest influence towards the users' acceptance of STB. The majority of the respondents agreed that it is the expectation from their communities to have an STB and that their friends and families thinks that too. This was in response to questions 18 and 19 of the survey questionnaire on social influence. This indicates the influence that societies have on the decision to accept STBs.

**Hypothesis 4** stated that there is a positive relationship between facilitated conditions (FC) and behavioural intentions to adopt STB. Facilitated conditions in this research refer to the extent to which participants in this study felt that the infrastructure and the support required for the adoption of the STB is available. The study also found that there is a positive relationship between FC and BI thus validating the hypothesis and **rejecting the null hypothesis**.

The regression coefficient of 0.499 suggest a moderate positive relationship which is significant at  $P=0.048$  which is less than the significant value of 0.05. Venkatesh and Morris (2003) contend that FC should be measured by various factors including advice from marketers and availability of resources. On the survey questionnaire, 80% of the respondents indicated that the facilitated conditions existed in their communities because of the available resources in their communities. The standardized  $\beta$  coefficient of 0.151 indicated a low predictive power of facilitating conditions. Previous studies by Heise and Schukat (2021) and Venkatesh et al, (2003) found FC to have an influence on both behavioural intentions and actual use. In this research, facilitated conditions as stated in question 25 of the survey questionnaire have to do with infrastructure support available. The majority of the respondents agreed that the support for infrastructure enabling them to adopt DTT is there. The infrastructure according to the respondents is the transmitters located across all the nine provinces of the country and the technical support provided.

**Hypothesis 5** stated that technology awareness (TA) has an influence on behavioural (BI) intention to adopt DTT. In this study, technology awareness refers to a state of being mindful of the technology (set-top box) that is becoming popular and is readily adopted in the market. The awareness stage is where individuals or organization are exposed to the existence of the innovation and are provided with the information relating to functioning and benefits of the innovation. The study found the hypothesis to be true since the **null hypothesis was rejected**. The p-value of technology awareness was 0.075 which is more than 0.05. The results indicate that the relationship between technology awareness and behavioural intention is not significant at  $p = 0.05$ , even though technology awareness was found to be a predictor of behavioural intention.

The standard beta coefficient for technology awareness was also very low at 0.149, implying that the strength of the effect of technology awareness on the behavioural intention is weak. The element of the missing data proved once again to be behind the low beta coefficient. Questions 14 to 17 of the survey questionnaire asked respondents on their awareness of technology. The majority of the respondents said they were aware of what DTT and STB were and were also aware of the benefits associated with having an STB. These results clearly indicate the level of awareness that exists in Ethekewini Municipality but contradicts the qualitative findings which reveal a lack or poor awareness regarding DTT.

#### **9.4 Discussion on the findings of moderator variables**

The moderator analysis assists researchers in elucidating whether specific context exist when UTAUT predictors are more likely to reveal the predictable effects. The following moderator variables were included in the original UTAUT model: Individualism, Masculinity, Power Distance, and Uncertainty Avoidance.

A simple linear regression with moderators of Power Distance, Masculinity, Uncertainty Avoidance and Individualism was performed. A negative interaction coefficient means that the effect of the combined action of two predictors is less than the sum of the individual effects.

The four cultural dimensions were measured at an individual level before being integrated into the extended UTAUT model as moderators. The moderation effects were found to be insignificant except for the moderating effect of masculinity on the relationship between Social influence and Behavioural intentions.

The correlation coefficient of the interaction variable of **Power Distance** and PE on BI was found to be 0.003 at P value of 0.965. This means that PD has no moderation effect on the relationship between PE and BI resulting in the insignificant interaction. The author had no choice but to accept the null hypothesis. A study by Yoon (2009) discovered that the relationship between performance expectancy and behavioural intentions is influenced by Masculinity and not Power Distance. In this research, its

outcomes mean that the relationship between high ranking individuals and low ranking individuals of the community does not affect the perceived benefits expected from using a technology by the citizen's.

The correlation coefficient for the interaction variable of **Masculinity** and EE on BI was found to be -0.125 indicating a negative and weak moderation effect on BI. The P value of 0.111 indicated that the nature of the interaction was insignificant. The interpretation of the findings is that respondents who espouse high masculinity will need less effort to interact with a set-top box, implying that more men will need less effort to use STB than women. These findings are consistent with Venkatesh and Zhang (2010), who found that masculinity does moderate the influence of EE on BI.

For the interaction variable of **uncertainty avoidance** and BI, the coefficient variable was found to be -0.99, indicating a strong negative moderation; however, this moderation was insignificant at  $p = 0.141$ . Within this research, this finding means that the more the citizens are uncertain about a particular technology, the less they will adopt or show less intention to adopt. Consequently, a high uncertainty avoidance coupled with ambiguity may result in citizens becoming hesitant and less motivated to adopt new technology (Zakour, 2004). The uncertainty avoidance construct has been observed by researchers as having a strong influence on individual behaviour which is in agreement with the outcomes in this study. The insignificant moderation suggests that the citizens' uncertainty about the technology will not significantly influence their behaviour.

The moderating effect of **individualism** on the relationship between FC and BI is very weak, positive and insignificant ( $p = 0.296$ ), with a beta coefficient of 0.081. This implies that the individual's self-interest has little or nothing to do with the impact of FC on BI. Individualism has been attributed as having a powerful influence on an individual's behaviour, perception and decision-making process (Yates & Oliveira, 2016; De Mooij et al., 2019). Srite and Karahana (2006) found individualism to have a significant moderating effect on the intention behaviour. Their findings are contradicted by the findings of this study which found that the moderating effect was insignificant.

The study also found **individualism** to have no moderating effect on the relationship between technology awareness and BI (Beta = 0.007) with a P value of 0.927 indicating insignificant relationship. Technology awareness in this research refers to the citizens' knowledge on DTT, what are the benefits associated with adopting STB, where to get help regarding STB purchase or subsidy and the technical support. About 65% of the respondents have said they are aware of the technology and the associated benefits. In previous research, individualism was found to have an important robust causal effect on innovation and long-term growth, Gorodnichenko (2010) and Roland (2011), which is in agreement with the outcomes of this study on technology awareness and intention behaviour. With regard to moderation effect of individualism on TA and BI, the individualistic nature of the respondents had no effect on the influence TA has on BI.

**Masculinity** was found to have a negative weak moderation effect (Beta = - 0.153; P = 0.040) on SI and BI. Even though the moderation effect was weak, it was found to be significant. The masculinity in this study indicates the degree to which respondents value ambitiousness, assertiveness and being in control. Most studies on masculinity moderation were comparative studies based on attitude and or behaviour, but not on technology awareness. It should be further noted that masculinity in this context does not refer to gender but to whether a society or an individual espouses masculine values (Bem, 1981 & Hofstede, 1984). Previous studies by Lisco (2015) and Himmelstein (2018) on the moderation effect of masculinity found masculinity to have a strong moderation effect on effort expectancy and not on technology awareness. There is no available data on the moderation effect of technology awareness on intention behaviour, and the findings of this study will add to the growing body of knowledge on technology adoption.

Table 50 presents a summary of the moderation hypothesis.



