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Research Report

Investigating the Critical Factors Affecting Citizens'

e-Government Adoption in South Africa

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DECLARATION

I declare that this is my own unaided work and is, to the best of my knowledge and belief, original, except as acknowledged in the text.

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ABSTRACT

Over the past several years, the rapid advancement of innovative technology has resulted in the expansion of electronic government (e-Government) practices as a novel paradigm for enhancing the provision of public services. Numerous governments worldwide are looking to capitalise on these advancements and see e-Government as a key driver of service efficiency and effectiveness. Unfortunately, e-Government implementation is complex and developing countries, in particular, face greater challenges than their counterparts. This places a greater burden on developing-country governments to develop better policies and strategies in order to facilitate the widespread e-Government uptake. This study investigated the critical factors affecting e-Government adoption in a developing country, South Africa. It used a hybrid TAM-UTAUT model, to explore the critical factors that drive the adoption of e-Government among South African citizens. The study addresses a gap in the e-Government literature in South Africa by presenting a model that government, policymakers, and administrators can employ to effectively expand the country's e-Government implementation program. The survey data collected from 238 respondents underwent analysis using the structural equation modelling (SEM) technique, with IBM SPSS tools utilized for the examination. This study revealed that Trust in e-Government, Performance Expectancy, Social Impact, Facilitating Conditions, Accessibility, and Perceived Enjoyment are pivotal factors influencing the adoption of e-Government among citizens in South Africa. While previous studies suggested age as a moderating variable between Performance Expectancy, Effort Expectancy, Social Impact, and the Behavioural Intention to Use e-Government Services, this study found that age does not act as a moderating variable among these factors. These findings contribute to theoretical understanding of how constructs commonly used in e-commerce can be applied to the e-Government setting, and can further assist the South African government and policymakers in developing effective e-Government policies to support the South African government's renewed approach and program, which aims to transform South African public service into an inclusive digital society where all citizens can reap the benefits of digital technology.

Keywords:
Adoption, E-Government, TAM, Trust, UTAUT

TABLE OF CONTENTS

DECLARATION ..... **i**

ABSTRACT ..... **ii**

TABLE OF CONTENTS ..... **iii**

LIST OF TABLES ..... **viii**

LIST OF FIGURES ..... **ix**

LIST OF ACRONYMS ..... **xi**

1. Introduction **1**

1.1 Background 2

1.2 Problem statement 2

1.3 Research Question 5

1.4 Purpose of the study 7

1.5 The intended contribution of the study 8

1.5.1 Contributions to research 8

1.5.2 Contributions to practice 9

1.6 Delimitations of the study 9

1.7 Outline of chapters 11

2. Literature Review **13**

2.1 Background of E-Government Adoption 13

2.1.1 E-Government definition of terms 13

2.1.2 Types of e-Government 16

2.1.3 E-Government in developing counties 17

2.1.3.1 Adoption factors in related developing country-based studies 18

2.1.4 E-Government in South Africa 23

2.1.4.1 E-Government policy and legislation in South Africa 24

2.1.5 Factors promoting e-Government 26

2.1.6 E-Government benefits and challenges 27

2.1.6.1 Benefits 27
2.1.6.2 Challenges 28
2.1.7 Theoretical background and relates studies 29
2.1.7.1 E-Government Adoption models 29
2.1.8 Theoretical background and related studies summary 35
3. Conceptual Model/Framework 37
3.1 Introduction 37
3.2 TAM-UTAUT Conceptual Model 38
4. Research methodology 47
4.1 Research Paradigm and Approach 47
4.2 Research Design and Methodology 48
4.3 Data Collection Methods 49
4.4 Questionnaire development 49
4.5 Questionnaire administration 53
4.5.1 Strategy for Pre-Testing and Pilot-Testing 54
4.5.1.1 Outcomes of Pre-Testing and Pilot-Testing 54
4.5.2 Sampling and Respondents 55
4.6 Data Analysis Methods 56
4.6.1 Reliability and validity 56
4.6.2 Hypothesis testing 57
4.7 Ethical Considerations 57
4.8 Limitations and Threats to Internal and External Validity 58
4.8.1 Advancing the study and practice of IS 58
4.8.2 Testing of the model 59
4.8.3 Additional theoretical extensions 59
5. Data Analysis and Results 61
5.1 Introduction 61
5.2 Research Setting 61

5.3 Data analysis 62
5.3.1 Demographic Information of Participants 62
5.3.1.1 Age of Participants 62
5.3.1.2 Gender of Participants 63
5.3.1.3 Education of Participants 64
5.3.1.4 Employment Status of Participants 65
5.3.2 Descriptive Statistics 65
5.3.3 Component Analysis 67
5.3.4 Reliability Analysis 69
5.3.4 Correlation Matrix 69
5.3.6 Regression Estimation Results 70
5.3.6.1 Hypothesis 1: Performance Expectancy (PE) positively influences Behavioural Intention to use (IU) 70
5.3.6.2 Hypothesis 2: Age (moderating variable) positively moderates the relationship between PE and IU 71
5.3.6.3 Hypothesis 3: Effort Expectancy (EE) positively influences Behavioural Intention to use (IU) 72
5.3.6.4 Hypothesis 4: Age (moderating variable) positively moderates the relationship between EE and IU 73
5.3.6.5 Hypothesis 5: Social Impact (SI) positively influences Behavioural Intention (IU) 74
5.3.6.6 Hypothesis 6: Age (moderating variable) positively moderates the relationship between Social Impact (SI) and Behavioural Intention to use (IU) 75
5.3.6.7 Hypothesis 7: Facilitating Conditions (FC) positively influence Behavioural Intention to use (IU) 76
5.3.6.8 Hypothesis 8: Trust in E-Government (TeG) positively influences Behavioural Intention to use (IU) 77
5.3.6.9 Hypothesis 9: Availability (moderating variable) positively moderates the relationship between Trust in e-Government (TeG) and Behavioural Intention (IU) 78

5.3.6.10 Hypothesis 10: Accessibility (AC) positively influences Behavioural Intention to use (IU) 79

5.3.6.11 Hypothesis 11: Availability (moderating variable) positively moderates the relationship between Accessibility (AC) and Behavioural Intention to use (IU) 80

5.3.6.12 Hypothesis 12: Perceived Enjoyment (PENJ) positively influences Behavioural Intention to use (IU) 81

5.3.6.13 Hypothesis 13: Perceived cost (PC) negatively influences Behavioural Intention to use (IU) 82

6 Interpretation & Discussion of findings 84

6.1 Hypothesis 1 87

6.2 Hypothesis 2 88

6.3 Hypothesis 3 89

6.4 Hypothesis 4 90

6.5 Hypothesis 5 91

6.6 Hypothesis 6 92

6.7 Hypothesis 7 93

6.8 Hypothesis 8 93

6.9 Hypothesis 9 94

6.10 Hypothesis 10 95

6.11 Hypothesis 11 96

6.12 Hypothesis 12 97

6.13 Hypothesis 13 98

6.14 Summary 98

7 Conclusion 100

7.1 Study Results 100

7.2 Recommendations 102

7.3 Areas for Future Research 103

7.4 Limitations 104

7.5 Study Conclusion 105

REFERENCES 107

APPENDIX A: INVITATION TO PARTICIPATE & CONSENT FORM 124

APPENDIX B: SURVEY QUESTIONNAIRE 126

APPENDIX C: ETHICAL CLEARANCE CERTIFICATE 132

APPENDIX D: CORRELATION MATRIX 133

LIST OF TABLES

Table 1.1: E-Government challenges and proposed strategies: Source: (DTPS, 2017). 3

Table 2.1: E-Government definitions 14

Table 4.1: Questionnaire Development 50

Table 5.1: Age of participants 62

Table 5.2: Gender of participants 63

Table 5.3: Education of Participants 64

Table 5.4: Employment status of Participants 65

Table 6.1: Outcomes of Hypotheses 84

LIST OF FIGURES

Figure 2.1: E-Government components 15

Figure 2.2: E-Government development index(UN E-Government Survey, 2020). 18

Figure 3.1: E-Government conceptual model 41

Figure 5.1: Age of participants summary 62

Figure 5.2: Gender of Participants summary 63

Figure 5.3: Education of participants summary 64

Figure 5.4: Employment status of participants summary 65

Figure 5.5: Distribution for AC, TeG, IU, AV and PE 66

Figure 5.6: Distribution for PENJ, SI, EE, FC and PC 67

Figure 5.7: Cronbach's Alpha measurement of reliability 69

Figure 5.10: Hypothesis 1 Results 71

Figure 5.11: Hypothesis 2 Results 72

Figure 5.12: Hypothesis 3 Results 73

Figure 5.13: Hypothesis 4 Results 74

Figure 5.14: Hypothesis 5 Results 75

Figure 5.15: Hypothesis 6 Results 76

Figure 5.16: Hypothesis 7 Results 77

Figure 5.17: Hypothesis 8 Results 78

Figure 5.18: Hypothesis 9 Results 79

Figure 5.19: Hypothesis 10 Results 80

Figure 5.20: Hypothesis 11 Results 81

Figure 5.21: Hypothesis 12 Results 82

Figure 5.22: Hypothesis 13 Results 83

Figure 6.1: E-Government structural model……...…75

Figure 7.1: Critical factors in South Africa 100

LIST OF ACRONYMS

AAU	Actual Adoption and Use of E-Government
AC	Accessibility
AV	Availability
DOI	Diffusion of Innovation
DTPS	Department of Telecommunication and Postal Services
e-Driving License	Electronic driving licenses
e-Filing	Electronic tax filing
e-Government	Electronic Government
e-IDs	Electronic Identity Cards
e-Society	Electronic Society
ECT	Electronic Communication and Transaction
EE	Effort Expectancy
EGAUM	E-Government Adoption and Usage Model
EGDI	Electronic Government Development Index
ER	E-Government Readiness
eVoting	Electronic-voting
FC	Facilitating Conditions
G2B	Government to Business
G2C	Government to Citizen
G2G	Government to Government
GAM	e-Government Adoption Model
GITO	Government Information Technology Officers Council
ICT	Information and Communication Technology
IS	Information Systems
IT	Information Technology
ITU	Intention to Use E-Government

IU	Intention to Use
MF	Motivational Factors
MISS	Minimum Information Security Standards
MPSA	Minister of Public Services and Administration
PC	Perceived Cost
PCI	Perceived Characteristics of Innovation
PE	Performance Expectancy
PENJ	Perceived Enjoyment
PEOU	Perceived Ease of Use
PF	Personal Factors
POPI	Protection of Personal Information
PU	Perceived Usefulness
RF	Reliability Factors
SI	Social Impact
SITA	State Information Technology Agency
TAM	Technology Acceptance Model
TeG	Trust in e-Government
TF	Technical Factors
TOE	Technology–Organization–Environment
TPB	Theory of Planned Behaviour
TRA	Theory of Reasoned Action
UN	United Nations
UTAUT	Unified Theory of Acceptance and Use of Technology

1. INTRODUCTION

The computer and the Internet, collectively referred to as Information and communication technology (ICT), have transformed human interaction and communication like nothing else before (Mugivane, 2014; Ofori-Dwumfuo & Paatey, 2011). During the latter half of the twentieth century, around 1945, the application of binary math and Boolean logic led to the creation of computers (Leiner et al., 2009; Mugivane, 2014). In 1962, the first recorded description of the social contact that networking may facilitate was made (Leiner et al., 2009; Mugivane, 2014). The inventions of the telephone, the telegraph, the radio and cell phones laid the groundwork for this unprecedented convergence of capabilities (Leiner et al., 2009). Despite these developments and more than 50 years later, many governments globally continue to rely on conventional, paper-based techniques such as ballot papers for elections, tangible plastic cards for identification, walk-ins for customer service and so on (United Nations [UN] E-Government Survey, 2020).

Confronted with the unprecedented challenges brought on by Covid-19 pandemic and consequent infection-control measures, the South African (SA) government was forced to postpone the 2021 municipal elections or risk a rise in Covid-19 infections (Davies, 2021; Dube, 2022). This sparked several discussions on various social media platforms about why society still relies on traditional ballot paper voting rather than contemporary technology like computers and the Internet (Dube, 2022; Mathe, 2022).

Unfortunately, utilising computers and the Internet to replace traditional methods is challenging. Government institutions have difficulty capitalising on the potential afforded by contemporary technology, even while there can be no doubts about the potential and advantages they offer (Bannister & Grönlund, 2017; Mawela et al., 2017; Ndou, 2004; Toader et al., 2018). As per the findings of Toader et al. (2018), in research over the last two decades looking at the implications of ICT and innovation in countries, it was concluded that ICT is a crucial factor in most country's economic and social development since it has beneficial effects on economic growth, productivity and employment.

This, coupled with governments' economic aspirations, has compelled numerous governments to reconsider civic participation as well as transform societies into Electronic Societies and public sectors into Electronic Governments in order to stimulate sustainable growth, social development, job creation and service efficiency and effectiveness (Mawela et al., 2017; Singh & Travica, 2018).

Electronic government (hereafter termed e-Government) is an extension of Electronic Society (hereafter referred to as e-Society) that describes the utilisation of ICT and its applications by governments and their agencies to improve internal processes and disseminate information and offer services to government agencies, citizens, and entities, including organizations and businesses (Mawela et al., 2017; Ndou, 2004; Nkwe, 2012). Motivated by the South African government's commitment to e-Government, this study seeks to examine the determinants influencing the adoption of e-Government from the perspective of ordinary citizens.

1.1 Background

Governments dedicated to fostering economic growth, social development, higher employment rates, and enhanced efficiency and efficacy of services provided by the public sector now perceive e-Government not as a choice but as a vital expansion of the services offered to their citizens (Glyptis et al., 2020; Nkwe, 2012; Verkijika & De Wet, 2018). Although contentious, implementing e-Government appears to improve service quality, reduce costs, time and corruption and increase the efficacy and efficiency of governmental services (Nkwe, 2012; Verkijika & De Wet, 2018).

Like other governments, the South African government has followed suit by setting up legislative bodies to oversee the implementation of Digital Government initiatives. The State Information Technology Agency (SITA) (2017) reports that two of these entities are the Government Information Technology Officers Council (GITO Council) and SITA. Both entities are tasked with procuring, implementing, and managing information and communication technology (ICT) in the public sector (Pillay, 2012; SITA, 2017).

1.2 Problem statement

The adoption and sustained utilization of digital services (computerized services) extend beyond technical considerations, encompassing various economic, social, organizational, human, cultural, and political factors. These multifaceted influences play a crucial role in shaping the pace and scope of adoption (Ndou, 2004; Nkwe, 2012; Rabaai et al., 2015). Rodrigues et al. (2016) argue that when planned, designed and implemented properly, e-Government can increase trust in government, the efficiency with which government delivers its services and ultimately strengthen citizen adoption. Abu-Shanab and Bataineh (2014) propose that governments should intentionally enforce the critical factors that increase the

probability of success and concurrently pay closer attention to factors that increase the probability of failure and avoid them.

According to Mawela et al. (2017), amongst other factors, failure of e-Government programs emanates from issues with infrastructure and costs, social and cultural impediments, accessibility and usefulness issues, lack of trust and confidentiality, along with misunderstanding of the needs of citizens.

Mawela et al. (2017) cite several South African e-Government projects that failed to meet stakeholder expectations. Among these was the Golaganang project, whose goal was to offer government employees affordable ICT resources and cater to the demand for digital literacy; however, the project failed to launch (Mawela et al., 2017). In the same breath, the National Welfare Agency began with the intention of rolling out over three years; However, only 40% of the project could be completed (Mawela et al., 2017). Many other challenges limit the execution of e-Government programs in South Africa (Department of Telecommunication and Postal Services [DTPS], 2017). Among these are the following and the proposed remediation procedures outlined in Table 1.1.

Table 1.1: E-Government challenges and proposed strategies: Source: (DTPS, 2017).

Challenge	Proposed strategy
Insufficient utilization of e-Government services.	Facilitate uptake and utilization of e-Government by facilitating the formation of a legislative and regulatory framework that supports its use.
Lack of consistency in how various government departments are approaching digital transformation.	Establish administrative structures and procedures for monitoring the execution of e-Government service programs.
Poor direction and management of programs, resulting in a lack of accountability and responsibility due to overlapping roles between departments	Establish a framework to enhance streamlined and effective communication between citizens and the government, Interactions between the government and other stakeholders, including government-to-business and government-to-employee engagements.
Impediments such as process and database duplication, large-scale system incompatibilities and inefficiencies.	Seek the direct and active participation of the private sector in Digital Government initiatives. implementation initiatives by

	utilizing ICT within an efficient e-Government framework.