<b>Moderator (Null Hypothesis)</b>	<b>Reject/Accept</b>
PD on PE and BI	Accepted
MAS on EE and BI	Rejected
UA on SI and BI	Rejected
IND on FC and BI	Accepted
IND on TA and BI	Accepted
MAS on SI and BI	Rejected

Table 50: Summary of Moderation Hypothesis

Table 49 presents a summary of hypotheses one to five, while the summary of hypotheses six to eleven is presented in Table 50. These results are captured in the adapted UTAUT model in Figure 47.

## 9.5 Research Model

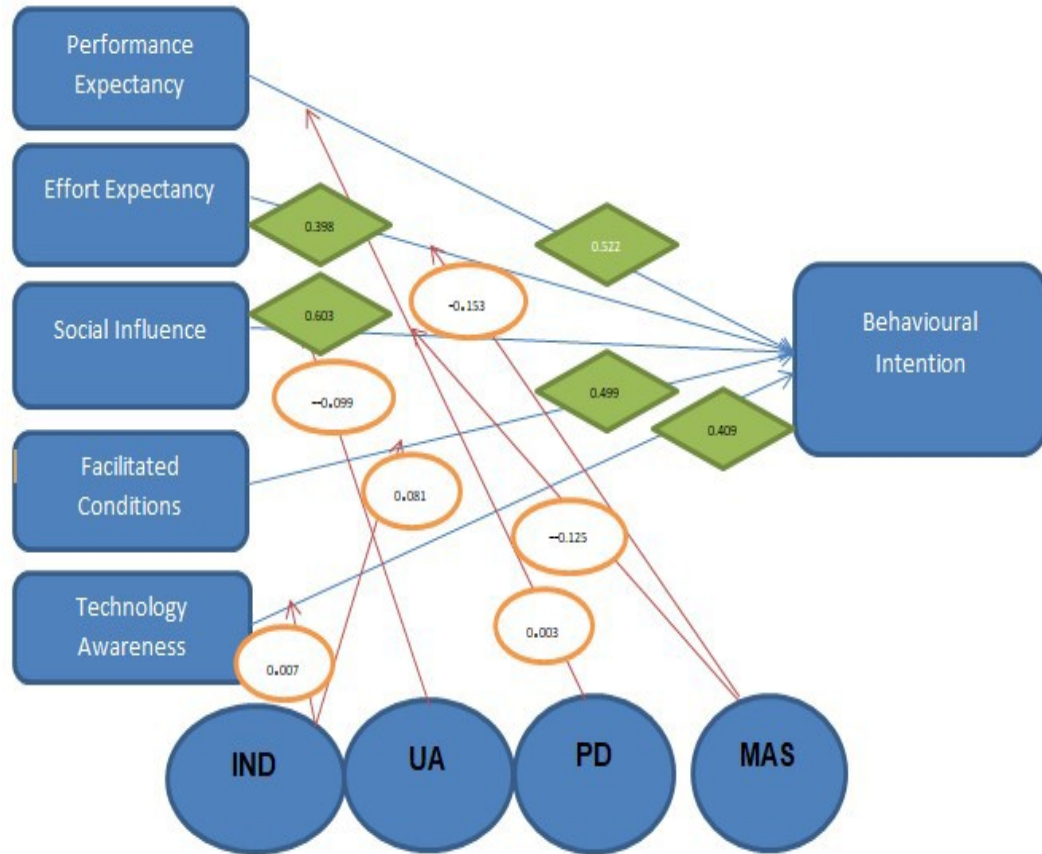


Figure 48: Adapted UTAUT model

Figure 47 presents the adapted UTAUT model generated from the quantitative data. The effect of the moderator variables is highlighted in orange, while effect of the exogenous variables on the behavioural intention is highlighted in green. It can be seen from the adapted model that there is a positive relationship between the exogenous variables (PE, EE, SI, FC, and TA) and the endogenous variable (BI). The level of significance is not indicated in the model but was established in Section 7.6.2 and presented in Table 29

## **9.6 Methodological triangulation**

In this study, a mixed methods approach was used to study a phenomenon. This section of the study use triangulation method to discuss whether the qualitative results complement the quantitative findings or if there is a divergence of the research findings. The methodological triangulation technique refers to the use of more than one method or approach using different investigative methods to the same phenomenon, in order to improve the accuracy of the observation (Kern, 2016: 2). In addition, this method is described as a prevailing method that facilitates the validation of data by employing a combination of multiple research approaches in the study of the same phenomenon (Bogdan & Biklen, 2006; Holtzhausen, 2000).

Turner and Turner (2012) describe triangulation as a means by which a different perspective is used to validate, challenge or extend the existing findings. Several researchers (Redfern & Norman, 1994; Risjord et al., 2001; Foss & Ellefsen, 2002) have found methodological triangulation to be beneficial in enhancing the understanding of the studied phenomenon, providing comprehensive data, confirmation of the findings and increased validity of the findings. This study has also benefited from application of the methodological triangulation in so far as confirmation and validity of the findings.

Triangulation in general plays an important role in ensuring reliability and validity of the data and results. This study has produced complementary findings, divergent findings and convergent findings. The methodological triangulation used in this study followed the Ertzberger and Kelle (2003) as depicted in Figure 47.

### **9.6.1 Triangulating complementary results**

Complementarity is used by researchers in building a richer picture of the research findings by allowing results obtained by the use of different methods inform each other. The theoretical propositions that resulted in complementarity of the findings are based on the skills and knowledge required to successfully deliver a DTT project and the availability of technical support.

The first proposition was tested quantitatively using SPSS and was supported by quantitative data. From the survey questionnaire responses, the majority of respondents believe that South Africa has the required skills and knowledge to deliver DTT project to the citizens. This theoretical proposition was also supported by the qualitative empirical data in showing that most of the participants in the interviews are convinced that the country has broadcasting skills, project management skills and manufacturing skills. The quantitative finding also revealed skills and knowledge as an essential factor in the successful roll out of digital migration project.

The second theoretical propositions drawn from the survey questionnaire is that of technical support. This proposition as well was tested quantitatively using SPSS and was supported by quantitative data. From the survey questionnaire responses, the majority of respondents believe that technical support will be made available to them as and when a need for support arises. This theoretical proposition was also supported by the qualitative empirical data in showing that most of the participants in the interviews believe that the government has made technical support available for households that will be migrated to DTT platform. This support includes training of the installers and information on how and where to get a set-top box. The qualitative result has proved to complement the quantitative results.

### **9.6.2 Triangulating convergent results**

Many researchers believe that convergent data is most credible and actionable than divergent results. Convergent results highlight the extent of overlap between the data sets and provide an assurance that the methods employed are appropriate, and also ensures the accuracy of the strength of the findings. The theoretical proposition that resulted in convergence of results emerged from the Facilitated Condition (FC) construct, where infrastructure was identified as key factor in the adoption of DTT. The proposition “lack of infrastructure contributed to the delay in migrating from analogue to digital” was tested quantitatively using SPSS and was supported by quantitative data. From the survey questionnaire responses, the majority of

respondents believe that South Africa has the infrastructure required to successfully roll out DTT. This theoretical proposition was also supported by the qualitative empirical data in showing that most of the participants in the interviews are convinced that the country has the required technical infrastructure to roll-out DTT compared to a decade ago. The participants in the interviews went on to mention SENTECH's DTT transmitters that have been installed in all the provinces, and the SABC studios and equipment upgrades, as evidence of infrastructure readiness.

Another area where there was convergence of results is Technology Awareness. The theoretical proposition here was that "Awareness drives adoption of technology". This proposition as well was tested quantitatively using SPSS and was supported by the quantitative data. What emerged from the survey questionnaires was that majority of the respondents were not aware of where and how to get a set-top box, the requirements for a set-top box and what exactly is DTT. This theoretical proposition was also supported by qualitative empirical data in showing that most of the participants in the interviews believe that there was not enough awareness to drive the adoption of DTT in the country. Many authors have identified technology awareness as one of the biggest drivers of technology adoption. Both qualitative and quantitative findings are in agreement with the outcomes of Katungi (2007) Simtowe (2016), and Saghafian (2021). These authors investigated the impact of awareness on the adoption of technology. Although their focus was on farming and banking technology, their findings can be generalised to other fields of technology because of the universal nature of technology and the methods that were used in their separate studies.

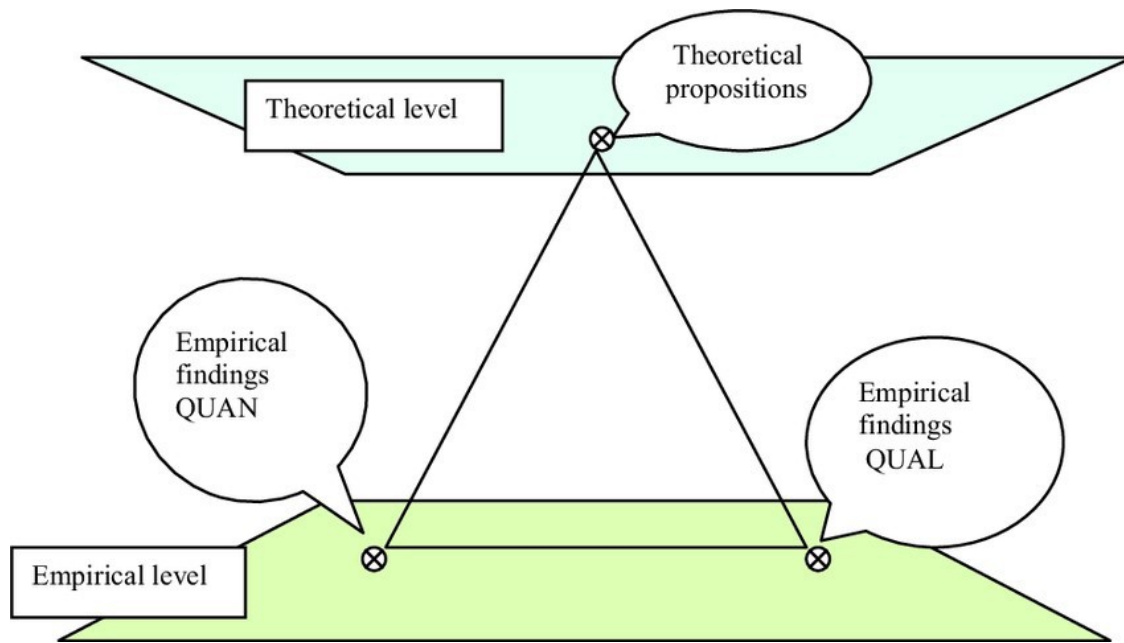


Figure 8: Illustration of the triangulation triangle (Etzberger and Kelle, 2003)

## 9.7 Chapter Summary

Chapter nine discussed the outcomes that emerged from the qualitative themes and quantitative results. The study found a significant and positive relationship existed between the five exogenous variables and the Behavioural Intentions. The findings from quantitative data resulted in the adapted UTAUT model (Figure 44) with Social Influence (SI) emerging as the strongest predictor of intention behaviour and Effort Expectancy as the least influential predictor.

The use of methodological triangulation in this study revealed that some of the qualitative results were complementary and converged with the qualitative findings. The addition of technology awareness construct was justified by the qualitative findings as a contribution to the adapted UTAUT model. Technical infrastructure also emerged as an additional construct to be added in UTAUT model for future studies.

## CHAPTER TEN

### CONCLUSION, RECOMMENDATIONS AND LIMITATIONS

#### 10.1 Introduction

This chapter presents the conclusions from the investigation and the literature review conducted. These conclusions are based on whether the objectives of this study were achieved or not.

The study sought to investigate the slow adoption of Digital Terrestrial Television (DTT), with Ethekwini Municipality being the case in point. It focused on citizens' intention to adopt DTT by using set-top boxes (STB). The use behaviour was excluded in the study as the number of households that have been migrated to DTT was very minimal to justify inclusion. The objectives of this study were to investigate issues that have led to the slow adoption of DTT in South Africa by:

- I. To investigate issues that have led to the slow adoption of DTT in eThekweni Municipality
- II. Examine the nature of the association between the exogenous constructs of the UTAUT model plus technology awareness as an additional variable and the behavioural intention to use set-top box for digital terrestrial television.
- III. Determining the extent of the moderating effect of power distance, individualism, masculinity, and uncertainty avoidance on the relationship between the exogenous constructs of the UTAUT model and the behavioural intention to adopt the STB.

For these objectives to be achieved, the following research questions needed to be answered.

- What are possible reasons that have influenced the slow adoption of digital terrestrial television in Ethekwini Municipality?

- Is there a significant and positive relationship between the exogenous constructs of the UTAUT model with technology awareness as an additional construct and the citizen's behavioural intention to adopting the set-top box for digital terrestrial television?
- To what extent is the relationship between the exogenous constructs of the UTAUT model and the behavioural intention to adopt the set-top boxes (STB) being moderated by power distance, individualism, masculinity, uncertainty avoidance and technology awareness?

## 10.2 Conclusions from the qualitative findings

In determining reasons for the slow adoption of DTT, a qualitative approach was adopted to address the research problem. Several factors were identified as contributors to the delay in migrating citizens from analogue to DTT.

- The research question in the qualitative study was: *What are possible reasons that have influenced the slow adoption of digital terrestrial television in Ethekewini Municipality?*

In answering this question, the researcher engaged industry experts to solicit their views and opinion on what could have led to the slow adoption of DTT. An interview questionnaire with 16 questions all aimed at answering the research question was prepared. The outcome of the interviews revealed many factors as possible reasons for the slow adoption of digital terrestrial television and these factors led to several conclusions being made by the researcher. These conclusions arrived at represent the majority views of the participants which were captured in interviews and analysed through thematic analysis techniques. The conclusions were as follows:

1. Leadership instability at the level of Ministers had impacted the roll out of DTT. The majority of the participants agreed that the changes that took place in the Department of Communication had a serious impact on the implementation of the DTT project. Previous and current studies on leadership and management supported this finding. In the last 12 years, for example, the department of communications had well over 11 Ministers and each minister had his or her own ideas of how the project should unfold.