The preceding demonstrates that the South African government is making attempts to improve e-Government success by leveraging various strategies. The government further recognises that success of e-Government services necessitates a shift in how government operates and handles information (Mawela et al., 2017; Nkwe, 2012). This opens up research opportunities to investigate aspects of the proposed strategies to further drive e-Government success.

The initial literature review conducted as part of this study, which covered peer-reviewed journal articles published between 2012 and 2022, revealed that e-Government is an area that has been widely researched in various countries, particularly developed countries such as the Netherlands and Estonia, as well as developing countries more broadly (Al-Hujran et al., 2015; Glyptis et al., 2020; Kurfalı et al., 2017). However, similar exploration and research in South Africa is scant. Table 1.2 presents the literature review outcomes where only two studies were conducted by Shambare (2020) and Verkijika and De Wet (2018), which empirically tested the factors impacting the acceptance of e-Government among South African citizens.

Table 1.2: E-Government studies in South Africa

Reference	Purpose of Study	Key Findings
(Verkijika & De Wet, 2018)	Using information from 282 respondents in South Africa, UMEGA and an expanded version of it were empirically tested for factors influencing the adoption of e-Government.	Social influence, performance expectancy, perceived risk and computer self-efficacy all substantially impacted perceptions regarding the utilization of e-Governmen. In contrast, facilitating conditions, government trust and Internet trust all directly impacted behavioural intention.
(Shambare, 2020)	The research investigated barriers to e-Government adoption by surveying 349 customers from two South African provinces.	Found that infrastructure unavailability, trust and risk, are the major barriers to the adoption of e-Government

The existence of this gap creates both a challenge and a potential for further tudy on the uptake of e-Government services by South African citizens. This study explores the critical factors that influence citizens' adoption of e-Government in the country, incorporating constructs like Perceived enjoyment, e-Government trust, accessibility, and ICT infrastructure availability, which were not previously investigated in two prior studies.

1.3 Research Question

Considering the aforementioned context and problem statement, the aim of this study is to examine critical factors that influence citizens' adoption of e-Government in South Africa. The primary research question can be summarized as follows: “What are the critical factors affecting citizens’ adoption of e-Government in South Africa?”

According to Oates (2006), an information systems research question should have all of the following key attributes to be comprehensive: Question type (what, why or how), the phenomenon, IT artefact, context and unit of analysis. Table 1.2 summarises the primary question to the corresponding key attributes using the research question framework given by Oates (2006).

Table 1.3: Structuring questions for systematic reviews

Question criteria	Research frame
Question Type	What
Phenomenon	Adoption
Information Technology (IT) Artefact	e-Government
Context	South Africa
Unit of Analysis	Citizens

Source: (Oates, 2006).

To comprehensively tackle the main research question, this study delves into the extent to which these identified factors influence the behavioural intention of citizens to adopt e-Government in South Africa. Through an examination of the correlation between these factors and citizens' inclination to adopt e-Government services, this research endeavours to yield valuable insights into the catalysts and hindrances impacting e-Government adoption in the nation. This investigation seeks to contribute to enhanced comprehension of the intricacies surrounding e-Government usage and inform policymakers and stakeholders on strategies to enhance citizen engagement and uptake of digital government services.

1. What is the effect of Performance Expectancy (PE) on citizens' behavioural intention to use (IU) e-Government?
2. How does Age (the moderating variable) moderate the relationship between PE and IU in using e-Government?
3. What is the effect of Effort Expectancy (EE) on citizens' behavioural intention to use (IU) e-Government?
4. How does Age (the moderating variable) moderate the relationship between EE and IU in using e-Government?
5. What is the effect of Social Impact (SI) on citizens' behavioural intention to use (IU) e-Government?
6. How does Age (the moderating variable) moderate the relationship between SI and IU in using e-Government?
7. What is the effect of Facilitating Conditions (FC) on citizens' behavioural intention to use (IU) e-Government?
8. What is the effect of Trust on citizens' behavioural intention to use (IU) e-Government?
9. How does Availability (the moderating variable) moderate the relationship between Trust and IU to use e-Government?
10. What is the effect of Accessibility on citizens' behavioural intention to use (IU) e-Government?
11. How does Availability (the moderating variable moderate the relationship between Accessibility and IU to use e-Government?
12. What is the effect of Perceived Enjoyment (PENJ) on citizens' behavioural intention to use (IU) e-Government?
13. What is the effect of Perceived Cost (PC) on citizens' behavioural intention (BI) to use e-Government?

1.4 Purpose of the study

Although adoption is essential to the achievement of e-Government program objectives, it remains inadequately comprehended, especially in developing nations (Al Hujran et al., 2013; Rabaai et al., 2015; Verkijika & De Wet, 2018). This lack of understanding has prompted several scholars to advocate for specialised, developing-world-based investigations into e-Government adoption factors, particularly because the challenges faced by developing countries differ from those faced by developed ones (Mawela et al., 2017; Munyoka & Maharaj, 2019; Ndou, 2004; Singh & Travica, 2018; Toader et al., 2018; Verkijika & De Wet, 2018).

The principal objective of this study is to undertake an empirical analysis focused on investigating and comprehending the fundamental determinants that influence the adoption of e-Government services among South African citizens. The study will centre its attention on the adoption of various e-Government services such as electronic voting (e-Voting), electronic tax filing (e-Filing), electronic driving licenses (e-Driving License), and electronic Identity Cards (e-IDs) in South Africa. Through an in-depth analysis of the factors influencing the adoption of these digital services, the research aims to provide valuable insights into the critical factors affecting citizens' willingness to embrace Digitised government solutions.

This investigation will involve surveying a diverse sample of South African citizens to collect data on their perceptions, experiences, and attitudes towards Digitised Government services. The study will also analyse the extent to which factors such as performance expectancy, trust, availability, accessibility and effort expectancy influence their decision-making process regarding e-Government adoption. Additionally, it will explore the impact of demographic variables, such as education, age, and income, on nationals' adoption behaviour.

Through a comprehensive analysis of the collected data, this research seeks to contribute to enhanced comprehension of the underlying intricacies of the factors influencing e-Government adoption in South Africa. The findings are expected to be of great significance to policymakers, government agencies, and other stakeholders, enabling them to formulate effective strategies to promote and improve the utilization of e-Government services for the benefit of citizens and the overall advancement of the country's digital governance landscape.

There are other various classifications of e-Government initiatives in South Africa, each with its own set of issues and challenges. This study will look into e-Government services as a

group. Future studies can look at how different types of e-Government services differ and what factors influence the adoption of each service individually.

1.5 The intended contribution of the study

The investigation of crucial factors affecting e-Government adoption in South Africa has been relatively limited in existing literature. In this study, the initial literature review focused on examining empirically tested research on the determinants impacting the uptake of e-Government services among the citizenry of South Africa. Among the reviewed studies, only two comprehensive reviews were found, conducted by Shambare (2020) and Verkijika and De Wet (2018). A concise overview of the findings from these reviews is visualised in Table 1.3. Despite the scarcity of previous research on this topic, this study aims to contribute significantly to the comprehension of e-Government adoption in South Africa by conducting a comprehensive empirical analysis of the critical factors impacting citizens' adoption behaviour.

1.5.1 Contributions to research

This research study makes a substantial and noteworthy contribution to the domain of information systems by augmenting the current understanding. It accomplishes this by devising and validating a hybrid model, referred to as the Technology Acceptance Model-Unified Theory of Acceptance and Use of Technology (TAM-UTAUT) model, specifically customized to analyse the acceptance of e-Government initiatives.

The amalgamation of elements from the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT) enables a comprehensive examination of the factors influencing citizens' acceptance and adoption of e-Government services. By synthesizing and adapting these two prominent theories, the study strives to shed light on the complexities and dynamics underlying the successful implementation and adoption of e-Government initiatives.

The novel TAM-UTAUT model, designed to address the distinctive challenges and intricacies of e-Government acceptance, contributes to the theoretical foundation of information systems research. Its development and empirical testing open new avenues for understanding how citizens perceive and interact with digital government services. As governments worldwide increasingly transition to digital platforms, the insights derived from this study hold significant potential for informing policy and decision-making in the realm of e-Government implementation and improvement

Given that e-Government is a relatively new domain with limited established theories, this research further enriches the theoretical understanding by exploring how constructs commonly used in e-commerce settings, such as enjoyment, trust, accessibility, and availability, can be applied to the context of e-Government. By bridging this theoretical gap, the study lays the groundwork for an improved comprehension of the determinants that impact the adoption of e-Government services among citizens in South Africa and beyond. The findings will not only enhance academic understanding but also offer valuable insights for policymakers and practitioners to devise and execute effective e-Government strategies and initiatives that resonate with citizens' needs and preferences.

1.5.2 Contributions to practice

In practice, the study's findings can help the South African government and policymakers develop effective e-Government policies to support the South African government's renewed approach and program, which aims to transform South African public service into an all-encompassing digital society, where every citizen is able to enjoy the advantages of digital technologies, leading to an enhancement in their quality of life (DTPS, 2017).

The South African Cabinet, in September 2016, approved the National ICT Integrated White Paper Policy to create a “development-oriented, people-centred and inclusive digital society” (DTPS, 2017). The White Paper Policy focuses on digital transformation of public services, in which ICT is utilised to enhance service delivery to the general public and it directs the creation of the National e-Government Strategy and Roadmap (DTPS, 2017).

In support of the South African government’s renewed approach and program, as well as the National e-Government Strategy and Roadmap, research findings highlighting, from a citizen's standpoint, which factors are crucial for the adoption of e-Government, will benefit the South African government and policymakers to better understand, plan and execute e-Government programs suited to citizens’ needs and requirements, ultimately resulting in improved adoption of e-Government services.

1.6 Delimitations of the study

Thee most significant delimitation of this study is that it only includes South African citizens over the age of 18, with access to an electronic device and internet connectivity to receive and

complete a questionnaire survey. This is especially important since, in order to use e-Government services, users must have access to electronic devices and the Internet.

The study measures multiples variables of interest among participants at a certain point in time, rather than tracking them across time (cross-sectional approach).

1.7 Outline of chapters

This thesis is meticulously organized into seven comprehensive chapters, each of which serves a distinct purpose in contributing to the overall research objectives. The following is a brief summary of the content covered in each chapter:

1.7.1 Chapter 1: Introduction

This chapter provides context for the study, as well as a problem statement and research questions. The chapter goes into further detail on the study's objective, expected contributions and delimitations.

1.7.2 Chapter 2: Literature Review

This chapter examines, synthesizes and critiques the literature found from a variety of sources. The literature review covers critical topics such as types of e-governments, the setting of e-government in developing nations, factors promoting e-government, and the theoretical background and related studies.

1.7.3 Chapter 3: Conceptual Model/Framework

This chapter provides a representation of a system, phenomenon, and problem that highlights the key ideas, factors, connections, and presumptions involved. The hybrid TAM-UTAUT model is explored in this chapter and the various constructs represented to show their relationship to each other.

1.7.4 Chapter 4: Research Methodology

The methodology used to conduct the research is described in detail in Chapter 4. The chapter starts off by explaining the research paradigm and design. The chapter then proceeds to elaborate on the data collection methods, questionnaire development, administration, data analysis, ethical considerations and limitations.

1.7.5 Chapter 5: Data analysis and results

This chapter presents the findings of the study and focuses on the presentation of the data and the outcomes of the statistical analysis. It includes tables, charts and graphs that show the findings in a clear and organized manner. The chapter provides an objective and unbiased representation of the data without any subjective interpretation or conclusions.

1.7.6 Chapter 6: Interpretation & Discussion of Findings

In this chapter, the analysis and interpretation the data analysis results is performed to derive meaningful insights and draw conclusions. The chapter involves explaining the implications of the outcomes in relation to the research questions and objectives. The interpretation goes beyond merely presenting the numbers; it involves providing explanations for the observed outcomes.

1.7.7 Chapter 7: Conclusion

This chapter examines the background of this research and the pertinent areas covered. It also briefly gives an overview of the research by touching on some key aspects of each chapter. The chapter then concludes with an overview of the contribution and limitations identified during the research.

2. LITERATURE REVIEW

This chapter aims to review relevant literature to foster an all-encompassing comprehension of e-Government concepts, along with essential components of e-Government such as definitions, delivery models/types, benefits and challenges, success factors, and based on existing literature, the critical factors influencing e-Government adoption. In addition, the chapter analyses the features of e-Government development in developing nations, with a particular emphasis on South Africa.

2.1 Background of E-Government Adoption

One among several obstacles to the widespread uptake of Digitised Government services, especially in developing African counties, is the lack of technological infrastructure and citizen's access to computerised facilities caused by the economic divides amongst other things (Glyptis et al., 2020; Nkwe, 2012; UN E-Government Survey, 2020). In citizens' opinion, the government is a slow-moving bureaucracy that is unwilling and unable to reform to benefit from new technologies and business practices (Abu-Shanab & Bataineh, 2014; Pillay, 2012; UN E-Government Survey, 2020).

A substantial amount of administrative work is required when consumers and businesses interact with the government, making the process burdensome and complex (DTPS, 2017; UN E-Government Survey, 2020). A wide range of methods and techniques are employed to allow such connections (Grönlund & Horan, 2005; Leiner et al., 2009).

As stated by Mawela et al. (2017) in their research, the first and most effective way to address citizens' concerns is to create e-Government definitions that put users at the centre of the definition, allowing for a better understanding and satisfaction of public requirements. According to Bwalya (2017), e-Government can imply a variety of things to a variety of people; it is critical, therefore, to understand how e-Government differs depending on different people's context.

2.1.1 E-Government definition of terms

There are several definitions encapsulating e-Government, each addressing a different aspect of the interaction between government, business and citizens enabled by technology (Abu-Shanab & Bataineh, 2014; Glyptis et al., 2020). The acknowledgement of the enablement

provided by ICT is central to most definitions; due to rapid advancements in technology, as well as vast improvements in digital operations and connectivity, most governments have established electronic websites, supported by systems and tools, to offer citizens and businesses a diverse array of services accessible at any time and from any location. (Al Hujran et al., 2013; Bannister & Grönlund, 2017).

Despite facts that some aspects of e-Government are universal, most definitions are interpretations of context, regulatory setting, the dominance of a group of actors or the various priorities in government strategies of those providing the definition (Abu-Shanab & Bataineh, 2014; Bwalya, 2017). The definitions of e-Government as defined by several related research are depicted in Table 2.1.

Table 2.1: E-Government definitions

References	Definitions
Wangpipatwong et al. (2009)	E-Government denotes the utilisation of innovative technology and its wide-ranging capabilities to make governments and their agencies better reachable, effective and accountable.
The World Bank (2015)	E-Government entails the integration of information and communication technologies (ICT) within government agencies, utilizing tools like Wide Area Networks, Telephony, the Internet, and mobile computing. This incorporation has the potential to reshape interactions with individuals, organizations, and other governmental departments.
Bwalya (2009) Kumar et al. (2007)	E-Government is the delivery of social services and information over the Internet or other digital channels by government.
Bwalya (2009) Bwalya (2017) Bwalya et al. (2012)	E-Government balances government offerings to the public in an interplay between e-democracy and e-administration.
Liu and Bing (2017)	E-Government involves the government's utilization of information and communication technology to facilitate citizens' access to information and public services.
Kefallinos et al. (2009)	E-Government refers to the techniques, organisational procedures, skills and ICT utilised to improve citizen, company and government agency access to and delivery of government information and services.
Safeena and Kammani (2013)	E-Government is the ongoing improvement of service delivery channels, citizen participation and governance.

Kumar et al. (2007)	E-Government, also known as Digital Governance, involves delivering prompt services to citizens, various segments of society and business through the use of technology.

The key takeaway from these definitions is that e-Government encompasses a wide range of elements, including actors, strategies, activities, priorities, technologies and services, all required to drive successful e-Government adoption. Figure 2.1 summarises some of the key components of e-Government that have been observed in earlier related studies.