2. Policy inconsistencies had also played a huge role in the slow adoption of DTT and the slow uptake of STBs. The policy inconsistencies had to do with analogue switch-off date, STB encryption, STB standard, STB subsidy and funding allocation. The inconsistencies in this study refer to a situation where a Minister decides on the policy objectives, and before the policy is implemented, another Minister takes over with new or adjusted policy objectives. For a policy to be developed and implemented, it takes anything between 6 months and 24 months, during which time nothing is happening regarding project implementation. The participants agreed based on their broadcasting and policy experience that these inconsistencies have resulted in a substantial delay.
3. The study also concluded that litigation amongst broadcasters interfered with the uptake of set-top boxes and the DTT roll-out project. The famous case in point is e.tv versus Multichoice regarding the STB encryption. The matter went to the High Court, the Supreme Court of Appeal (SCA) and up to the Constitutional Court. This litigation resulted in a time delay of 3-year delay and cost millions of rands. Based on the participants' responses and the documentary evidence such as newspaper articles, TV and Radio news, the researcher concluded that the time spent on litigation between stakeholders was a key factor which contributed to the delay.
4. The self-serving interest amongst stakeholder also contributed to the slow adoption of DTT. The participants highlighted a scenario in which a set-top box manufacturer lobbied the Minister of Communications to endorse their product. This did not sit well with other manufactures who approached the court for intervention. This court process created another delay of the analogue switch-off.
5. Corruption in the STB manufacturing was highlighted by participants as having had a negative impact in the uptake of set-top boxes. Various publications ran with this story, accusing the then Minister of Communications of favouring other bidders. The participants were of the view that lack of transparency from the Minister regarding the price that the government was

paying for the acquisition of the new set-top boxes, and the failure by the department to follow procurement process were a clear evidence of corruption. Eventually, Treasury cancelled the tender before a new one was issued. It was concluded by the researcher based on the evidence from the media and the participants' responses that this impacted negatively on the DTT roll out.

6. Political interference is endemic in most African countries and was identified as a factor that has also contributed to the slow adoption of DTT by the majority of the participants. Only one participant defended the interference by Ministers and senior government officials and said that it was intervention, not interference. The evidence that was provided by participants was strong enough to conclude that political interference and not intervention, contributed to the slow adoption of DTT. The example cited as evidence is the Minister's interference in the STB standard by endorsing the Japanese standard, while many Africa were endorsing the Brazilian standard. Other participants cited the interference by the Minister in encryption of the STBs.
7. The global shortage of chips has affected the manufacturing of set-top boxes. This factor was raised by participants as a contributor to the slow adoption of DTT. This shortage has not only affected the STB manufactures but also the entire computing industry and has resulted in the delay of up to 18 months, according to participants.
8. The awareness campaigns about DTT were not aggressive enough and the message did not resonate well with the targeted consumers. Majority of the participants felt that the entire Minister's "imbizos" were more about ANC campaigns than DTT messages. A survey that was conducted by the South African Broadcasting Corporation (SABC) has revealed that majority of the South African citizens had no idea what DTT is. If the potential consumers of a product have no knowledge of the product, then the chances of adoption are minimal. Many studies have found technology awareness as having an influence towards intention to adopt technology.

To a greater extent, the research problem was adequately addressed to the satisfaction of the author.

### 10.3 Conclusion from the quantitative findings

The second research question was: *How will the exogenous constructs of the UTAUT model and technology awareness as an additional construct influence the behavioural intention of citizens in adopting the set-top box for digital terrestrial television?* The study findings revealed that there was positive and significant correlation between the exogenous constructs (PE, EE, SI, FC, TA) and Behavioural intention. This was based on the results of the Pearson correlation coefficient that was conducted on SPSS version 27. It is concluded that the respondents have shown intentions of adopting digital terrestrial television. These results further confirm the appropriateness of the constructs and also validate the conceptual model proposed in this study, and also extended the model by incorporating technology awareness (TA). Many studies have cited TA as playing a crucial role in influencing the citizen's intention to adopt technology, arguing that potential adopters of technology are less likely to acquire technology they have not seen or heard of (Modupe & Binuomote, 2007); (Bardram & Hansen., 2015).

The research question 3 was: *To what extent is the relationship between the Independent constructs of the UTAUT model and the behavioural intention to adopt the STB being moderated by power distance, individualism, masculinity, and uncertainty avoidance?* The conclusions drawn from the findings are as follows:

- Power Distance does not have a moderation effect on the relationship between Performance expectancy and Behavioural intention.
- Masculinity has a negative, insignificant moderation effect on the relationship between Effort expectancy and Behavioural intention.
- Uncertainty Avoidance has a negative, strong, and insignificant moderation effect on the relationship between Social influence and Behavioural intention.
- Individualism has a positive, weak and insignificant moderation effect on the relationship between Facilitated conditions and Behavioural intention.
- Individualism does not moderate the relationship between Technology awareness and Behavioural intention.
- Masculinity has a negative and significant relationship between Social influence and Behavioural intention.

#### **10.4 Significance and implications of findings to theory and practice**

The study succeeded in providing the underlying reasons that have contributed to the delays in migrating the majority of the indigent citizens from analogue to digital terrestrial television. The theory available before the study was undertaken could not provide actual reasons for the delays. The study also has implications for policy makers, regulators and broadcasters. Policy inconsistencies, financial resources, leadership instability and digital infrastructure emerged as dominant factors.

#### **10.5 Model testing**

During the data analysis process, confirmatory factor analysis was conducted to check the construct's validity and also to test the model fit. Reliability, discriminant reliability and convergent validity were achieved leading to a conclusion that the structural model supports the robustness of the model. The fit indices obtained were all within the acceptable range.

#### **10.6 Study limitations**

The findings of this study are encouraging and useful for government, broadcasters and equipment manufacturers as they are informed by theory and empirical data drawn from the qualitative aspect of the study.

Firstly, the targeted sample size was 271 for the quantitative part of the study but only 138 respondents completed the survey questionnaire. Due to the Covid-19 global pandemic, the researcher could not directly and physically engage with both respondents and participants as a safety measure. The generalizability of the study was negatively impacted and the tentative conclusions would need to be tested in a fully representative sample.

Secondly, the study sample comprised individuals who had access to technology, thus missing the contribution from those who do not have access to technology such as email and internet. This again impacted negatively on the generalizability of the findings of the study.

Thirdly, the literature on set-top box adoption was very limited, as not much research has been done on STB adoption. Most of the available literature was around other digital technologies such as banking, education, cloud, internet and mobile. This limitation presented an opportunity for this study to build literature on the adoption of the digital terrestrial television.

Lastly, the study was limited to the case of Ethekewini Municipality as a geographical target population.

## **10.7 Recommendations**

Based on the findings of this study, the following recommendations on the slow adoption of digital terrestrial technology and the behavioural intention to adopt are made:

### **10.7.1 Effective Project Management and Resourcing**

When government decides on initiating and implementing a project as extensive as DTT, a due diligence exercise should be undertaken regarding the magnitude of the project, and the impact it will have on the country's economic growth and employment. Appointment of experienced personnel in the related field should be done. These should include Project Managers, Analyst, Accountants and other relevant personnel. Resourcing in this case refers to people, equipment, money and everything needed for successful delivery of a project.

These projects, once approved, should have a budget allocation, ring-fenced, and deadlines should be agreed upon and no further unnecessary postponement should be entertained.

Government should also apply Project Resource Management Good Practice by doing the following:

- Resource estimation: both the internal and external resources requirement should be estimated based on expert judgement.

- Data collection regarding available and required resources and utilization of resources.
- Resource planning, including allocation and utilization of resources.
- Scheduling development which includes project start and project end dates.
- Preventing over allocation of resources to save costs.
- Setting a Project Management office that will deal with all issues that have the potential of derailing the project.

### **10.7.2 Political interference**

Interference by politicians has been identified as a serious problem that needs to be addressed. Many government institutions have failed as a result of interference by politicians especially in the procurement of services and goods. Rogger (2018) observed that a political interference on project implementation reduces the project quality by 18%. The country has experienced a high level of interference in the appointment of board members, appointment of service providers, interference in the regulatory environment and appointment of officials in key areas of government entities. A study by Mfuru, Sarwatt and Kanire (2018) found that political interference lead to abuse of power, improper conduct, inexcusable delay and poor service delivery. In addressing the issue of political interference, it is recommended that government should allow for greater independence and engagement in entities of government, strengthen oversight role and governance capacity, respect separation of power between entities of government and officials in political office.

### **10.7.3 Leadership instability**

While it is appreciated and accepted that all Ministers are appointed at the sole discretion of the President of the Republic, such appointments should be based on competency and should be long-term to allow for the successful implementation of critical projects. Low turnover and stability at leadership level starts with appointment of experienced leaders at the top whose management style instils confidence. It is therefore a recommendation that government should consider appointing competent leaders who are driven by the passion to succeed and to serve the country with

dignity and respect. Ministers and other senior government officials must be allowed to finish their term of office with interference unless their incompetency affects their work negatively; only then they can be removed.

#### **10.7.4 Policy inconsistencies**

Before a project is linked to a policy, all the factors linked to the successful of the project should be decided and agreed upon. Issues like technical standards, budget, subsidies, project timelines, roles and responsibilities, and benefits the project will have on the citizens, should be clarified before being incorporated into a policy. This will avoid ambiguity and unnecessary delays that often result in financial loss.

#### **10.7.5 Litigation between stakeholders**

Within the Project Management office, government should establish a Stakeholder Relations Office (SRO) that will deal with all SR issues including clarify roles and responsibilities of each and every stakeholder. It should develop a dispute resolution plan that all stakeholders will be part of and abide by. This will provide stakeholders with an opportunity to discuss and resolve difference without the intervention of the courts, thereby minimizing or avoiding delays in project implementation.

#### **10.7.6 Awareness campaigns**

It has been proven by previous research that awareness influences adoption of technology. Government should avoid sending ambiguous messages to the citizens and start to use available platforms to communicate consistent and direct messages regarding the DTT project. The majority of the citizens are not aware of what DTT is, what the benefits of migrating from analogue to digital terrestrial television are and the cost implications associated with adoption of DTT. The study recommends that:

- The Government Communication and Information System (GCIS) should handle all awareness campaigns instead of the Department of Communications and Digital Technologies.

- The campaigns should carry the message that explains what DTT is, what digital migration is, the benefits of DTT, who are the target market, the cost implications, the support, the application process, who qualifies and the criteria for qualification.
- The effectiveness of the campaigns should be evaluated quarterly.
- The message should be simple, easily understood and in all official languages.

#### **10.7.7 Partnerships with stakeholders**

One of the reasons attributable to the delay and the slow uptake of DTT was that government wanted to do everything alone from policy, regulations and project implementation at the exclusion of other stakeholders. Government should allow broadcasters to handle broadcasting issues related to the implementation of DTT, and electronic equipment manufacturers should handle issues of set-top box manufacturing, standards, training and technical support. If this is done, the government will have more time to concentrate on other government priorities and eliminate unnecessary delays. Only policy and regulatory matters should be handled by government.

### **10.8 Contribution and originality of the study**

Previous studies that investigated the adoption and use of technology were based on the Technology Adoption Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT). These studies were mostly on examining the relationships between dependent and exogenous constructs of these models leading to the acceptance and use of technologies. Technologies that were investigated were mainly in education (Blackwell, 2013; Rogers, 1999; Mustapha, 2020), health (de Grood, 2016, Gu, 2021; Roos, 2016); e-commerce (Kurnia, 2015; Al-Qirim, 2007; Garg, 2015; Kang, 2021); internet (Wang & Yang, 2005) and agriculture (Atsriku, 2020; Kinuthia, 2017; Li, 2020). Very few studies were on digital television, and to the best of the researcher's knowledge, no studies were done on the factors influencing the adoption of set-top boxes. This present study employs the extended UTAUT model to examine the behaviour intention of citizens to adopt digital



terrestrial television. The study introduced the cultural dimensions as moderators and opted to omit age, gender, experience and voluntary of use. The extension of UTAUT to serve as a framework for investigating the adoption of STBs thus expands the reach of UTAUT.

### **10.9 Contribution to Theory**

This study makes new contributions to the theory and also on the existing literature of technology adoption. The study provided an additional exogenous construct to the UTAUT model by examining the influence of technology awareness on the intention behaviour of Ethekeeni citizens. The study also went further to examine the four cultural dimensions as moderators and found very little to no moderation effects on the relationship between exogenous and endogenous variable. In addition, the author established a relationship between Technology Awareness (TA) as an exogenous construct and the Behavioural Intention (BI) construct of the UTAUT model.

There was a positive and significant relationship between the five independent constructs (PE, EE, TA, FC and SI) and the behavioural intention. These confirmed relationships were captured in the adapted UTAUT model. The methodological triangulation revealed complementarity of results on the skills and knowledge required to successfully roll out DTT, and also on the technical support available to households as and when such a need arises.

The quantitative findings of this study resulted in the new adapted UTAUT model which contributed to theory.

The qualitative findings contributed to practical recommendations on policy and implementation of the digital migration rollout process.

### **10.10 Suggestions for further research**

The study examined the effect of exogenous factors on the behavioural intentions to accept Digital Terrestrial Television (DTT). The adoption was measured by the uptake of the set-top boxes (STB), which was very slow. The study also investigated

the possible reasons for the slow adoption of DTT, with data collected from industry experts and citizens. The study used a mixed methods approach in the data collection phase which proved to be helpful. This approach used a methodological triangulation which led to the identification of technical infrastructure as a new construct to be added in UTAUT model for future studies.

The study only looked at the acceptance behaviour and not the usage behaviour because of the low base of households with STBs. It is therefore recommended that further studies should be conducted to look at the usage behaviour once the number of households with STBs is high enough to justify the influence on usage behaviour. It is also recommended that a further study should include not only industry experts by experience, but also the opinion of journalists who reported on the digital migration challenges. The importance and purpose of journalism is to inform citizens with the required information to make decisions about their life choices (American Press Institute, 2017).

The study also suggests that technical infrastructure to be added as a new construct in future technology adoption studies.