In this paper, E-Government is delineated as a technique for governments to employ innovative ICT, such as telephone and internet-based web applications, aimed at offering citizens with seamless access to government services and information and, eventually, to optimize and expand chances for participation in democratic institutions and procedures, in line with the World Bank (2015) definition. This definition is explicitly limited to transactions between the government and citizens (G2C) and excludes transactions between the government and businesses (G2B) and between the government and government agencies (G2G).

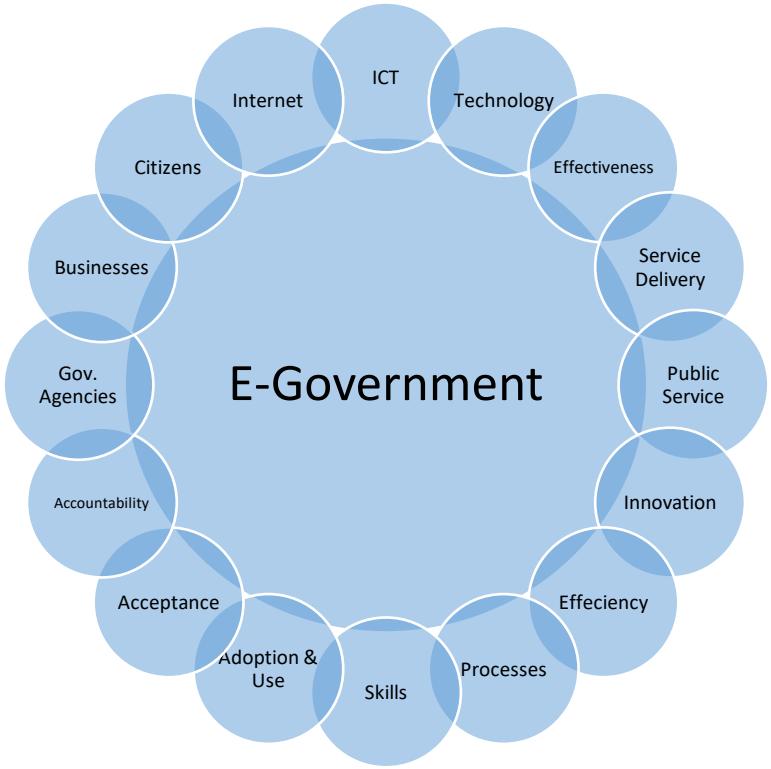

Figure 2.1: E-Government components

Adoption and usage are essential components in the embracing of e-Government services. A lack of either could indicate a lack of utilisation or a failed e-Government implementation; Governments that choose to use e-Government will fail to improve public service delivery if citizens reject e-Government initiatives (Liu & Bing, 2017). Thus, the understanding of critical factors promoting e-Government is highly key in e-Government Adoption (V. Kumar et al., 2007; Mkwizu & Sichone, 2019).

E-Government is becoming more important due to improved interactions between governments and their stakeholders, increased citizen empowerment through information access and a growing digital footprint (Al Zaabi et al., 2013). Despite this, developing countries experience slow adoption and widespread failure (Bwalya et al., 2012; UN E-Government Survey, 2020). A considerable disparity persists between industrialized and emerging economies, particularly in Africa, owing to various impediments.

in an endeavour to comprehend the role of people in the adoption of digital government services and identify methods to enhance users' perceptions to increase intent to use and adopt technology, Kiilu and Nzuki (2015) concluded in two studies that perceived security and trust can influence user decisions and behaviour, specifically that the larger the gap between perceived security and actual security, the lower the likelihood of users accepting technology. According to Mohammed and Hakizimana (2019), the adoption of e-Government is hindered by budget and financial restrictions, technical difficulties, poor understanding, concerns regarding data security and privacy, along with the appropriate technology implementation, lack of leadership skills and confidence in e-Government. The upcoming section will delve into the factors associated with e-Government adoption in developing nations. Given the economic, social, and cultural similarities, understanding the developing country context is vital for comprehending the influences on the integration of e-Government practices in South Africa.

2.1.2 Types of e-Government

There are three primary delivery models for e-Government: Government-to-Government (G2G), Government-to-Business (G2B) and Government-to-Citizens (G2C) (Munyoka & Manzira, 2014).

- G2G: Refers to internal dealings and exchanges between government departments and agencies (Blom & Uwizeyimana, 2020). G2G can also refer to the government's relationship with its employees (Bwalya, 2017; Nkwe, 2012). The critical goal of G2G development is to streamline cooperation and coordination in order to enhance and improve inter-governmental organisational processes (Blom & Uwizeyimana, 2020).

Utilizing online communication facilitates the exchange of information and resources, enabling the synergy of skills and knowledge, ultimately enhancing the efficiency and effectiveness of processes (Solinthone & Rumyantseva, 2016) and provides easily accessible information on training and education, compensation and benefits policies and civil rights laws (Solinthone & Rumyantseva, 2016).

- G2B: Refers to dealings between government departments & agencies and the private sector (Blom & Uwizeyimana, 2020; Bwalya, 2009). G2B is the second most common type of e-Government (Blom & Uwizeyimana, 2020). G2B services include the exchange of policies, rules, memos and regulations among the government and business sectors (Al Zaabi et al., 2013).
- G2C: Includes the interactions between governments and their citizens as well as all electronic services provided by government agencies and departments (Blom & Uwizeyimana, 2020). This application encompasses the vast majority of government services to provide people with secure electronic resources to address routine concerns and government transactions (Blom & Uwizeyimana, 2020). The principal objective of this application aims to cater to citizens and facilitate seamless interaction between citizens and the government through increasing the accessibility of public information, thereby reducing transaction time and costs (Lallmahomed et al., 2017; Pillay, 2012). Besides enabling and enhancing citizen engagement in government, G2C projects' capability to transcend temporal and geographic obstacles may bring together people who would not otherwise come into touch with one another (Al Zaabi et al., 2013; Lallmahomed et al., 2017; Safeena & Kammani, 2013).

2.1.3 E-Government in developing counties

As per the UN E-Government Survey (2020), which evaluates the progress of country e-Government efforts derived from three components: online service index, telecommunication infrastructure index, and human capital index, European countries have the highest proportion of countries with the very high Electronic Government Development Index (EGDI) group (58 percent), followed by Asia (26 percent), the Americas (12 percent) and Oceania (4 percent). The EGDI is a comprehensive index of core components of e-Government (UN E-Government Survey, 2020).

Online service index evaluates government's ability and desire to offer services and engage with its residents through digital channels UN E-Government Survey (2020). The Telecommunication Infrastructure Index is an arithmetic average of four indicators: (i) Number of mobile subscribers per 100 inhabitants, (ii) Estimated internet users per 100 inhabitants, (iii)

Active mobile-broadband subscriptions and (iv)number of fixed broadband subscriptions per 100 inhabitants. Human capital index is a measure of citizen's ability to use e-government services.

The UN E-Government Survey (2020) further posits that developing countries have a limited understanding of what is required to be ready to implement e-Government projects, resulting in most embarking on these projects unprepared, leading to failure.

Figure 2.2 demonstrates the overall rankings of the e-Government development index (UN E-Government Survey, 2020). Denmark ranks as the frontrunner in e-Government development, with an EGDI score close to one (1), as seen on the far left of figure 2.2. Finland, the United Kingdom, the Netherlands and other developed countries closely follow Denmark. On the right are the majority of developing countries with scores close to zero (0), including Somalia, Equatorial Guinea, Niger, Liberia and many others.

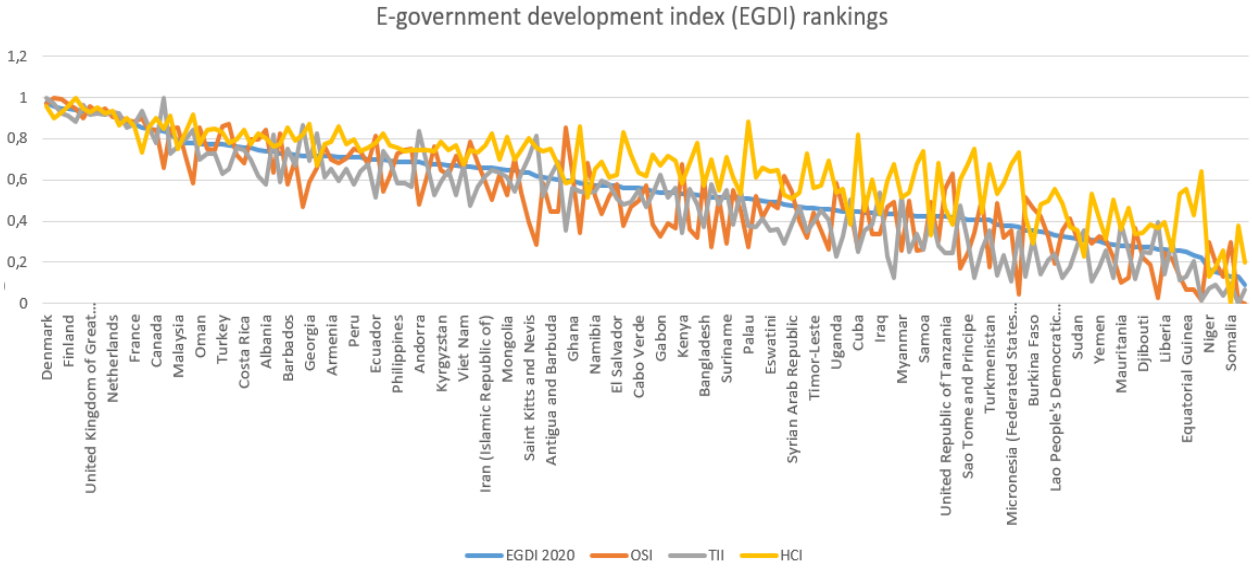

Figure 2.2: E-Government development index(UN E-Government Survey, 2020).

The context of developing countries is relevant in this study because, while each of the developing countries may differ in some ways, they share social, structural and economic similarities that allow for cross-learning and reference (Munyoka & Manzira, 2014).

2.1.3.1 Adoption factors in related developing country-based studies

Due to persistent infrastructure and human capital development gaps, developing African countries continue to lag behind other developed countries (UN E-Government Survey, 2020).

Africa’s internet penetration is estimated to be 36% (473 million people online), which is very low compared to the flagship of e-Government development countries such as Denmark and Switzerland, which have a penetration of 99% and 98% respectively (UN E-Government Survey, 2020). Other obstacles involved in the provision of effective e-Government in Africa include undeveloped ICT infrastructure, with several countries lacking basic resources and/or mechanisms to fully address priorities such as cybersecurity, privacy protection, power supply, Internet access and reliable connectivity (Komba & Ngulube, 2015; Ndou, 2004; Pillay, 2012; UN E-Government Survey, 2020).

Results from this survey are in line with those found in earlier works on e-Government in developing nations. According to Nkwe (2012), who delved into the obstacles faced during the implementation of e-Government and the potential opportunities within Botswana's context, it was concluded that the country lags behind others in harnessing ICT to deliver government services. The cost of accessing global systems of interconnectivity that provides a variety of information and communication services is also high (Nkwe, 2012). Liu and Bing (2017) investigated the driving models that influence e-Government acceptance in Vietnam. They found that Trust in Government is a key component of e-Government, proposing that government and their agencies strengthen system trust and accountability to stimulate participation in online government services among the general public.

e-Government research, citizens' trust has consistently been recognized as a crucial factor since the government-citizen interaction involves the exchange of data (Alzahrani, 2012). Examining the impact of trust in e-Government, Papadopoulou et al. (2010) conducted a comprehensive study on the subject and concluded that, though trust in e-Government is multifaceted and identifies several types of trust, it is still critical for e-Government adoption.

Trust is inextricably linked to and influenced by Accessibility (Agangiba & Kabanda, 2016). Unlike other electronic services, e-Government should be available to everyone at all times; citizens want to trust that the government will handle personal information responsibly and that services will be accessible when required (Agangiba & Kabanda, 2016). Unfortunately, most existing e-Government services were not designed with user needs in mind, resulting in usability, accessibility and cost issues (Mtebe & Kondoro, 2017). Accessibility and affordability were also cited by the UN E-Government Survey (2020) as critical and relevant socioeconomic issues that must be addressed urgently if digitalisation is to grow.

These findings are harmonious with the literature by Ndou (2004), Nkwe (2012) and Rokhman (2011), who propose impediments such as ease of use, usefulness and digital divides as

reliable predictors of failure. Heeks (2003) further explores challenges like the gap between design and reality and emphasises how developing countries typically depend on external experts to implement cutting-edge technological systems. This typically occurs without regard for the country's national culture and social context, resulting in failure in practice. Researchers noted barriers such as utility, convenience of use and digital divides as reliable predictors of failure in multiple other studies (Ndou, 2004; Nkwe, 2012; Rokhman, 2011).

In a qualitative study investigating challenges to embracing and integrating electronic commerce (e-commerce) in African countries, Mthembu (2018) concluded that accessibility, as well as the cost of using the Internet, are some of major impediments to the spread of e-commerce in developing nations. Despite being different in trajectories, e-Government and e-commerce have major similarities, allowing for cross-learning between the two phenomena (Moorthy et al., 2017). The two share characteristics, such as the need to manage expectations, balance stakeholder interests and close the digital divide through equal access, infrastructure accessibility and reach. Both aim to streamline procedures, reduce expenses, enable vertical and horizontal system integration and information sharing and raise the responsiveness and calibre of services (Moorthy et al., 2017).

The cost implications of using digital services are critical in determining stakeholder intentions (Benazić et al., 2015; Nirmawan & Astiwardhani, 2021; Sniehotta et al., 2014; Tiwana & Bush, 2007). Using an adapted TAM, Nirmawan and Astiwardhani (2021) discovered that perceived cost and perceived trust have a significant and positive impact on the individual's desire to use, whereas perceived usefulness has a negative and insignificant effect. A Malaysian study that used an extended Innovation Resistance Theory model to investigate the resistance factors to digitisation following low adoption levels among Malaysia’s generation X discovered that cost is a significant barrier to adoption (Moorthy et al., 2017). Naidoo (2012) similarly conceded that perceived costs, which can be in the form of a deficiency of equal access for all individuals, predominantly when considering the gap between rural and urban areas in the allocation of national resources, long-distance travelling, shortage of skills necessary to use digital services and long waiting times to access services, are all high in determining adoption.

As opposed to computer and office applications, predicting behavioural intention to use e-Government is heavily influenced by external factors like the social environment as well as personal internal elements like perceived enjoyment (PENJ) and self-efficacy (Venkatesh et al., 2012; Venkatesh & Bala, 2008). PENJ is the presumption that using a technology, application, or service is enjoyable, pleasurable and exciting (Balog & Pribeanu, 2010). When utilising the extended UTAUT model to examine behavioural intention to utilise digital platforms

from the perspective of consumers and incorporating perceived enjoyment, satisfaction, mobile self-efficacy, trust and perceived risk moderators, Chao (2019) discovered that perceived enjoyment, effort expectancy and performance expectancy had positive relationships with behavioural intention.

In a study aimed at determining factors influencing customers' e-commerce behaviours using an expanded technology acceptance model (TAM) that includes social impact and perceived enjoyment, research revealed that the perceived usefulness, attitude, social impact and perceived enjoyment are significant positive predictors of e-commerce adoption (Hasan et al., 2021).

Table 2.2 provides a summary of findings from peer-reviewed empirical studies related to e-Government adoption in developing countries, published between 2012 and 2022.

Table 2.2: Empirical findings

Reference	Purpose of Study	Key Findings	Limitations
Rodrigues et al. (2016)	Determine the components and frameworks that are essential for the transformation of e-governments in the United Arab Emirates to be more user-cantered.	Trust and confidentiality, performance expectations, effort expectations, facilitating conditions, disposition regarding the utilization of technology and ease of use have all emerged as significant factors influencing e-Government adoption.	The questionnaire was distributed at a single time point and lacked complete objectivity.
Weerakkody et al. (2013)	Empirical research based on a survey involving 502 participants was conducted in Madinah City, Saudi Arabia. The investigation focused on examining the significance of intermediaries in expediting the adoption and diffusion of e-	Intermediary trust, Performance expectancy and effort expectancy have a substantial beneficial impact on behavioural intention, within the context of embracing e-Government services through intermediaries.	In this research, moderator factors for UTAUT are not assessed. Thus, performing an analysis of the moderator variables might be helpful in determining the major components that have an effect on both the behavioural intention to utilize e-Government services and the actual usage of these services.