Finally, the study could also be extended to provinces in the Republic of South Africa to widen the target population, ensuring the sample is representative to increase generalizability.

## **10.11 Conclusion**

The aim of the study was to determine the possible reasons for the slow adoption of digital terrestrial television (DTT) and to investigate whether the citizens of eThekweni municipality have the intention to adopt DTT. The mixed methods approach for data analysis was deemed necessary for this study. The qualitative analysis revealed reasons presented in section 9.21 as possible reasons for the slow adoption of DTT. With regard to the second objective, the study found that there was a positive and significant relationship between the exogenous construct of the adapted UTAUT model and behavioural intention, thus confirming the citizens' intention to adopt.

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## APPENDIX 1: INTERVIEW GUIDE FOR INDUSTRY EXPERTS

### **Name of interviewer**

Date:

Place where the interview was held:

Time of Interview:

### **Background of interviewee:**

Age:

Gender:

Ethnic group:

Employment status:

1. Could you kindly give us your background with regard to your work and your involvement in the Digital Migration project.
2. 2009 the ITU issued a resolution that all members countries in the region 1, of which South Africa is a member, should migrate from analogue broadcasting to digital broadcasting by June 2015. To this date South Africa has not migrated fully to digital terrestrial broadcasting. In your professional opinion, what are the possible reasons that could have led to the failure to meet the deadline?
3. South Africa has previously set itself some deadlines for migration but has consistently failed to meet any of those deadlines. To what can you attribute these failures to?
4. Should the SA government be held responsible for the failure to meet the migration deadline? if so, why?
5. From 2006 to 2019, South Africa has had over 10 Ministers of Communications. How do you think this has contributed to problem of failing to meet the deadline?
6. As an expert in this field, do you think that the government has done enough to create awareness about DTT?

7. In your opinion, should South Africa still be focusing on DTT or rather be focusing on other offerings like OTT streaming (VOD, SVOD, IPTV etc.)?
8. Do you think that politics had to do with the current state of DTT in South Africa? If so, please explain in detail the perceived political interference and the impact it had on the failure to migrate on time.
9. There has been some confusion around the issue of set-top box subsidy, initially set-top boxes were to be given for free to indigent households (100% subsidized), and now we're told that only vouchers will be given to the poor households (partial subsidy). Do you think that this confusion has played a role in the slow adoption of DTT?
10. There have been amendments to the broadcast digital migration policy, in your opinion, how have these policy amendments contributed to the delays in migrating to digital terrestrial television?
11. Smaller countries like Namibia and Malawi have successfully completed the migration process from analogue to digital. How do you think they got it right with limited budget compared to South Africa?
12. Looking at the skills required to successfully delivering on the DTT project, do you think that South Africa has the required skills and expertise?
13. There are different stakeholders involved in the DTT project (Sentech, DCDT, ICASA, SAPO, the Broadcasters, Set-Top Box manufacturers, USAASA), Do you think that the roles for each stakeholder were clearly identified, and that every stakeholder did their best to deliver? Please provide a detailed explanation.
14. To what extent do you think the OTT players like Netflix have contributed to the slow adoption of DTT?
15. In your own view, do you think that DTT is still relevant to the South African TV consumers, amidst the ever-growing consumption of OTT content such as Netflix, Hulu, Amazon Prime, Apple TV and others?
16. Taking into account everything that we have discussed, what do you think should be done to finally get it right?
17. Is there anything more you want to add that we may have omitted?

We have come to the end of our interview, and may I take this opportunity to thank you for your participation in this study and for your time. Your contribution has been valuable and it is highly appreciated.

Thank you!

## APPENDIX 2 SURVEY QUESTIONNAIRE

### Investigating the slow adoption of digital terrestrial television (DTT): The case of Ethekewini Municipality

#### Survey questionnaire

##### Demographics

- Age (18-25/26-45/46-65/66+)
- Gender (Male/female)
- Employment status (employed/unemployed)
- Monthly Income range (1k-5k/5.1k-15k/15.1k-25k/25.1k-35k/35.1k+)
- Education level (no matric/matric/matric + certificate/ diploma/ degree)
- From Ethekewini Municipality (Yes / No)

##### Construct and Item Code

<b>Performance expectancy</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<ul style="list-style-type: none"><li>• PE1 Set-top boxes are useful in bridging the digital divide.</li><li>• PE2 Using a set-top box will enable the consumer to access information quickly.</li><li>• PE3 Set-top box would improve picture quality.</li><li>• PE4 Set-top box will grant access to more quality programs on digital TV.</li></ul>					
<b>Effort Expectancy</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<ul style="list-style-type: none"><li>• EE1 I think using an STB is easy.</li><li>• EE2 Finding or using features in a set-top box is easy.</li><li>• EE3 I will not need high effort to use a STB.</li></ul>					
<b>Technology Awareness</b>					
<ul style="list-style-type: none"><li>• I am aware that I will need a STB to access DTT</li><li>• I am aware of the benefits that STB</li></ul>					

<ul style="list-style-type: none"> <li>offers to consumer</li> <li>I know where to get a STB from</li> <li>I am aware what a STB and DTT are</li> </ul>					
<b>Social Influence (SI)</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<ul style="list-style-type: none"> <li>SI 1 My community expect me to have an STB to access DTT</li> <li>SI 2 My friends have an STB and I should have one also to access DTT</li> <li>SI 3 Having an STB to access DTT will enhance my standing in society</li> <li>SI 4 It's a shame not to have an STB</li> <li>SI 5 People who are important to me think that I should use a set-top box for accessing DTT.</li> </ul>					
<b>Facilitating Conditions (FC)</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<ul style="list-style-type: none"> <li>FC1 In general, my community has support for set-top boxes.</li> <li>FC2 In general, the country in which my community is located has support (infra-structure, policies etc.) for DTT adoption.</li> <li>FC3 I have the resources necessary to acquire a set-top box.</li> <li>FC4 I have the knowledge necessary to use a set-top box.</li> <li>FC5 Support from government or service providers is available when problems are encountered with set-top boxes</li> </ul>					
<b>Attitude towards using STB (ATT)</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<ul style="list-style-type: none"> <li>ATT1 Using STB is a good idea.</li> <li>ATT2 I would like to use STB for accessing DTT.</li> <li>ATT3 I believe that interacting with STB would be fun.</li> </ul>					
<b>Behavioural Intentions (BI)</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<ul style="list-style-type: none"> <li>BI1 I intend to use set-top box for DTT.</li> <li>BI2 I predict I will continue to use STB for DTT</li> </ul>					
<b>Gender (GD)</b>					

Age (AG)					
<b>Experience (EXP)</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<ul style="list-style-type: none"> <li>• I have used a STB before</li> <li>• I have interacted with stb's functionalities</li> </ul>					
<b>Voluntary of use (VU)</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<ul style="list-style-type: none"> <li>• I am pressurized to have stb</li> <li>• Having an STB is voluntary</li> </ul>					
<b>Cultural dimension (CD)</b>					
<b>Uncertainty avoidance</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<ul style="list-style-type: none"> <li>• I prefer not to change in my believe about STB</li> <li>• I like to try new technologies for purposes of staying relevant</li> <li>• I feel more comfortable in a more secure and less stressful adopting STB.</li> </ul>					
<b>Power distance</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<ul style="list-style-type: none"> <li>• I feel uncomfortable if I disagree with my supervisor</li> <li>• My elders in the community often interfere with my decisions to adopt new technology</li> <li>• I like to consult my elders before making a decision to adopt new technology</li> </ul>					
<b>Masculinity</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<ul style="list-style-type: none"> <li>• I enjoy digital technology challenges</li> <li>• I pursue digital opportunities that come with technology adoption.</li> </ul>					
<b>Individualism</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<ul style="list-style-type: none"> <li>• The quality of my decisions is normally better than that of my community and my Government</li> <li>• I like to make technology adoption decisions by myself</li> <li>• My digital technology skills are more important in the adoption of STB than some colleagues I know.</li> </ul>					

## **APPENDIX THREE: INFORMED CONSENT LETTER FOR SURVEY**

### **University of KwaZulu-Natal**

Researcher: Bongane Brian Mabaso / 0614928503 / 216076108

Supervisor: Prof. Brian McArthur / 033-2605605 / mcarthurb@ukzn.ac.za

Project Title: Investigating the slow adoption of Digital Terrestrial Television: The case of Ethekewini Municipality

#### **Declaration of Consent**

I (-----, have been informed about the study entitled (Investigating the slow adoption of Digital Terrestrial Television: The case of Gauteng / Ethekewini Municipality) by (Bongane Brian Mabaso).

I understand the purpose and procedures of the study.

I have been given an opportunity to ask questions about the study and have had answers to my satisfaction.

I declare that my participation in this study is entirely voluntary and that I may withdraw at any time.

If I have any further questions/concerns or queries related to the study I understand that I may contact the researcher.

---

Signature of Participant      Date

#### **APPENDIX FOUR: REQUEST TO PARTICIPATE**

##### **University of KwaZulu-Natal**

Researcher: Bongane Brian Mabaso / 0614928503 / 216076108

Supervisor: Prof. Brian McArthur / 033-2605605 / mcarthurb@ukzn.ac.za

Project Title: Investigating the slow adoption of Digital Terrestrial Television: The case of Ethekewini Municipality / Gauteng

Information Sheet and Consent to Participate in Research

MAY 2021

Greetings

##### **REQUEST TO PARTICIPATE IN A VOLUNTARY, CONFIDENTIAL RESEARCH PROJECT**

I am a student in the School of Management, IT and Governance at the University of KwaZulu-Natal, doing research on (Investigating the slow adoption of Digital Terrestrial Television: The case of Ethekewini Municipality) for my PhD qualification. You, as an industry expert, have been selected as a potential respondent for participation in a voluntary, anonymous survey that I am conducting. I would appreciate your participation and your permission to use your responses for official research purposes only. Your personal identity will be treated with the utmost confidentiality throughout the survey and will at no stage appear in print. The data will be stored securely throughout the study, archived safely for a period of 5 years and destroyed thereafter. If you have any queries or concerns about completing the questionnaire, or about participating in this study, feel free to contact me, or my supervisor at the numbers listed above.

If you are willing to participate, please sign the accompanying declaration of consent that gives me permission to use your responses, and thereafter please complete the accompanying questionnaire. It should take only about 10 minutes of your time to do so.



In the event that you experience any problems or concerns/questions, you may contact the researcher at (cell:0614928503; email: 216076108@stu.ukza.ac.za) or the UKZN Humanities & Social Sciences Research Ethics Committee, contact details as follows:

**HUMANITIES & SOCIAL SCIENCES RESEARCH ETHICS ADMINISTRATION**

Research Office, Westville Campus

Govan Mbeki Building

Private Bag X 54001

Durban 4000 KwaZulu-Natal, SOUTH AFRICA

Tel: 27 31 2604557- Fax: 27 31 2604609

Email: HSSREC@ukzn.ac.za

## APPENDIX 5: APPROVAL TO PROCEED WITH RESEARCH

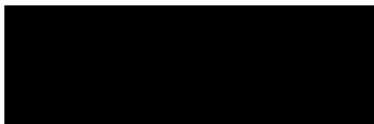


To: Mr Brian George Mabaso (216076108)  
From: School Of Management, IT & Governance  
Date: 12 June 2018  
Subject: Outcome of Doctoral Research Proposal

<b>Student Name &amp; Student Number:</b>	<b>Title on Proposal:</b> Adoption of Digital Terrestrial Television
<b>Mr Brian George Mabaso (216076108)</b>	
<b>Qualification, Major &amp; Campus:</b>	<b>Supervisor:</b> Prof B McArthur
<b>PhD, Westville, Mgt</b>	<b>Co- Supervisor:</b> Mr Karna Naidoo
<b>Proposal submission Date:</b>	<b>14 September 2017</b>
<b>Decision:</b>	<b>Proceed with your study</b>

You may proceed with your study.

Yours sincerely,



Prof Isabel Martins  
AL: Research & Higher Degrees  
School of Management, IT & Governance  
University of KwaZulu-Natal – Westville Campus

## APPENDIX SIX: ZULU SURVEY QUESTIONNAIRE

### Investigating the slow adoption of digital terrestrial television (DTT): The case of Ethekwini Municipality

Uhlu lwemibuzo yocwaningo

Ulwazi ngenani labantu abahlala endaweni nobuhlanga babo

- Ubudala (18-25/26-45/46-65/66+)
- Ubulili (Owesilisa/Owesifazane)
- Isimo somsebenzi (Uyasebenza/Awusebenzi)
- Imali engena ngenyanga (1k-5k/5.1k-15k/15.1k-25k/25.1k-35k/35.1k+)
- Izinga lemfundo (Awunawo umatikuletsheni/Unawo/Unawo kanye nesitifiketi/ Une-diploma/ Uneziqu)
- UkuMasipala weTheku (Yebo / Cha)

Ukwakheka nekhodi ye-item

1 = strongly disagree, 2 = Disagree, 3 = neither agree nor disagree, 4 = agree, 5 = strongly agree

Okulindeleke ekusebenzi	1	2	3	4	5
<ul style="list-style-type: none"> <li>• Amabhokisi Set-top awusizo ekuvaleni igebe lezobuchwepheshe.</li> <li>• Uku sebenzisa ibhokisi le-set-top liyokwazi ukusiza umthengi ukuthi afinyelele olwazini ngokushesha.</li> <li>• Ibhokisi Set-top liyokwenza ngcono ikhwalithi yesithombe.</li> <li>• Ibhokisi le Set-top box liyonikeza izinhlelo ezinekhwalithi eningi ezinombolweni zobuchwepheshe be- TV.</li> </ul>					
Okulindeleke emizamweni	1	2	3	4	5
<ul style="list-style-type: none"> <li>• Ngicabanga ukuthi ku lula u ku sebenzisa i-STB.</li> <li>• Ukuthola noma ukusebenzisa ibhokisi le-set-top elinezimpawu /okubhalwe kulona kulula.</li> <li>• EE3 angeke ngidinge umfutho omkhulu ukusebenzisa i-STB.</li> </ul>					
Ukuqaphela ngezobuchwepheshe					
<ul style="list-style-type: none"> <li>• Ngiyazi ukuthi ngizodinga i-STB ukufinyelela kwi-DTT.</li> </ul>					