Reference	Purpose of Study	Key Findings	Limitations
	government initiatives.		
Lallmahomed et al. (2017)	Conducted an analysis of e-Government adoption factors in Mauritius, a small island developing state.	According to the findings, behavioural intention is positively related to performance expectancy and facilitating conditions. Furthermore, computer self-efficacy and resistance to change have a significant negative relationship with e-Government service intention.	The study was carried out in a small developing island where e-Government programs exhibit limited interaction. Due to this specific context, the generalization of the study's results to other developing nations or countries with fully interactive e-Government services may not be feasible.
Al Hujran et al. (2013)	The acceptability of electronic government services among Jordanian citizens was investigated, along with the factors that influence the adoption of electronic government services.	The researchers identified that trustworthiness, citizen satisfaction, perceived ease of use, and perceived usefulness are key indicators influencing a citizen's inclination to use e-Government services. Additionally, factors like perceived ease of use and perceived usefulness emerged as potential predictors. Furthermore, the quality-of-service elements, including responsiveness, reliability, and empathy, significantly affects the level of citizen satisfaction.	In the research, a design known as cross-sectional was used. This research takes a snapshot in time and does not reveal how the opinions and behaviours of residents change over the course of time since it is a cross-sectional study.
Rehman et al. (2012)	In Pakistani society, which the nascent stages of e-Government adoption, attempts have been made to uncover the factors that enable residents	Citizens' willingness to engage in transactions on the government website is influenced by various factors related to website design. These factors include perceived ease of use, e-readiness, awareness, service quality, and transaction security.	The survey was carried out digitally, with invitation e-mails with a web link being sent to the individuals who were going to be the focus of the study. It is probable that the sample data may

Reference	Purpose of Study	Key Findings	Limitations
	to accept e-Government services.	Furthermore, citizens express concerns about the quality of information obtained from the government website, as well as transaction security and service quality, when conducting transactions on the platform.	not effectively represent the overall population as a whole due to the fact that the majority of respondents in this sample are highly educated and have extensive experience using the internet.

The empirical studies related to e-Government use and adoption in developing countries, as reviewed, illustrates that diverse factors impact user adoption and sustained utilization of e-Government services. The influence of these factors depends on the specific context, regulatory environment, the dominance of various stakeholders, and the priorities of citizens.

From a developing country perspective, the following key factors are most prevalent: Perceived Enjoyment, Perceived Cost, Performance Expectancy, Effort Expectancy, Social Impact, Facilitating Conditions, Trust in e-Government, Accessibility and Behavioural Intention. These key themes represent an early attempt to understand the adoption of e-Government. The next step will be to determine which of the key themes are applicable to South Africa, which constitutes the primary focus of this study.

2.1.4 E-Government in South Africa

Like other developing African countries, South Africa has made numerous attempts at e-Government projects, some of which were successful and others not (Blom & Uwizeyimana, 2020; Pillay, 2012; Singh & Travica, 2018). Although South Africa has been long recognized as one of the pioneers in the development and adoption of e-Government systems in developing countries, it has lately been eclipsed by governments that are far less developed (Munyoka & Manzira, 2014). A comprehensive empirical review of African countries' failures and successes can help these countries (like South Africa) move towards highly successful e-Government implementation (Nkwe, 2012; Pillay, 2012). Much of the existing body of literature on e-Government in South Africa has been cantered on theoretical research highlighting the challenges African countries face when deciding whether or not to implement e-Government rather than empirical research that looks into the factors that influence adoption (Lin et al., 2011).

According to Bwalya et al. (2012), these research gaps are caused by the inadequacy of implementation models for African countries; that is, the implementation models do not account for the existing gap between real-life conditions on the ground and e-Government implementation, making them more appropriate for developed countries with cutting-edge technology and better social welfare. Bwalya et al. (2012) go on to argue that the African continent faces a unique set of challenges that should not be overlooked when conducting empirical research using relevant models.

Table 1.3 outlines the key findings in a summarized manner from the preliminary literature review, examining peer-reviewed research published between 2012 and 2022 that empirically tested the factors influencing the adoption of e-Government among South African inhabitants. It is evident that only two studies were conducted, conducted by Verkijika and De Wet (2018) and Shambare (2020). This observation adds to the evidence that investigative studies on the adoption of e-Government in South Africa is limited, as previously noted by Bwalya (2017). Furthermore, Verkijika and De Wet (2018) noted that the multiple empirical studies on e-Government adoption in Southern South Africa displayed inconsistencies, emphasizing the critical need for more empirical research on e-Government adoption, particularly in the context of South Africa.

As the South African government, policymakers, and shareholders formulate tactics to foster uptake and use of electronic government services, it is vital to take into account the country-specific empirical findings highlighted in this paper. By acknowledging unique factors that influence e-Government adoption in South Africa, they can tailor their approaches effectively. The insights garnered from the section focusing on e-Government in emerging countries provide a valuable foundation for further investigation into the specific determinants impacting citizen embracing of e-Government in South Africa. By examining and integrating these factors into their initiatives, decision-makers can enhance the probabilities of positive e-Government implementation and ensure that services resonate with the needs and preferences of South African citizens.

2.1.4.1 E-Government policy and legislation in South Africa

E-governance, like regular ICT, requires rules, policies, regulations and legislative principles to address electronic activities (Mathe, 2022). The South African government has a number of key actors who have a legislative mandate, either directly or indirectly, to manage, enable, create or execute e-Government (Bwalya, 2009; Singh & Travica, 2018). The following

legislation has been established to facilitate the of e-Government implementation in South Africa:

- The 2002 Electronic Communication and Transaction (ECT) Act is designed to facilitate and regulate e-Government services, as well as interactions and transactions conducted electronically between public and private entities, institutions, and citizens (DTPS, 2017). Furthermore, the ECT Act grants authority to the Minister of Telecommunications and Postal Services (MTPS) for the formulation of the National e-Strategy (ECT Act, 2002).
- The Public Service Act of 1994, along with later revisions, bestows the Minister of Public Services and Administration (MPSA) with the power to set and uphold standards and norms within the public sector, covering information management and electronic governance (Public Service Act, 1994). As a result, the DPSA is authorized to guide e-Government practices in the public sector, leading efforts in transformation and modernization through the development and execution of policies and frameworks (DTPS, 2017)
- Chapter 5 of the Public Service Regulations of 2001, along with any subsequent amendments, encompasses regulations pertaining to e-Government (Public Service Regulation, 2001). This section addresses three vital aspects of e-Government. Firstly, it emphasizes the importance of proper and efficient handling of Information Technology (IT) by all departments to enhance public service delivery, departmental productivity, and cost efficiency (Public Service Regulation, 2001). Secondly, it underscores the significance of info security, mandating the MPSA to publish a manual known as the Minimum Information Security Standards (MISS) (Public Service Regulation, 2001). Lastly, the regulations emphasize the need for interoperability, which the MPSA will address across the government (Public Service Regulation, 2001).
- The State Information Technology Agency Act 1998, as revised in 2002, establishes an entity known as the State IT Agency (SITA) (SITA, 1998). SITA is mandated to provide information technology, information systems and related services to or on behalf of Minister of Telecommunications and Postal Services, which acts as the exclusive government representative, functioning as the sole Shareholder, overseeing participating departments and serving as the government's agent concerning these services (SITA Act, 1998).

Additional noteworthy legislations that impact e-Government services encompass South Africa's Protection of Personal Information (POPI) Act of 2013. This act aims to advance the protection of personal information handled by both public and private organizations, while also

implementing information protection principles to establish essential standards for the processing of personal data (DTPS, 2017).

The Protection of State Information Act governs how state information should be protected; it promotes transparency and accountability in governance while acknowledging that state information may be shielded from publication in order to defend the Republic's national interests (DTPS, 2017). It also allows for the security of some information against destruction, loss, or unauthorised disclosure and the regulation of how information may be safeguarded (DTPS, 2017).

2.1.5 Factors promoting e-Government

From many vantage points, e-Government is a multi-layered, multidimensional construct (Kumar et al., 2007; Pillay, 2012; Stefanovic et al., 2016). An informed comprehension of the success factors of e-Government can allow policymakers manage the risks involved with innovative government initiatives and, ultimately, make more informed choices (Stefanovic et al., 2016). Due to complexity of e-Government programs, however, the success criteria must be applicable to a broad variety of situations and scenarios (Eberhagen & Naseroladl, 1992; Kumar et al., 2007; Lin et al., 2011). The investigation and categorization of factors encouraging e-Government are significant in the analysis of government activities because they enable academics to obtain more clarity and comprehension of the multitude of other aspects (Pillay, 2012; Stefanovic et al., 2016). The preliminary step in understanding the success criteria for e-Government is defining who the e-Government user is and what their requirements are (Irfan et al., 2018; Rodrigues et al., 2016).

A summary of key factors identified in the literature review includes UTAUT's constructs: performance expectancy, effort expectancy, social influence, facilitating conditions and behavioural intention. Nirmawan and Astiwardhani (2021) came to the conclusion that the perceived usefulness of TAM has a negative and insignificant impact, while perceived ease of use was not shown to be thee major predictor of adoption. Instead, it was shown that perceived enjoyment and perceived cost, together with two additional variables, trust and accessibility, had a stronger influence on adoption.

2.1.6 E-Government benefits and challenges

2.1.6.1 Benefits

E-Government is an evolving discipline that broadly encompasses governmental activities that are influenced by and makes use of ICT (Mawela et al., 2017). Numerous governments worldwide have pursued the implementation of e-Government systems, driven by recognition of the significant value that can be achieved through their effective deployment. (Mawela et al., 2017; Pillay, 2012). The surge in e-Government research further demonstrates that many governments and agencies have recognised the benefits of e-Government (Agbozo et al., 2019; Nkwe, 2012). The citizens' growing expectations as a result of their e-commerce experiences have also persuaded the government to consider e-Government (Agbozo et al., 2019).

According to Solinthone and Rumyantseva (2016), among the other benefits provided by e-Government is an improvement in service quality made possible by the availability of e-Government services seven days a week, 24 hours a day. Solinthone and Rumyantseva (2016) go on to argue that by streamlining and reorganising operating procedures, e-Government can reduce costs and levels of organisational processes. The arguments are harmonious with Alshomrani and Qamar (2013), who suggest that e-Government offers great advantages for saving costs and improving government service operations, such as lower transaction costs, increased efficiency, supplementary services for citizens and greater transparency for citizens.

The following other benefits were noted from the review of related studies:

- Service delivery enhancements and citizen satisfaction (Abu-Shanab & Bataineh, 2014; Bwalya, 2017).
- Reduced time, effort and costs for customers and organisations (Alshomrani & Qamar, 2013; Solinthone & Rumyantseva, 2016).
- Enhancement of users' computer usage, internet knowledge and ICT skills (Alshomrani & Qamar, 2013; Kurfalı et al., 2017).
- Enhancement of government agencies' data processing efficiency (Abdoh et al., 2020; Liu & Bing, 2017).
- Service enhancement through an improved understanding of the needs of users (Irfan et al., 2018; Rodrigues et al., 2016).

- Helping the government achieve its economic policy goals by promoting the productivity gains inherent in ICT and e-commerce (Dash & Pani, 2016; Lallmahomed et al., 2017).
- Enhanced transparency, precision, and simplicity in the exchange of information between the government and its constituents. (Alshomrani & Qamar, 2013; Solinthone & Rumyantseva, 2016).

This demonstrates that implementing e-Government not only saves resources, effort and money but can also vastly improve service quality and decrease time spent on administrative tasks. There are no doubts about the advantages that can be expanded from the successful implementation of e-Government (Bwalya, 2017; Pillay, 2012).

2.1.6.2 Challenges

Despite the benefits gained from successful e-Government implementation, some challenges must be overcome (Dash & Pani, 2016; Glyptis et al., 2020). Some of the challenges presented in related studies include:

- Inequity in public Internet access;
- Cybercrime and a lack of trust;
- Hyper-surveillance;
- An erroneous perception of transparency and accountability; and
- Expensive ICT infrastructure.

According to the literature, users are at the heart of e-Government adoption, specifically using and adopting e-Government technology (Pillay, 2012; Rehman et al., 2016). Consumers of e-Government services should be trained to use a specific technology and other human factors should be taken into account, particularly in underdeveloped communities with low education levels (Bwalya & Healy, 2010; Pillay, 2012). These are known as hard-soft gaps (Pillay, 2012). Researchers contend that resource availability, skills and training, values, beliefs and motivations all play crucial roles in the success of e-Government initiatives and that a lack of any of these factors would result in an elevated failure percentage for e-Government ventures.

The security of the systems used in e-Government is also critical (Kefallinos et al., 2009; Munyoka & Maharaj, 2019; Pillay, 2012). Information dissemination and unauthorised access significantly impact user decisions (Agbozo et al., 2019; Pillay, 2012). System security should be well managed to increase the likelihood of adoption (Kiilu & Nzuki, 2015).

In their study, Kiilu and Nzuki (2015) conducted experiments to identify methods for changing users' perceptions of information security to increase their intention to use and adopt the technology. To begin, users were asked to make electronic transfers via an e-banking system and questionnaires were used to assess their intent to use e-banking. In the other experiment, participants were encouraged to create online accounts and transact through them. It was discovered from the two experiments that perceived security can influence user decisions and behaviour; specifically, the greater the gap between perceived and actual security, the less likely users are to adopt a technology. Furthermore, Kiilu and Nzuki (2015) found that training and awareness can improve user compliance with security practices by increasing perceived knowledge, possibility and severity. This is in line with the observations by Pillay (2012).

According to Van Niekerk (2017), there were 54 significant cybersecurity breaches in South Africa between 1996 and 2014, with data exposure accounting for 42 percent of the 54. The increasing number of digital profiles raises the possibility of such breaches (Van Niekerk, 2017). Making security control implementation even more critical (Van Niekerk, 2017). This raises another concern: privacy. Users should feel safe and secure when sharing personal information, so privacy is an imperative facet of adoption (Agbozo et al., 2019; Lin et al., 2021; Pillay, 2012).

Given the country's economic disparities, inequality is another factor in South Africa (Singh & Travica, 2018). The effectiveness of e-Government is decreasing as the wealth gap grows wider (Pillay, 2012). In general, poorer communities require the most interaction with the government in terms of services (Tan & Chung, 2015; UN E-Government Survey, 2020). In a case study conducted in Slovakia, highly educated, economically active users were more likely to adopt new technology, whereas the rest were more resistant to it (Pillay, 2012). In this study, social and economic status played a significant role in e-Government participation (Pillay, 2012). Disparities in access to basic internet and telecommunications services affect the ability of e-Government to reach all inhabitants of a country (Pillay, 2012).

2.1.7 Theoretical background and relates studies

2.1.7.1 E-Government Adoption models

Numerous investigations into the utilization and adoption of e-Government services have used existing technology acceptance models, such as the Unified Theory of Acceptance and use of Technology (UTAUT), Technology Acceptance Model (TAM), Diffusion of Innovation Theory (DOI), Theory of Planned Behaviour (TPB), Perceived Characteristics of Innovation (PCI) and

Theory Of Reasoned Action (TRA), to investigate and improve their comprehension on the phenomena (Alshomrani & Qamar, 2013; Amrollahi et al., 2013; Bwalya, 2017; Bwalya et al., 2012). Because of close association between e-Government and e-Commerce solutions, vast majority of these models were modified using earlier conducted research and empirical data in order to obtain the desired study conclusions (Van de Walle et al., 2018).

According to Alghamdi and Beloff (2014) and Verkijika & De Wet (2018), E-Government adoption models tailored to specific domains, like the E-Government Adoption and Usage Model (EGAUM) and E-Government Adoption Model (GAM), are necessary and have been developed to encapsulate and prescribe the broad nature of people's e-Government adoption behavioural patterns, as models relying on e-commerce literature lack the necessary sophistication to comprehensively encompass and predict the diverse range of people's e-Government adoption behaviours.

This section delves into the application of various models to the phenomenon of e-Government adoption.

2.1.7.1.1 Diffusion of Innovation Theory (DOI)

The DOI model was developed to depict the process through which users adopt and utilize technology. It elucidates the reasons, mechanisms, and pace at which new ideas, innovations, and technology disseminate across different cultures (Minishi-Majanja & Kiplang'at, 2013).

The theory predicts that when people are exposed to new ideas, technologies, or innovations, they will make decisions about how and when to use the technology based on behavioural, societal and individual capability factors (Minishi-Majanja & Kiplang'at, 2013). The theory identified five elements that must be present for technology adoption to be successful; relative benefit, intricacy, compatibility, trialability and observability are some of these factors (Minishi-Majanja & Kiplang'at, 2013; Verkijika & De Wet, 2018).

Despite the importance of the five elements, empirical evidence suggests that observability and trialability have little influence on user attitudes toward new technology adoption (Al Zaabi et al., 2013). Consequently, e-Government researchers applying the DOI model have primarily focused on the remaining three elements (complexity, relative benefit, and compatibility) that have demonstrated a significant influence on user attitudes toward adopting new technology (Al Zaabi et al., 2013).

Because humans and human networks are complex, it is difficult to quantify diffusion (Minishi-Majanja & Kiplang'at, 2013). Quantifying what exactly causes an innovation to be adopted is extremely difficult, if not impossible (Minishi-Majanja & Kiplang'at, 2013). This is critical, especially in e-Government adoption, because decision-makers and promoters of e-Government must possess awareness of the many forces at work in the decision-making process of an individual to embrace a new behaviour or technology. As a result, this theory is unsuitable for use in this study; Diffusion theories can never account for every variable and tend to overlook important predictors of adoption (Alghamdi & Beloff, 2014). This wide range of variables has also led to inconsistencies in research findings, lowering heuristic value (Alghamdi & Beloff, 2014; Sharma & Mishra, 2014).

2.7.1.1.2 Theory of Reasoned Action (TRA)

The TRA was created in 1975 to demonstrate the distinction between deliberate and actual behaviour. The TRA assumes that an individual's behavioural actions are determined through their behavioural intention, which is influenced by subjective norms and attitudes (Zarzuela & Antón, 2015). This commonly used theory for describing internet technology adoption contends that people often assume responsibility for their actions before determining whether or not to engage in certain behaviour (Zarzuela & Antón, 2015).

Nevertheless, when applied In the realm of e-Government systems, the TRA has been shown to be deficient in key constructs for assessing the acceptability and use of vastly complex systems such as e-Government (Zarzuela & Antón, 2015). Despite this, the TRA remains an extensively debated and important theory in the e-Government literature, since it forms the theoretical basis for the leading e-Government adoption models (e.g., GAM, TAM and EGAUM).

2.7.1.1.3 Theory of Planned Behaviour (TPB)

Ajzen (1991) introduced the Theory of Planned Behaviour (TPB) as an extension of the TRA to offer a more comprehensive comprehension of human behaviour when individuals find themselves in situations where they may not have absolute control (Venkatesh et al., 2012). The TPB differentiates itself from the TRA by incorporating a third component, Perceived Behavioural Control (Venkatesh et al., 2012).

The TPB has been extensively employed in information systems research to analyse and forecast technology acceptance behaviours (Venkatesh et al., 2012). Several studies have

formulated TPB-specific models to explore e-Government adoption (Verkijika & De Wet, 2018; Zuiderwijk et al., 2015). However, the majority of these TPB models in context of e-Government adoption remain theoretical and have not been empirically validated yet (Kiilu & Nzuki, 2015; Lallmahomed et al., 2017).

Nonetheless, Cheng (2019) posits that studies that empirically validated TPB demonstrated that it was superior to the TAM, which had formerly been utilised in numerous e-Government adoption studies. However, according to Sniehotta et al. (2014), the TPB is limited in that, regardless of intent, it assumes the people have acquired the opportunities and resources to successfully perform the desired behaviour. Furthermore, TPB does not take into account additional variables that can impact behavioural intention and motivation, such as mood, fear, threat or prior experience and does not consider environmental or economic factors that may influence a person's intent to engage in a behaviour (Sniehotta et al., 2014). Adhering to the specified definition of e-Government within this paper, the influence of social impact, facilitating conditions and access to e-Government are all key constructs. The limitations of TPB make it unsuitable for use in this study.

2.7.1.1.4 E-Government Adoption Model (GAM)

The GAM was developed by Shareef et al. (2011) to determine the crucial elements that enhance e-Government adoption at different stages of development. According to Shareef et al. (2011), due to the limitations of previous e-Government adoption models like TAM, DOI, and TPB in fully capturing the essence of e-Government user adoption behaviour, the GAM was introduced. As per Shareef et al. (2011), e-Government adoption contrasts with e-Government service maturity levels, a factor not considered in earlier models

The GAM model underwent empirical testing in Canada, where it proved to be an effective model for analysing e-Government uptake (Shareef et al., 2011). While the GAM model has not been fully validated in other contexts, several studies have made modifications and shown its significant impact on e-Government adoption in Egypt (Almaiah et al., 2020). However, owing to insufficient empirical data supporting these claims, the suitability of GAM for this investigation remains uncertain.

2.7.1.1.5 E-Government Adoption and Utilisation Model (EGAUM)

Alghamdi and Beloff (2014) established the EGAUM as a way to give a domain-specific and comprehensive framework for evaluating the factors that influence e-Government system

adoption and usage. The authors argued that such a model was needed because most of the earlier commonly used e-Government models were generic technological acceptance and adoption models (Alghamdi & Beloff, 2014).

The EGAUM (E-Government Adoption and Usage Model), presents a comprehensive framework to analyse and understand the adoption of e-Government services (Alghamdi & Beloff, 2014). This model comprises three dependent variables: E-Government Readiness (ER), Intention to Use E-Government (IU), and Actual Adoption and Use of E-Government (AAU) (Alghamdi & Beloff, 2014). It further encompasses four distinct sets of independent variables: Personal Factors (PF), Motivational Factors (MF), Technical Factors (TF), and Reliability Factors (RF) (Alghamdi & Beloff, 2014).

The EGAUM seeks to explore the complex interplay between these variables, shedding light on the factors influencing individuals' readiness to embrace e-Government services, their intentions to use such services, and the actual adoption and usage patterns observed (Alghamdi & Beloff, 2014). By examining personal attributes, motivational drivers, technical aspects, and reliability considerations, the model offers a comprehensive view of the e-Government adoption process (Alghamdi & Beloff, 2014).

The relationships within EGAUM are depicted in two ways: direct and indirect. Direct relationships signify the immediate impact of specific variables on the dependent variables, while indirect relationships signify the influences mediated by other variables (Alghamdi & Beloff, 2014). This comprehensive approach enables a more nuanced understanding of the complex dynamics that shape individuals' behaviors towards e-Government services (Alghamdi & Beloff, 2014).

2.7.1.1.6 Unified Theory of Acceptance and Use of Technology (UTAUT)

UTAUT model is the most common method for investigating how people adopt new technologies (Zuiderwijk et al., 2015). It was created by Venkatesh et al. (2003) as a way to study how potential users adopt information technology systems. The UTAUT was made by combining the main theories of eight leading technology acceptance models: TPB, TAM, TRA, Combined TPB and TAM, Motivational Models, Social Cognitive Theory, DOI, and Model of PC Usage (Venkatesh et al., 2003, 2012).

The UTAUT (Unified Theory of Acceptance and Use of Technology) is built upon four essential factors aimed at explaining behavioural intention to adopt technology (Venkatesh et al., 2012).

After identifying four determinants, Venkatesh et al. (2003) extended the model by incorporating moderator factors that could influence the direct relationships identified. These moderators include gender, age, experience, and voluntary use. Amongst many other benefits, the key advantage of using UTAUT is that it incorporates demographic and experience into the model (Venkatesh et al., 2003, 2012). Moreover, using UTAUT means up to 70% of the variance in Behaviour Intention (a key construct in this paper) and 40% of the actual use can be explained (Munyoka & Maharaj, 2019; Rodrigues et al., 2016).

The use of UTAUT in this study is motivated by empirical evidence that proves its valuable academic lens for addressing issues related to the adoption of ICT across a number of fields (Almaiah et al., 2020; Kayali & Alaaraj, 2020; Rodrigues et al., 2016); It can be demonstrated that the constructs within UTAUT can be appropriately related to specific contexts in order to scrutinise the consequence on the actual use of technology in line with Behaviour Intention (Chao, 2019; Kayali & Alaaraj, 2020; Munyoka & Maharaj, 2017; West et al., 2019).

2.7.1.1.7 Technology Acceptance Model (TAM)

TAM was established by Davis et al. (1989), leveraging the theoretical underpinnings of the TRA and is one of the models that researchers typically employ when evaluating user technology acceptance. At its inception, TAM concentrated on employees as adopters of IT (Venkatesh et al., 2012).

TAM holds that before accepting to adopt a piece of technology, individuals must have a voluntary intention to use it; according to the theory, causal relationships manifest in a sequential pattern of beliefs, attitudes, intentions, and behaviours. (Lin et al., 2011). The model emphasizes two pivotal factors driving voluntary intentionality: perceived usefulness and perceived ease of use (Davis et al., 1989). Perceived usefulness refers to the subjective likelihood that adopting a particular technology will enhance a user's performance within a specific context (Venkatesh et al., 2012). Perceived ease of use, on the other hand, pertains to the extent to which a user anticipates using a given system with minimal effort (Venkatesh et al., 2012)..

TAM is simple to understand and has a high level of predictiveness in many contexts due to its few factors (Cheng, 2019). Similar to UTAUT, TAM and its extensions have been used in a wide variety of applications across disciplines, geographies and contexts, providing an important theoretical tool for predicting user behaviour (Belanche et al., 2012).

Chapter Summary

Chapter three (3) delves deeper into the selection of UTAUT and TAM as models for empirically testing e-Government adoption in South Africa. A conceptual model and related constructs are sketched out and explained.

2.1.8 Theoretical background and related studies summary

As stated in chapter one, the research problem is to gain insights into the critical factors influencing citizens' adoption of e-Government. This chapter's assessment of the literature reveals a variety of factors that influence individual adoption, as well as the numerous techniques and models used to investigate the phenomena. Most studies on information technology adoption are limited in their ability to cover complex and sophisticated technology adoption (Makombe, 2017; Venkatesh et al., 2012). Amongst the reviewed theories in this chapter are DOI, TRA, TPB, GAM, GAUM, UTAUT and TAM. Despite their generality where all of these models have certain parallels and overlaps, the bulk of them fail to account for issues such as cost, trust and accessibility, which have been demonstrated to be essential in adoption of digital government.

Consequently, due to the aforementioned reasons, employing a hybrid TAM-UTAUT model would be appropriate. TAM is a well-established and widely used adoption theory which provides a framework for categorising external variables that influence attitudes or completely internal beliefs (Sharma & Mishra, 2014). Furthermore, TAM's emphasis on usefulness and ease of use as fundamental structures of information technology adoption can be adapted to best suit research outcomes representing attitudes, such as perceived enjoyment and perceived cost (Balog & Pribeanu, 2010; Kayali & Alaaraj, 2020).

Similarly, in the context of ICT acceptance, UTAUT has greater explanatory power than other relevant models and theories (Taherdoost, 2018). According to Chao (2019), the UTAUT's validity, suitability and reliability have been demonstrated in technology adoption studies in a variety of contexts. Given that UTAUT already has five direct predictors of behavioural intention and use behaviour, the choice of UTAUT for this study is strengthened (Almaiah et al., 2020; Chao, 2019; Rodrigues et al., 2016).

Creating a hybrid TAM-UTAUT model by incorporating aspects from both models creates opportunities for a more comprehensive and robust framework for understanding technology adoption (Sharma & Mishra, 2014). The integrated constructs are combined in a cohesive

manner, taking into account potential links and interactions; This integration is important to the model's ability to deliver additional insights beyond what TAM and UTAUT can provide independently (Bowden, 2002; Burton-Jones & Volkoff, 2017; Kayali & Alaaraj, 2020; Lee et al., 2015).

The hybrid model can further provide a more thorough knowledge of e-government adoption factors, present a broader collection of variables that affect e-government adoption, taking into consideration not only individual beliefs and preferences but also offer a broader set of factors that impact e-government adoption (Bowden, 2002; Burton-Jones & Volkoff, 2017; Kayali & Alaaraj, 2020; Lee et al., 2015).

The hybrid TAM-UTAUT model, like any other model, would have to be empirically evaluated and validated using appropriate study approaches. The investigations will gather and analyse data to determine the model's efficacy in explaining technology adoption behaviour in the context of e-government or any other specialized application.

3. CONCEPTUAL MODEL/FRAMEWORK

3.1 Introduction

Several models have been used to investigate how individuals embrace new technology, as detailed in sections 2.1.7 and 2.1.8. Researchers have since recommended that future research studies use a variety of other models, including the TAM and UTAUT, to expand the study of e-Government adoption (Kayali & Alaaraj, 2020).

To best respond to the research question, the study conducted a comprehensive review of adoption literature across various sources, aiming to find critical factors influencing e-Government adoption in Southern Africa. The literature review revealed several established models that have proven effective in the realm of technology adoption, including the TAM, UTAUT, DOI, GAM, EGAUM, among others.

TAM and UTAUT are models developed to explain theories of IT component adoption (Venkatesh et al., 2003; 2012; Venkatesh & Bala, 2008). TAM centres on the elements that shape an individual's choice to adopt technology and asserts that perceived usefulness and perceived ease of use are the key determinants driving technology acceptance (Kayali & Alaaraj, 2020; Taherdoost, 2018; Venkatesh et al., 2003) UTAUT, on the other hand, is a more comprehensive model that considers not only individual factors but also social and organisational factors that affect technology adoption. According to UTAUT, four fundamental factors impact technology adoption and use performance expectancy, effort expectancy, social influence and enabling circumstances (Almaiah et al., 2020; Alshehri et al., 2012; Alzahrani, 2012; Kayali & Alaaraj, 2020).

TAM and UTAUT have been extensively tested to determine whether the underlying theories' principles would hold true in an ever-changing organisational environment and the models were later evaluated for "different user" adoption (Venkatesh et al., 2012). The models attempt to explain acceptance and/or adoption by examining factors moderated by behavioural intent to use an IT component (Almaiah et al., 2020; Munyoka & Maharaj, 2017). This is accomplished by investigating reasoned action, motivational models, personal computer use, diffusion of innovation, social cognition and planned behaviour, all of which influence behavioural intentions and, ultimately, the decision to use or not (Venkatesh et al., 2012; Venkatesh & Bala, 2008).

Both TAM and UTAUT have been extensively used and validated in various contexts and can provide a robust theoretical framework for research on technology acceptance and use (Cheng, 2019; Kayali & Alaaraj, 2020; Venkatesh et al., 2003). These models can assist researchers in comprehending the factors influencing technology adoption and guide the development of technology-based interventions aimed at promoting technology use (Almaiah et al., 2020; Alshehri et al., 2012; Rodrigues et al., 2016). However, it is imperative to note that these models possess limitations and researchers should carefully consider the context and specific research questions when choosing a theoretical framework for their study (Alshehri et al., 2012; Altameem et al., 2014; Alzahrani, 2012).

3.2 TAM-UTAUT Conceptual Model

Using a hybrid TAM and UTAUT model, this section theorises a model using factors such as perceived enjoyment, perceived costs, effort expectancy, performance expectancy, social impact, facilitating conditions, trust in government and accessibility on behavioural intention to use e-Government. The Hybrid model seeks to address some of the limitations of these individual models and proposes a more comprehensive and integrative theoretical framework for the study of technology acceptance and use (Munyoka & Maharaj, 2017; Venkatesh et al., 2003; Venkatesh & Bala, 2008). The Hybrid TAM-UTAUT model has found applications in diverse fields, such as healthcare, education, and business, demonstrating excellent predictive capabilities for technology acceptance and usage (Bowden, 2002; Burton-Jones & Volkoff, 2017; Kayali & Alaaraj, 2020; Lee et al., 2015).

The suggested TAM-UTAUT model incorporates e-Government trust and accessibility as critical factors identified by researchers to be impacting on adoption and continued use of e-Government (Agangiba & Kabanda, 2016; Belanche et al., 2012; Mtebe & Kondoro, 2017; Nirmawan & Astiwardhani, 2021). Trust, defined as citizens' confidence in the capability and integrity of the agency providing the service, is inextricably linked to risk and expectations; Commercial dealings necessitate it as a means to reduce the risk of falling victim to opportunistic behaviours (Komba & Ngulube, 2015). Colesca and Liliana (2008) argue that nearly all aspects of peoples' lives are based on trust in some form or another. As a consequence, trust is a very rich concept encompassing a wide range of relationships and objects (Komba & Ngulube, 2015). The importance of trust in this paper is consistent with the arguments made by Colesca and Liliana (2008) and Komba and Ngulube (2015); looking at how trust in e-Government services influences user intentions to use e-Government.