<ul style="list-style-type: none"> <li>• Ngiyazi ngemihlomulo ekhishwa yi-STB inikeza abathengi.</li> <li>• Ngiyazi ukuthi ngingayitholaphi i-STB.</li> <li>• Ngiyazi ukuthi iyini i-STB ne-DTT.</li> </ul>					
Imithelela yomphakathi (SI)	1	2	3	4	5
<ul style="list-style-type: none"> <li>• Umphakathi wami ulindele ukuthi ngibe ne-STB ukuze ngithole i- DTT</li> <li>• Abangane bami balindele ukuthi ngibe ne-STB futhi ngibe nenye ukuze ngithole i-DTT</li> <li>• Ukuba ne-STB ukuze ngithole i-DTT kuyokwenza ngcono izinga lami emphakathini.</li> <li>• Ukuyihlazo ukungabi nayo i-STB.</li> <li>• Abantu ababalulekile kimina bacabanga ukuthi kufanele ngisebenzise ibhokisi le-set-top ukuze ngithole i-DTT.</li> </ul>					
Izimo ezenza kusebenzeke kangcono (FC)	1	2	3	4	5
<ul style="list-style-type: none"> <li>• Ngokujwayelekile, umphakathi wami uyangeseka kumabhokisi e-set-top box.</li> <li>• Okujwayelekile, izwe lapho kukhona umphakathi wami uyakweseka (ingqalasizinda, inqubomgomo,) ekusetshenzisweni kwe-DTT.</li> <li>• Nginazo izinsiza ezidingekayo zokuthola ibhokisi le-set-top.</li> <li>• Nginalo ulwazi oludingekayo lokusebenzisa ibhokisi le-set-top.</li> <li>• Ukwesekwa uhulumeni noma labo abanikeza ngosizo kutholakala uma kuqhamuka izinkinga ngamabhokisi e-set-top.</li> </ul>					
Ukubuka nokucabanga ngokusebenzisa i-STB (ATT)	1	2	3	4	5
<ul style="list-style-type: none"> <li>• kuwumqondo omuhle ukusebenzisa i-STB.</li> <li>• Ngingathanda ukusebenzisa i-STB ukuze ngithole i-DTT.</li> <li>• Ngikholelwa ukuthi ukuxhumana ne-STB kungaba mnandi.</li> </ul>					
Okulindeleke ngokuziphatha (BI)	1	2	3	4	5
<ul style="list-style-type: none"> <li>• Ngihlose ukusebenzisa ibhokisi le-set kwi-DTT.</li> </ul>					

<ul style="list-style-type: none"> <li>• Ngihlawumbisela ukuthi ngizoqhubeka nokusebenzisa i-STB kwi-DTT</li> </ul>					
	1	2	3	4	5
Ukuzithandela ukuyisebenzisa (VU)	1	2	3	4	5
<ul style="list-style-type: none"> <li>• Nginengcindezi yokuthi ngibe ne-STB.</li> <li>• Kungukuzithandela ukuba ne-STB</li> </ul>					
Ukuhlukahlukana kwamasiko (CD)					
Ukugwema ukungaqiniseki	1	2	3	4	5
<ul style="list-style-type: none"> <li>• Kulo mphakathi, izidingo zomphakathi kanye nemiyalo ephathelene nokusetshenziswa kwe-STB ichazwe kabanzi ukuze izakhamizi zazi ukuthi kulindeleke ukuthi zenzeni.</li> <li>• Kulo mphakathi, kucindezelwa imiyalezo engaguquki ephathelene nokubaluleka kokuthola i-STB.</li> </ul>					
Ukulingana/ukungalingani ngokwamandla	1	2	3	4	5
<ul style="list-style-type: none"> <li>• Ngizizwa ngingakhululeki uma ngingavumelani nomeluleki wami.</li> <li>• Abadala emphakathini wami bajwayele ukugxambukela ezinqumweni zami uma ngisebenzisa ubuchwepheshe obusha.</li> <li>• Ngithanda ukuxhumana nabadala ngaphambi kokuba ngisebenzise ezobuchwepheshe obusha.</li> </ul>					
Ubulisa	1	2	3	4	5
<ul style="list-style-type: none"> <li>• Ngiyazithokozela izinselelo zobuchwepheshe.</li> <li>• Ngilandela amathuba ezobuchwepheshe nokusetshenziswa kwezobuchwepheshe.</li> </ul>					
Ukuba wedwa	1	2	3	4	5
<ul style="list-style-type: none"> <li>• Ikhwalithi yezinqumo zami</li> </ul>					

ngokujwayelekile ingcono kuneyomphakathi kanye nekahulumeni. <ul style="list-style-type: none"> <li>• Ngithanda ukuzithathela izinqumo ngokusebenzisa ezobuchwepheshe.</li> <li>• Amakhono ami ezobuchwepheshe abaluleke kakhulu ekusebenziseni i-STB kunabanye ozakwethu engibaziyo.</li> </ul>					
Ukwazi kangcono kwesikhathi eside	1	2	3	4	5
<ul style="list-style-type: none"> <li>• Kubalulekile ukubekezela kimina ukuze ngithole imivuzo yesikhathi eside elethwa ukusebenzisa ezobuchwepheshe.</li> <li>• Ukuzinza kwami uqobo kubalulekile kimina uma ngikhetha ukusebenzisa ezobuchwepheshe ezintsha.</li> </ul>					

**Translation by:**

Dr H.S. Gumede (PhD)

University of KwaZulu-Natal

School of ARTS (Howard College Campus)

Memorial Tower Building - Room G092

Mazisi Kunene Road - Durban, 4041

Tel: 031 260 7849/2510 - Mobile: 083 433 4381

Email: [gumedeh@ukzn.ac.za](mailto:gumedeh@ukzn.ac.za)

## APPENDIX SEVEN: ETHICAL CLEARANCE



14 April 2021

Mr Brian George Mabaso (216076108)  
School of Man Info Tech & Gov  
Westville Campus

Dear Mr Mabaso,

Protocol reference number: HSSREC/00002090/2020

Project title: Investigating the slow Adoption of Digital Terrestrial Television -The case of Ethekwini Municipality  
Degree: PhD

### Approval Notification – Expedited Application

This letter serves to notify you that your application received on 09 October 2020 in connection with the above, was reviewed by the Humanities and Social Sciences Research Ethics Committee (HSSREC) and the protocol has been granted **FULL APPROVAL**.

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment/modification prior to its implementation. In case you have further queries, please quote the above reference number. **PLEASE NOTE:** Research data should be securely stored in the discipline/department for a period of 5 years.

This approval is valid until 14 April 2022.

To ensure uninterrupted approval of this study beyond the approval expiry date, a progress report must be submitted to the Research Office on the appropriate form 2 - 3 months before the expiry date. A close-out report to be submitted when study is finished.

**All research conducted during the COVID-19 period must adhere to the national and UKZN guidelines.**

HSSREC is registered with the South African National Research Ethics Council (REC-040414-040).

Yours sincerely,