In research on adopting technology, the idea that attitudes affect behavioural intention is well established (Kayali & Alaaraj, 2020). Comparing e-learning to other electronic services, preceding research has shown that the perceived usefulness is clearly impacted by the intention to use IT (Almaiah et al., 2020). Carter and Belanger (2005) argued that the success of e-Government services, devoid of face-to-face interaction, hinges on the level of trust displayed by customers or citizens. They also underscored the advantages of remote accessibility, enabling individual users to access services from any location, ensuring a seven-day availability, twenty-four-hour convenience.

According to Leist and Smith (2014), because many government services are natural monopolies, usability and accessibility issues have a disenfranchisement effect, potentially excluding citizens who are least prepared and equipped to participate in a digital society. These findings are congruent with those of Cumbie and Kar (2016), who argue that accessibility is a significant barrier to e-Government services. The digital gap and inequity in e-Government service offerings between rural and urban cities have been exacerbated by issues of accessibility (Cumbie & Kar, 2016; Dash & Pani, 2016; Glyptis et al., 2020). E-Government services can never be successful if relevant governments do not ensure adequate access to use the services (Leist & Smith, 2014). To be accessible, e-Government services must be open to all users, simple to use and compatible with people's technology (Leist & Smith, 2014).

There can be no discussion of accessibility without considering the availability. Al-Omari and Al-Omari (2006) define readiness and availability interchangeably as the degree to which a service provider (i.e., government) has the resources necessary, such as workforce and capacity, to meet the client's expectations and offer six important criteria for e-Government adoption. These are said to be fundamental components that must be evaluated before starting an "e-initiative" to ensure its execution in the appropriate direction (Al-Omari & Al-Omari, 2006).

Research in Tanzania looked at the moderating effect of technology available on the relationship between user attributes and IS success for e-Government implementation; The findings indicated a substantial association between users attributes and IS success and further showed that technology availability does moderate the relationship between user attributes and IS success (Mkwizu & Sichone, 2019).

According to socio-ecological models and extended motivational models, environmental factors like availability impact behaviour and predictors at the individual level (i.e., cognitions) (Esegine Diejomaoh et al., 2015). These models also assume that there is mediation between

individual cognitions and environmental factors or that these influences are moderated (Esegine Diejomaoh et al., 2015).
In their study, Esegine Diejomaoh et al. (2015) observed that the availability of sports facilities was not connected with sports participation. However, the availability of sports facilities significantly moderated the intention-sports participation correlation, with the intention-behaviour relationship being higher when more facilities were accessible.

Typically when using UTAUT to study adoption, age, gender, voluntariness of use and experience, the moderator variables are used to evaluate the impact of the primary factors taken into account (Al-Omari & Al-Omari, 2006; Cumbie & Kar, 2016; Venkatesh et al., 2003); however, the voluntariness of use and experience have been eliminated from this study to improve its appropriateness.

This model adaptation is supported by the fact that e-Government in South Africa is still in its infancy and that participation in e-Government is optional, meaning users who choose not to use-Government still have viable alternatives (Almaiah et al., 2020; Munyoka & Maharaj, 2017). Secondly, e-Government services in South Africa offer different user experiences (Pillay, 2012; Singh & Travica, 2018); Some e-Government services may be straightforward, with clear instructions and a simple user interface, while others may be more complex, requiring extensive documentation or a multi-step process that can be time-consuming (Blom & Uwizeyimana, 2020; Bwalya, 2009).

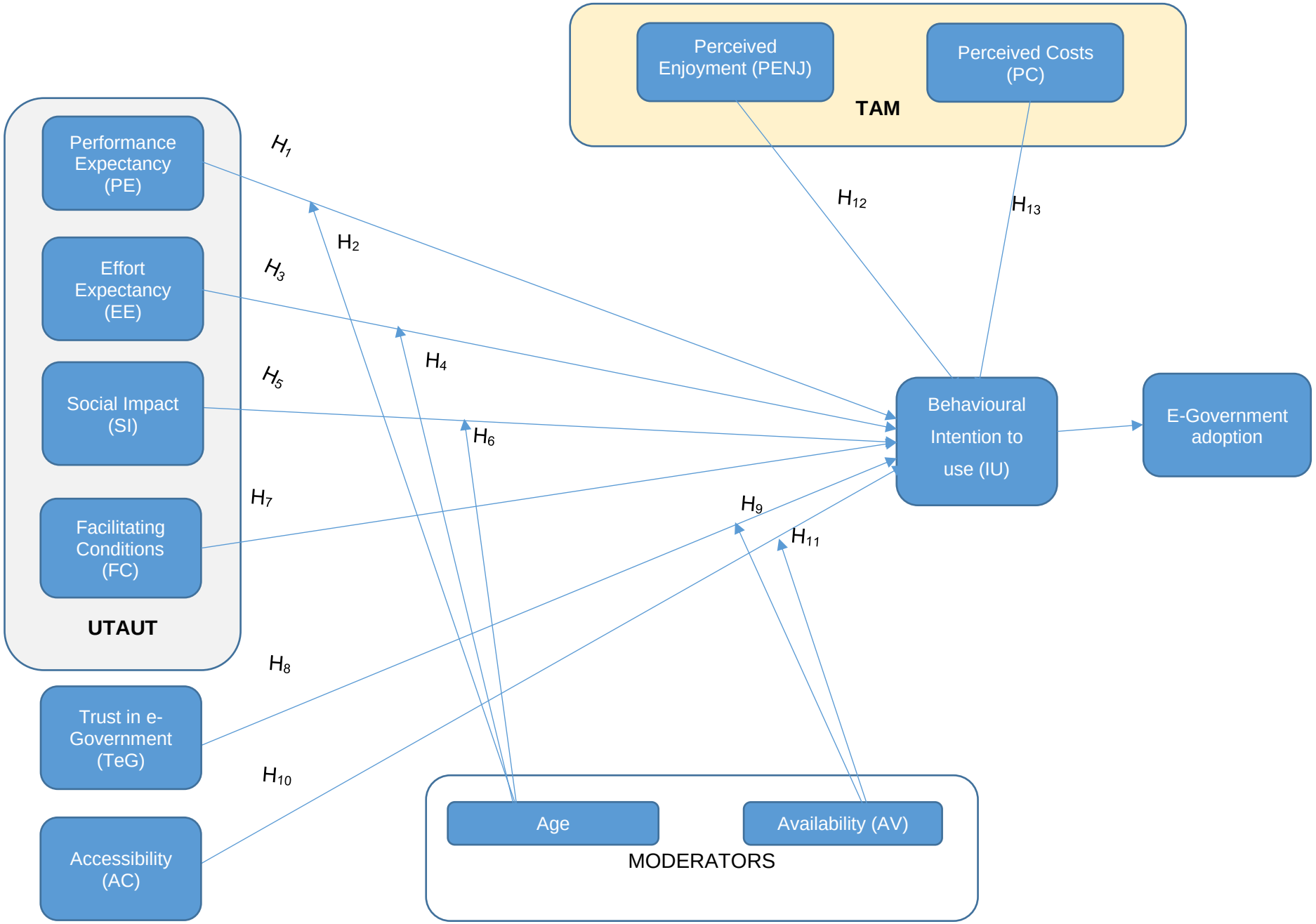

Figure 3.1: E-Government conceptual model

In place of voluntariness of use and experience, this research employs availability as a moderating variable, which is supported by earlier research as outlined earlier in this section 3.2.

As depicted in Figure 3.1, Performance Expectancy (PE), recognized as a highly influential predictor of technology adoption, signifies the extent to which technology can benefit users in their activities (Venkatesh et al., 2012). Numerous studies have proved that technology usage enhances performance, leading to positive sentiments (Lin et al., 2021). In this context, e-Government can play a pivotal role in facilitating effective and efficient service delivery, ultimately contributing to an improved quality of life for citizens. Therefore, the following hypothesis can be proposed:

H1: PE positively influences the citizen's behavioural intention to use (IU) e-Government.

According to Venkatesh et al. (2012), previous research has suggested that age is a critical demographic variable that influences and moderates behavioural intentions to use, adopt and accept technology. Kumar and Benbasat (2006) and Lin et al. (2021) made considerations that the inclusion of age as a moderator would increase the explanatory power of adoption models. Past research has proven that younger users are the least affected by acceptance problems (Liang et al., 2017). Venkatesh et al. (2012) further emphasized the role of age as a significant moderator in the UTAUT model. For younger employees, as perceived usefulness increases, the relationship between behavioral intention and performance expectancy becomes stronger (Venkatesh et al., 2003). Conversely, older users are more inclined to be influenced by the opinions of others (Venkatesh et al., 2012).

Several other studies have zoned in on the moderating effect of age on technological use and adoption (Lin et al., 2021; Rokhman, 2011; Venkatesh et al., 2012). The studies propose that older users tend to lag behind younger users when required to adapt to changing technology (Lin et al., 2021; Rokhman, 2011; Venkatesh et al., 2012); attributed to things such as cognitive skills that are lost with age, lack of time required to adapt, etc. (Lin et al., 2021). Thus, we hypothesize that age will positively moderate the relationship between PE, EE, SI, and IU.

H2: Age (the moderating variable) positively moderates the relationship between PE and IU to the use of e-Government.

Effort expectancy (EE) refers to the perceived level of exertion or effort required to utilize technology effectively (Venkatesh et al., 2012). It represents users' subjective assessment of

the ease with which they can navigate and interact with the technology to accomplish their tasks or objectives (Venkatesh et al., 2012). In other words, effort expectancy delves into users' perceptions of the system's user-friendliness, intuitiveness, and simplicity in performing various operations. A technology that is perceived to be easy to use and demands minimal effort is more likely to be embraced and adopted by users.

Empirical evidence indicates that EE is a strong determinant of personal intentions (Lin et al., 2021; Venkatesh et al., 2012). Past investigations also indicated that citizens' preferences and interactions with e-Government were associated with previous experiences (Bwalya, 2009). Consequently, prior experience in using e-Government can positively influence the acceptance of the new version of e-Government, mitigating anxiety and adoption challenges. Previous familiarity with e-Government services can foster a sense of comfort and confidence among users, making them more receptive to adopting and embracing the updated technology. By leveraging their prior experience, users are better equipped to navigate the new features and functionalities, resulting in smoother and more seamless adoption processes. As a result, facilitating access to training and support for individuals with limited prior experience becomes crucial to ensuring successful e-Government adoption and user satisfaction (Bwalya, 2009; Rokhman, 2011).

H3: EE positively influences the citizen's behavioural intention to use (IU) e-Government.
H4: Age (the moderating variable) positively moderates the relationship between EE and IU to use of e-Government.

Social impact (SI) refers to the scope to which users perceive that other members of the social circle (e.g., friends and family) believe that they should use technology. Previous research has found that users are most influenced by those closest to them when deciding whether or not to adopt a technology (Lin et al., 2021). Furthermore, as with PE and EE, age is a moderating variable that may potentially adjust the influence of social impact on behavioural intentions. The subsequent hypotheses are put forth:

H5: SI positively influences the citizen's behavioural intention to use (IU) e-Government.
H6: Age (the moderating variable) positively moderates the relationship between SI and IU to the use of e-Government.

According to Venkatesh et al. (2012), Facilitating Conditions (FC) are the perceptions of consumers regarding the support available to accomplish a task and the provision of relevant resources to aid the process of performing required tasks. Examples of FC are knowledge

transfer, training and support (Munyoka & Maharaj, 2017). According to Venkatesh et al. (2012), when EE and PE appear in a personal computer utilisation model and diffusion innovation model as antecedents, FC (the assistance provided for utilizing e-Government services) has no influence/effect on the user's intention. In contrast, if EE is omitted from the planned behaviour theory, then FC becomes a predictor of intention. Other researchers reached similar conclusions (Rokhman, 2011; Sharma & Mishra, 2014). For the purposes of this study, FC refers to an person's credence that organisational and technical infrastructure exists to support the use of e-Government. The Hypothesis is proposed:

H7: FC positively influences citizens' IU to use e-Government.

Some research suggests that experience, as a moderator, plays a crucial role when evaluating technology acceptance (Tripathi, 2018). Experience refers to the amount of exposure to a technology that leaves an impression on users (Hyytinen et al., 2022; Lusthaus & Adrien, 1998). A certain level of familiarity with technology can provide insights as to whether a user will adopt a technology (Lusthaus & Adrien, 1998; Tripathi, 2018). In contrast, other studies have suggested that exposure to and usage of technology does not always lead to familiarity, as some technology may differ from others, which could result in users having negative feelings towards the unfamiliar technology (Tripathi, 2018). This, in turn, could mean users are anxious and require much effort to use technology (Hyytinen et al., 2022; Lusthaus & Adrien, 1998; Tripathi, 2018).

According to Venkatesh et al. (2012), users with extensive experience in using technology are usually less impacted by social influence; users with a greater degree of experience are practically driven. Therefore, social influence's effects on IU will likely decrease if experience increases. However, when experience does not lead to familiarity, experience as a variable should not be considered (Tripathi, 2018).

Consumers' trust in e-Government adoption is critical, as it encourages desired transaction attitudes and behaviour (Colesca & Liliana, 2008; Komba & Ngulube, 2015). According to Agbozo et al. (2019), trust and privacy are major barriers to the spread of e-Government. Because of the Internet's open nature as a transaction infrastructure and its global constitution, trust has become a critical component of e-Government (Akkaya et al., 2011; Belanche et al., 2012). For e-Government to succeed and prosper, citizens must have strong trust in the security of the electronic information they exchange (Lin et al., 2021; Munyoka & Maharaj, 2019). Therefore:

H8: Trust in e-Government positively influences citizens' behavioural intention to use (IU) e-Government.

Accessibility, as defined by Leist and Smith (2014), pertains to the availability of technology and infrastructure that allows citizens to access e-Government services easily. Similarly, Alghamdi and Beloff (2014) view accessibility as the citizen's capacity to reach and use e-Government systems, encompassing the various methods available for accessing the system's services. The exploration of accessibility is particularly crucial in developing countries because of known technology and infrastructure barriers (DTPS, 2017). Inconsistencies in the availability of e-Government may deter users from consuming such services (UN E-Government Survey, 2020). Similar to the definition by Komba and Ngulube (2015), accessibility, in this study, refers to the extent a product (equipment, service, or environment) is available to as various people as feasible. The definition can be expanded to include the ability to use a system or entity's capabilities and potential advantages (Komba & Ngulube, 2015).

H9: Availability (the moderating variable) positively moderates the relationship between Trust and IU to use e-Government.
H10: Accessibility positively influences citizens' behavioural intention to use (IU) e-Government.
H11: Availability (the moderating variable) positively moderates the relationship between Accessibility and IU to use e-Government.

TAM-modified constructs are represented by Hypotheses 12 and 13 (H12 & H13). Following previous research revealing the impact of perceived enjoyment (PENJ) and perceived cost (PC) on technology use, the traditional variables of perceived usefulness (PU) and perceived ease of use (PEOU) have been replaced by PENJ and PC, respectively. (Al-Shafi & Weerakkody, 2010; Colesca & Liliana, 2008; Witarsyah et al., 2017). Heerink et al. (2008) found that PENJ is a stout and robust predictor of a user's intention to adopt and use technology. PENJ was also found to have a greater impact than perceived usefulness by Heerink et al. (2008). According to Venkatesh et al. (2012), computer users will feel more at ease using new technology if they have intrinsic motivation because their interest in technology will overcome negative feelings about putting in the effort to learn it. The following is proposed:

H12: PENJ positively influences citizens' behavioural intention to use (IU) e-Government.

When users change the technology or services they receive, they incur costs (Al-Shafi & Weerakkody, 2010; Colesca & Liliana, 2008). These costs may not always be monetary and may include expenses such as access, equipment and transmission (Al-Shafi & Weerakkody, 2010). Researchers have suggested that when introducing new technology, service providers should look for cost-effective methods to increase acceptance (Al-Shafi & Weerakkody, 2010). Currently, e-Government is in a user-transition situation, as users have other options (such as walk-ins) to obtain the required services. Consequently, the following Hypothesis is proposed:

H13: PC negatively influences citizens' behavioural intention to use (IU) e-Government.

4. RESEARCH METHODOLOGY

This chapter outlines the research methodology employed to achieve the study's objectives. According to Webster (2007), a research methodology describes the practical “how” of research. It explains how researchers design, execute and manage studies in order to achieve research objectives, yielding valid and dependable outcomes that directly correspond to the research objectives (Webster, 2007). A research methodology consists of the following components: research design, research approach, research paradigm, research strategy, sampling, the unit of analysis, data collection instruments, data analysis techniques, instrument reliability and ethical considerations.

There are various research strategies, according to Oates (2006): experiment, survey, case study, action research, ground theory, ethnography and archival research. Consequently, it is understandable that each strategy has advantages and disadvantages (Oates, 2006). Each strategy’s data collection methods lead researchers to a different research approach, which can be exploratory, explanatory, or descriptive (Oates, 2006; Yin, 2009).

4.1 Research Paradigm and Approach

A research paradigm (or philosophy) speaks to a pattern, model or shared way of thinking amongst researchers; It is what researchers perceive to be true, real and informing (Alharahsheh & Pius, 2019). Paradigms are crucial in outlining values and beliefs guiding the research study's design, collection, analysis and interpretation (Alharahsheh & Pius, 2019; Gefen & Straub, 2000). These values and beliefs can be categorised into Ontology, Epistemology, Methodology and Methods (Alharahsheh & Pius, 2019). Oates (2006) further posits that there are three (3) paradigms applicable to IS and computing research: Positivism (Positivist research), Interpretivism (interpretivist research, also called Constructivism) and Critical research (also called pragmatism).

This study adopts a Positivism Paradigm (Positivist research), Often associated with quantitative research and experimental methodologies (Oates, 2006; Webster, 2007; Yin, 2009). The study develops and tests the hypothesis, identifies variables before testing and uses a quantitative method to interpret the results (Alharahsheh & Pius, 2019; Oates, 2006; Yin, 2009). Positivist research is regarded as a progression or form of empiricism (Alharahsheh & Pius, 2019; Gefen & Straub, 2000; Makombe, 2017). Empiricism is a philosophical theory founded on the belief that knowledge must be objective and free from any bias stemming from

the researcher's past experiences, beliefs and/or values (Alharahsheh & Pius, 2019; Makombe, 2017).

In the Ontological aspect, Positivist researchers believe reality is the same for each person and that there are facts that can be proven - observation and measurement tell us what that reality is (Alharahsheh & Pius, 2019). Furthermore, from an epistemological viewpoint, positivism assumes that the investigator and the investigated are independent (Alharahsheh & Pius, 2019). There are four important characteristics of positivism (Alharahsheh & Pius, 2019; Gefen & Straub, 2000; Makombe, 2017):

- Phenomenalism – only the knowledge that science can confirm will be considered genuine.
- Objectivity – science should be free of values, beliefs and past experiences.
- Deductivism – the theory produces testable hypotheses for proven 'laws'.
- Inductivism – knowledge is inferred from particular facts or observational evidence.

This research notes the limitations of the positivist approach as highlighted by Alharahsheh and Pius (2019), who argue that positivist research is limited in that the data it produces can be inflexible and fail to account for elements such as experiences, motivations and personal beliefs.

4.2 Research Design and Methodology

According to Alharahsheh and Pius (2019), a research design is the framework of research techniques and methods chosen by a researcher, allowing them to focus on the most appropriate and effective research method that will best achieve the research objectives. Researchers define the type of research they want to conduct during the research design process (Webster, 2007). There are six (6) research design strategies relevant to information systems (IS) and computing research, according to Oates (2006): Design and creation, survey, experiment, case study, action research and ethnography.

In keeping with the quantitative research paradigm, this study employs surveys, specifically a cross-sectional survey design strategy. According to Datta et al. (2005), Oates (2006) and Webster (2007), the planning and design of IS surveys includes six (6) key activities: defining the data requirements, the data generation method, the sampling frame, the sampling strategy, the response rate and non-responses and the sample size.

This study employs a non-probability sampling method, specifically convenience and snowballing technique to best achieve the research objectives. In other words, the study intended to collect quantitative data by sending questionnaires to participants chosen based on their availability and willingness to participate via social media such as Facebook, Instagram, Twitter and WhatsApp (data generation) (Oates, 2006; Webster, 2007). The data will also be collected simultaneously (sampling technique) (Oates, 2006). This research strategy is pertinent and suitable for this study as it captures the attitudes, opinions, and practices of South African citizens concerning the adoption of e-Government (sampling frame).

This study cannot apply a longitudinal survey approach because of time constraints, which would have been valuable to the IS body of knowledge. Given the time constraints of the research institution, a longitudinal survey approach would require data collection on trends with the same population over time (Oates, 2006; Yin, 2009), which would be unfeasible. Furthermore, due to the South African government's lockdown restrictions established due to the coronavirus, which sought to limit people's interaction to prevent the virus from spreading, surveys delivered through social media were the favoured data gathering technique (Blom & Uwizeyimana, 2020).

4.3 Data Collection Methods

Data collection involves strategically planning and gathering information from diverse sources to address the research problem, test hypotheses, and evaluate outcomes, ultimately generating valuable insights (Oates, 2006; Webster, 2007; Yin, 2009). The two types of data collection are primary data collection and secondary data collection (Oates, 2006; Yin, 2009).

Primary data collection methods refer to data collection via surveys, interviews or experiments (Oates, 2006; Yin, 2009). Secondary data collection methods use information previously published in newspapers, journals, magazines, books and portals, among other places (Oates, 2006; Yin, 2009).

This study uses primary data collection, a quantitative approach administered through survey questionnaires, in accordance with the Research Paradigm approach, the Research Design and Methodology as described above.

4.4 Questionnaire development

The main effort in developing the questionnaire for the study (Appendix B) was to source questions related to individual adoption of e-Government services. Six independent variables

and two dependent variables (behavioural intention and user behaviour) were chosen from the UTAUT and the adapted TAM model as the main structure of this study (Kayali & Alaaraj, 2020; Venkatesh et al., 2003). Trust and Accessibility are additional variables chosen to expand the study – sourced from past empirical research as shown in table.

Table 4.1: Questionnaire Development

Perceived Enjoyment (PENJ)	
(balog & pribeanu, 2010) (khurshid et al., 2022)	
Hypothesis	Survey questions
PENJ positively influences citizens' behavioural intention to use (IU) e-government	"E-government systems make government services interesting (e.g., SARS e-filing, natis car and license registration)"
	"I enjoy using e-government systems in general"
	"In general, E-government systems captivate my interest"
	"I find using e-government to be enjoyable"
	"E-government systems make government services interesting (e.g., SARS e-filing, natis car and license registration)"
Perceived Cost (PC)	
(mensah et al., 2020)	
Hypothesis	Survey questions
Pc negatively influences citizens' behavioural intention to use (IU) e-government.	"The use of e-government services may cause me financial losses"
	"Using e-government is more expensive than the other government alternatives"
	"I believe that using e-government services may have negative financial effects"
	"In general, I believe there is some financial risk connected with using e-government services"
	"The use of e-government services may cause me financial losses"
Performance Expectancy (PE)	
(khurshid et al., 2022) (zafiropoulos et al., 2012)	

Hypothesis	Survey questions
Pe positively influences the citizen's behavioural intention to use (IU) e-government.	"I find e-government services to be beneficial in meeting my needs"
	"E-government services are better than traditional government services"
	"I am more productive when i use e-government services"
	"I save time by using e-government services"
	"I find e-government services to be beneficial in meeting my needs"
Effort Expectancy (EE)	
(Zafiropoulos et al., 2012) (kayali & alaaraj, 2020) (rodrigues et al., 2016)	
Hypothesis	Survey questions
EE positively influences the citizen's behavioural intention to use (IU) e-government.	"My interaction with this e-government service is simple and easy to comprehend"
	"I find it simple to learn how to use e-government services"
	"I find e-government services to be very user-friendly"
	"I find it simple to learn how to use the features of e-government services"
Social Impact (SI)	
(zafiropoulos et al., 2012)	
Hypothesis	Survey questions
Si positively influences the citizen's behavioural intention to use (IU) e-government.	"People in my circle who use e-government systems have more prestige than those who do not"
	"People in my circle who use e-government systems have a high profile"
	"Using e-government systems is a status symbol in my community"
	"People who are important to me think that i should use e-government services"
Facilitating Conditions (FC)	
(zafiropoulos et al., 2012)	
Hypothesis	Survey questions

Fc positively influences citizens' IU to use e-government	"I have the resources i need to access e-government services"
	"My requirements are met by e-government services"
	"I have the necessary skills to use e-government services"
	"I have support with difficulties I experience with these e-government services"
Trust in e-government	
(zafiropoulos et al., 2012)	
Hypothesis	Survey questions
Trust in e-government positively influences citizens' behavioural intention to use (IU) e-government.	E-government services are trustworthy
	E-government systems, applications and websites can be trusted
	I feel that government acts in the citizens' best interest.
	I feel comfortable interacting with the government online.
Accessibility	
(Komba & ngulube, 2015) (munyoka, 2019) (bwalya, 2017)	
Hypothesis	Survey questions
Accessibility positively influences citizens' behavioural intention to use (IU) e-government.	"I have easy access to e-government services anytime I require them"
	"I have capabilities in my neighbourhood that allow me to use e-government services"
	"There are no barriers preventing me from accessing e-government services"
	"E-government services are readily accessible whenever they are required"
Availability	
(komba & ngulube, 2015)	
Hypothesis	Survey questions
Availability (the moderating variable) positively moderates the	"The network in my area is reliable and provides a substantial up-time"

relationship between accessibility and IU to use e-government.	"I have the required/necessary hardware and software components for the use of e-government"
	"E-government services are dependable enough for me to rely on them for required services"
	"I can access e-government services whenever I need them"

The basis of answers to the questionnaire is a Likert five-point scale ranging from "strongly disagree" to "strongly agree" (Boone & Boone, 2012; Joshi et al., 2015); This scale is commonly used in IT adoption research (Oates, 2006). These labels have been associated with points 1 to 5. The key feature of the 5-point Likert scale is that it assumes that a user's attitude can be measured and that the strength of attitude/intensity is linear (Boone & Boone, 2012; Joshi et al., 2015).

4.5 Questionnaire administration

Oates (2006) defines questionnaires as pre-defined sets of either open or closed questions (also known as items) assembled in a pre-determined order. With questionnaires, respondents are asked to answer a series of pre-defined questions by the researcher, providing the researcher with data that can be analysed and interpreted (Webster, 2007). Questionnaires can be self-administered or administered by a researcher (Riva et al., 2012). Self-administered questionnaires are completed by respondents in the absence of the researcher, whereas researcher-administered questionnaires are completed by the researcher, who asks each question in turn and writes down the responses (Oates, 2006; Riva et al., 2012).

This study uses self-administered questionnaires, meaning that the sampled participants must complete the questionnaire independently. This is due to the fact that a self-administered questionnaire addresses the issue of information reliability by reducing and eliminating variations in how the researcher administered questions and facilitating the collection of data from the majority of respondents in a short period of time (Datta et al., 2005; Oates, 2006; Webster, 2007). The questionnaire used in this study contains 40 e-Government specific questions and four demographic questions. This study used Survey Monkey to administer the survey questionnaire to 250 participants.

As proposed by Oates (2006), this study considers the questionnaire's content validity, construct validity and reliability to ensure a well-balanced sampling of the covered domain, accurate measurement and repeatability.

4.5.1 Strategy for Pre-Testing and Pilot-Testing

Pre and Pilot testing are small-scale trials of a specific research component that are critical to the data collection phase and required to provide researchers with feedback on the research process, the wording of specific items and data-gathering methods to validate and ensure that they are error-free (Bowden, 2002). Precisely, pre and pilot testing are required to allow researchers to revise methods and logistics for data collection prior to the start of actual fieldwork (Bowden, 2002).

To improve the reliability and validity of the results, a pre-test was administered for this study. The questionnaires were sent to IS research experts (supervisors) and a sample of participants for review (Bowden, 2002; Oates, 2006). Supervisor input was critical in clarifying the following points (Bowden, 2002; Oates, 2006; Yin, 2009):

- Questions that are difficult to understand;
- Ambiguous or vague questions;
- Whether the questionnaire instructions are easy to follow
- Whether the pre-defined responses will cover all desired answers; and
- How long it takes to complete the questionnaire and whether it is reasonable?

Similarly, a pilot study was undertaken to evaluate the sending out and completion of the questionnaires. A pilot study is a process of conducting a preliminary study and going through the complete research procedure with a small sample size. (Bowden, 2002; Oates, 2006).

4.5.1.1 Outcomes of Pre-Testing and Pilot-Testing

- A sample questionnaire was administered to 15 participants to provide feedback on the questionnaire's comprehensibility, clarity, neutrality and length. Eight (8) respondents provided feedback as follows:
    1. The survey questionnaire had to be configured to only allow one response per user.
    2. The survey questionnaire introduction page had to be updated to include confidentiality statements and researcher contact details.
    3. The survey question on Accessibility had to be reworded from “I have support with difficulties I experience with e-Government services” to “writing to “I have support when I experience technical difficulties whilst using e-Government services” to be clearer.

4. The survey question on Social Impact, which read “People who are important to me think that I should use e-Government service”, did not have a complete 5-point Likert scale and had to be updated.
5. Several other questions had to be amended to improve readability.

- Scale reliability and validity tests were performed on the sample data obtained. The outcomes of the testing proved that the scale was reliable.

4.5.2 Sampling and Respondents

The ideal scenario in any research study would be to explore phenomena across the entire population (Alharahsheh & Pius, 2019; Makombe, 2017); however, it is hardly ever possible to study the entire population due to time and resource constraints (Alharahsheh & Pius, 2019). Alternatively, researchers examine a sample that is large enough and representative of the population (Webster, 2007; Yin, 2009); A sample is a subset of a population that has been chosen to be representative of the larger population (Oates, 2006; Webster, 2007; Yin, 2009). Using a representative sample can reduce the costs incurred, the time and the manpower required to conduct the study (Makombe, 2017).

There are two types of sampling techniques: probability and non-probability sampling. This study employs a non-probability sampling technique (Oates, 2006); this technique is used when the researcher believes that the sample of respondents chosen is representative of the overall population and wants to make generalisations about the population (Bowden, 2002; Webster, 2007). In the category of probability sampling technique, the study used convenience and snowball sampling methods, in which respondents were chosen randomly (Bowden, 2002; Oates, 2006; Yin, 2009).

This study’s survey questionnaire was administered to at least 250 respondents. Three factors were considered for determining the sample size. Typically sample sizes from previous research were considered a guide (Bowden, 2002). Second, the minimal sample size requirements suggested by statisticians were consulted. According to these sources, a sample size of 200–300 respondents is the absolute least that should be used to do a significant analysis (Oates, 2006). Finally, a confidence level and margin error were used (Bowden, 2002; Field, 2009; Oates, 2006). With a South African population of approximately 65 million, a confidence level of 90% and a margin of error of 5%, the proposed sample ranges from 200-280 (Field, 2009).

4.6 Data Analysis Methods

Data analysis refers to a research element that systematically applies logical techniques to summarise, describe and compare data (Oates, 2006). According to Yin (2009), data analysis refers to a process of investigating, grouping, tabularising and testing data to address the initial propositions of a study. Yin (2009) further posits that the analysis of data can take on two (2) forms: Quantitative analysis and Qualitative analysis. Considering this is a quantitative study, Yin (2009) posits there are two (2) outcomes to Quantitative research: descriptive and inferential.

This study aims to use both analysis types; first, to describe the characteristics of the sampled participants (descriptive) and further analyse the responses on attitudes towards e-Government adoption to make generalisations about the population (inferential). For descriptive analysis, the study uses statistical tools such as mean, standard deviation, mode, Median and skewness (Oates, 2006; Yin, 2009). The study has T-tests, Anova correlation analyses, Average Variance Extracted (AVE) component matrix and regression analysis available as options for inferential analysis.

4.6.1 Reliability and validity

To reduce measurement errors, two critical issues must be addressed: reliability and validity (Sürücü & Maslakçi, 2020). To ensure the reliability of responses, the study considers the following, as proposed by Golafshani (2015):

- Using a language that respondents can understand.
- Choosing concise questions and to the point.
- Clearing up any confusion in questions.
- Allowing respondents enough time to answer the questions without feeling rushed.

According to Oates (2006), a questionnaire is valid when the results are usable and allow us to measure what we want to measure. Additionally, this study will adopt Cronbach's alpha at 0,7, the most common measure of internal consistency ("reliability") (Yin, 2009). Commonly used on multiple Likert questions in a survey/questionnaire that form a scale (Yin, 2009).

Though closely related, reliability and validity express different properties of the measuring instrument (Sürücü & Maslakçi, 2020). According to Sürücü and Maslakçi (2020), validity speaks to whether or not the measuring instrument behaves as expected.

There are four possible combinations of instrument reliability and validity. Validity can be in two (2) forms Convergent validity and Discriminant validity. Convergent validity is a subtype of construct validity, a test designed to determine (quantify) whether a particular construct is being measured (Louangrath, 2018). Convergent validity examines two measures that are supposed to measure the same construct and demonstrates their relationship (Louangrath, 2018). In contrast, discriminant validity demonstrates that two measures that are not supposed to be related are actually unrelated (Louangrath, 2018).

4.6.2 Hypothesis testing

According to Yin (2009), hypothesis testing refers to a systematic process for determining whether or not the results of a research study support a particular theory; that is, it is a mechanism available to researchers to assess whether these findings may have occurred by chance (Bowden, 2002; Oates, 2006; Yin, 2009). Hypothesis testing takes on two (2) forms: Research Hypothesis (proposed by the researcher) and Null Hypothesis (in opposition to the research hypothesis and theorises that there is no relationship between variables) (Bowden, 2002; Oates, 2006; Yin, 2009).

This study adopted a Research Hypothesis and used the correlation analysis statistical method as a means to explore the association between variables (Oates, 2006; Yin, 2009).

4.7 Ethical Considerations

This section reflects on the Ethics examined in this study. Oates (2006) defines Ethical Considerations as “sets of principles that guide the design, execution and reporting of research” and argues that when collecting and analysing data, researchers must be familiar with and adhere to various codes of conduct.

This study considered the following ethical issues:

- Informed voluntary participation: According to Oates (2006), researchers must ensure that participants (respondents) are informed about the benefits, methods, risks and intended use of the results of the study. The researcher obtain oral or written consent from participants before collecting data. For this study, respondents are sent a link which clearly state that their participation is voluntary and they may opt-out whenever they wish to do so.
- Confidentiality and privacy: According to Oates (2006), personal identifiers should not be used in any form of reporting or dissemination. In this study, personal identifiers

were linked to unique identifiers and kept secure (Oates, 2006). For this study, personal identifiers are not used. Respondents are not requested to provide names, surname and/or address.

- Right to refuse or withdraw: According to Oates (2006), researchers informed participants of their right to seek clarity, refuse to answer any questions or withdraw from the study at any point. For this study, the survey questionnaire requires that respondents accept the terms and conditions before proceeding. The terms and conditions are clear that respondents may opt-out at any given point.
- Risks and benefits: Oates (2006) argues that though participants may not face direct risks or benefits, researchers need to ensure that participants incur no harm for participating in studies. For this study, no risks are anticipated
- Payment: Participants did not have to pay to participate in the study and there was no compensation payment to the participants (Oates, 2006). The respondents are not required to make any payment nor given the impression that they will receive any payment for their participation.

4.8 Limitations and Threats to Internal and External Validity

4.8.1 Advancing the study and practice of IS

This study marks an initial attempt to explore e-Government adoption in South Africa from citizens' viewpoints, in light of the government's drive to revolutionize service delivery. Previous literature largely cantered on organizational perspectives, evaluating the success of e-Government initiatives. However, this research extends the understanding of citizens' adoption of e-Government services and applications by employing a hybrid technology acceptance model, UTAUT, and an adapted TAM.

The proposed model highlights that citizens’ characteristics need to be properly evaluated and understood, as well as other factors that generate satisfaction, before evolving active e-Government use and adoption strategies (Heerink et al., 2008; Lin et al., 2021; Rokhman, 2011). The model is premised on the confidence that higher levels of satisfaction, as a result of the government’s engaging, rich, secure, reliable and hassle-free experience, can lead to higher levels of adoption.

The hybrid model also reaps the benefits of both models, which would not be realised if tested separately. Both models suggest that a technology’s behavioural intention to use directly

impacts its actual use (Lin et al., 2021). TAM and UTAUT, when combined, provide a technology-centred perspective on technology adoption (Lin et al., 2021; Taherdoost, 2018). Finally, this study briefly outlines the challenges the South African government has faced in implementing e-Government and provides brief recommendations on how these can be managed to improve e-Government adoption.

4.8.2 Testing of the model

Given that the model seeks to evaluate factors that influence e-Government adoption from the citizens' perspective, a quantitative research methodology using surveys was used to test the conceptual model presented in this study. Surveys are less expensive, take less time and can provide both qualitative and quantitative data from a large sample (Rokhman, 2011; Witarsyah et al., 2017).

To accurately represent constructs in the proposed research model, questions were compiled from ICT adoption literature and the diction of the questionnaire was reformed to fit the research context (Sharma & Mishra, 2014). There are 4 biographical and 40 closed-format questions, with individual responses limited to multiple-choice answers on a Likert five-point scale (Witarsyah et al., 2017). The five-point scale was chosen because it has been validated in previous studies (Witarsyah et al., 2017) and the endpoints will be “strongly agree” (5) and “strongly disagree” (1). The questionnaire was distributed to South African citizens and the questionnaire was restricted to adults over 18.

4.8.3 Additional theoretical extensions

Although this study followed a thorough research approach, certain potential limitations remain, which should be explored and considered in future investigations.

To begin with, the study focused on South African citizens’ intentions to adopt an e-Government system. The role of government in the adoption of e-Government use is equally important and future studies could include the factors of e-Government adoption from a government (state) perspective; theoretical extensions could include the Technology–organization–environment (TOE) framework and contributions of Diffusion of Innovation in understanding the role that government plays.

Second, while the conceptual model accounts for intrinsic constructs such as Perceived Enjoyment (PENJ) and Perceived Cost (PC), which play important roles in motivation, it does

not account for user cultural, economic, social and religious differences. Future research can incorporate these elements into the model to better understand their role in e-Government adoption.

Third, the study intends to assess intention at a single point in time. Perceptions and preferences can shift over time, which is an important consideration. Utilizing longitudinal research enables a better comprehension of causality and interrelationships among variables crucial to e-Government acceptance over an extended period.

Given that the study only garnered 238 responses, there may be a need to expand the sampled population in the future.

Finally, this study focused on the broad definition of e-Government and did not take into account differences in government e-services. The rate of adoption varies from one e-Government application to the next [i.e., Electronic-voting (e-Voting), electronic tax filing (e-Filing), electronic driving licenses (e-Driving License) and electronic Identity Cards (e-IDs)]. Future research can focus on specific e-Government categories and test adoption for specific e-Government applications.

5. DATA ANALYSIS AND RESULTS

This chapter presents descriptive and inferential statistics related to the collected data, constructors' reliability and validity assessment and finally, the results of the hypotheses tested.

5.1 Introduction

This study aimed to investigate the critical factors influencing citizens' adoption of e-Government in South Africa. Drawing on previous research that empirically tested the factors that influence e-Government adoption in developing countries, various factors such as Performance Expectancy, Intention to Use, Social Impact, Perceived Enjoyment, Accessibility, Effort Expectancy, Perceived Cost, Facilitating Conditions, Trust in E-Government and Availability remained designated for testing in the South African context. The preceding sections discuss the design, administration and analysis of the data collected.

5.2 Research Setting

Using SurveyMonkey, an online survey tool for creating, sending and analysing surveys, a link to the survey questionnaire, which included 44 questions, was distributed to participants via social media platforms such as Facebook, Instagram, Twitter and WhatsApp. Participants were requested to respond to demographic questions (age, gender, education and employment status). On a 5-point Likert scale, participants were asked to indicate whether they strongly agreed or disagreed with statements intended to elicit their opinions on using e-Government.

The survey questionnaire was configured to only allow one (1) response per participant and was kept open for participation for a duration of four months (October 2022 to January 2023). The survey received 269 responses over the period; however, 31 responses from the 269 were disqualified due to being under the age of 18 and/or non-South African and incomplete surveys were left open (unanswered). This left the study with 238 responses, which constitutes a 95% response rate of valid and usable responses.

The preceding section presents the results of the analysis performed in the study.

5.3 Data analysis

5.3.1 Demographic Information of Participants

5.3.1.1 Age of Participants

Table 5.1 and Figure 5.1 show participants' age(s) and the correlating percentages.

Table 5.2: Age of participants

Question: What is your age?		
Answer to Question	Number of respondents	Percentage(s)
18-24 Years	20	8,40%
25-34 Years	114	47,90%
35-44 Years	57	23,90%
45-54Years	33	13,90%
55-64 Years	13	5,50%
65+ Years	1	0,40%

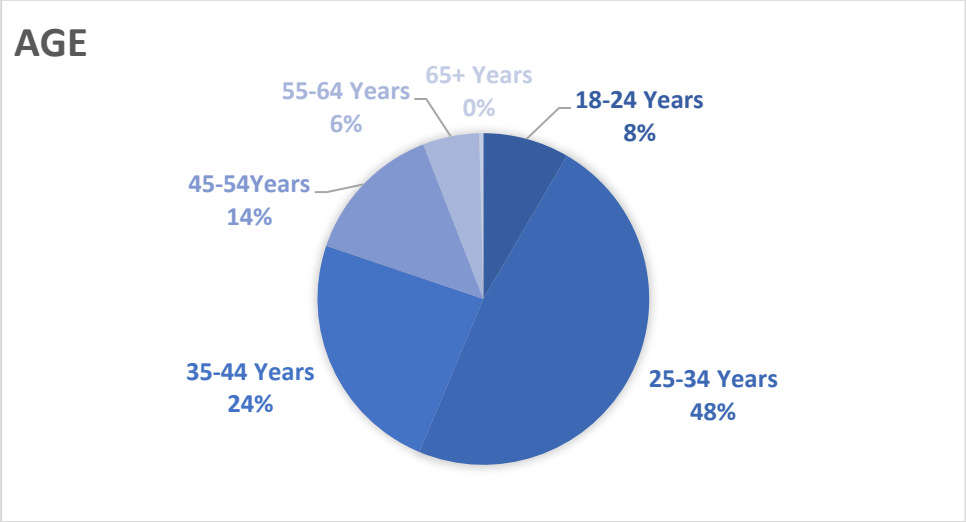

Figure 5.1: Age of participants summary

Participants ages and frequency distributions are shown in Table 5.1 and Figure 5.1. Participants between the ages of 18 and 24 made up 8.40% of the total, those between the ages of 25 and 34 made up 47.9% and those between the ages of 35 and 34 made up 23.9%. 13.9% of participants were between the ages of 45 and 54, 5.5% were between 55 and 64 and 0.4% were above 65. This indicates that the majority of participants were between the ages of 25 and 34, followed by 35 to 44, with 65 and older constituting the largest minority.

5.3.1.2 Gender of Participants

Table 5.2 and Figure 5.2 below show the gender of participants and the correlating percentages.

Table 5.3: Gender of participants

Question: What is your gender?		
Answer to Question	Number of respondents	Percentage(s)
Male	114	47,90%
Female	116	48,70%
Prefer not to say	8	3,40%

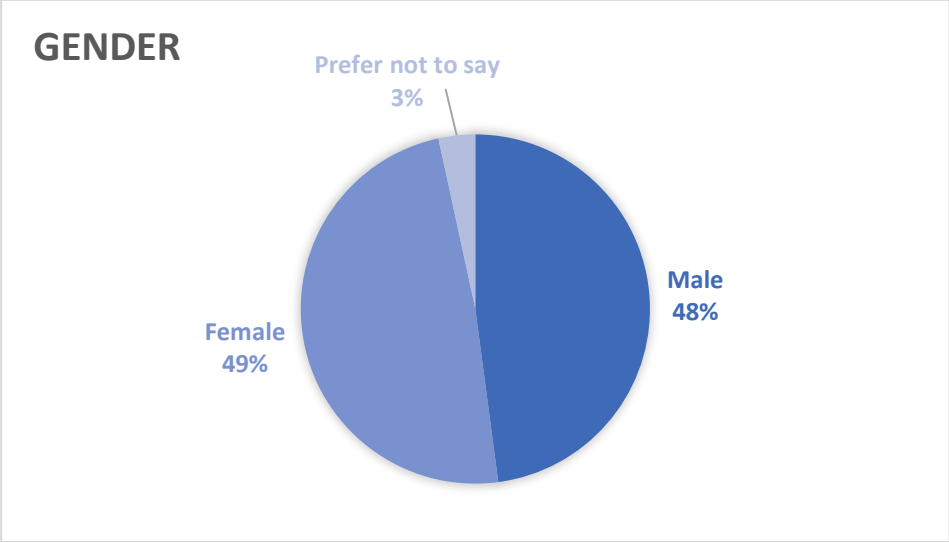

Figure 5.2: Gender of Participants summary

Participants' genders and frequency distributions are shown in Table 5.2 and Figure 5.2. It was observed that 114 (47.90%) of the respondents were Male, 116 (48.70%) were female and 8 (3.40%) preferred not to disclose their gender. This indicates that the majority of participants were female.

5.3.1.3 Education of Participants

Table 5.3 and Figure 5.3 show the education level of participants and the correlating percentages.

Table 5.4: Education of Participants

Question: What is your highest level of education?		
Answer to Question	Number of respondents	Percentage(s)
Primary School	6	2,52%
Higher/Secondary School	33	13,87%
College/University	125	52,52%
Post Grad Degree	74	31,09%

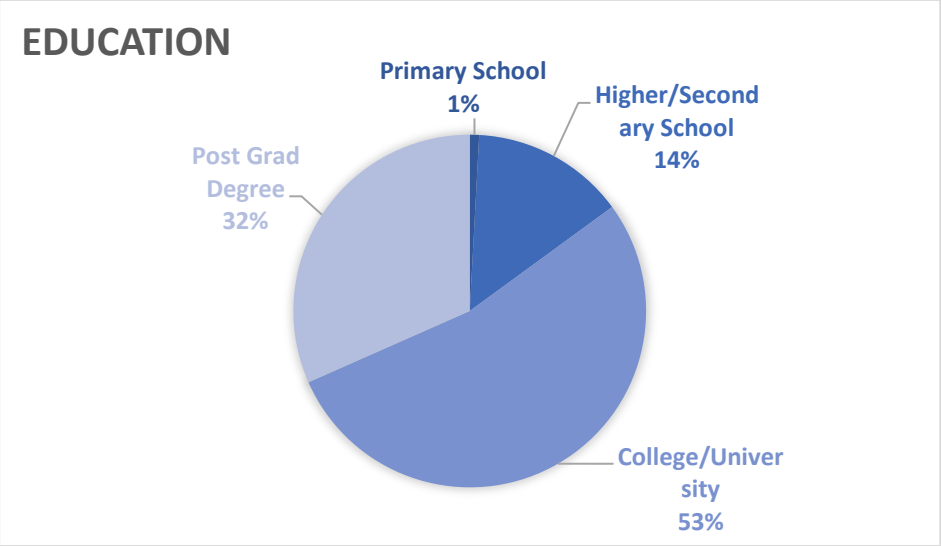

Figure 5.3: Education of participants summary

Participants' education levels and frequency distributions are shown in Table 5.3 and Figure 5.3. It was observed that 6 (2.5%) of the respondents had primary school as their highest level of education, 33 (13.87%) had some had High/Secondary school education, 125 (52.52%) had College or university education and 74 (34.09%) had post-graduate degree education. Respondents were also allowed to type in other education types if the ones provided did not adequately describe them; two responses stated military training and no formal education as education types.

5.3.1.4 Employment Status of Participants

Table 5.4 and Figure 5.4 show the employment status of participants and the correlating percentages.

Table 5.5: Employment status of Participants

Question: Which of the following categories best describes your employment status?		
Answer to Question	Number of respondents	Percentage
Student(s)	8	3,40%
Unemployed	46	19,30%
Employed	138	58,00%
Self-employed	43	18,10%
Pensioner(s)	3	1,30%

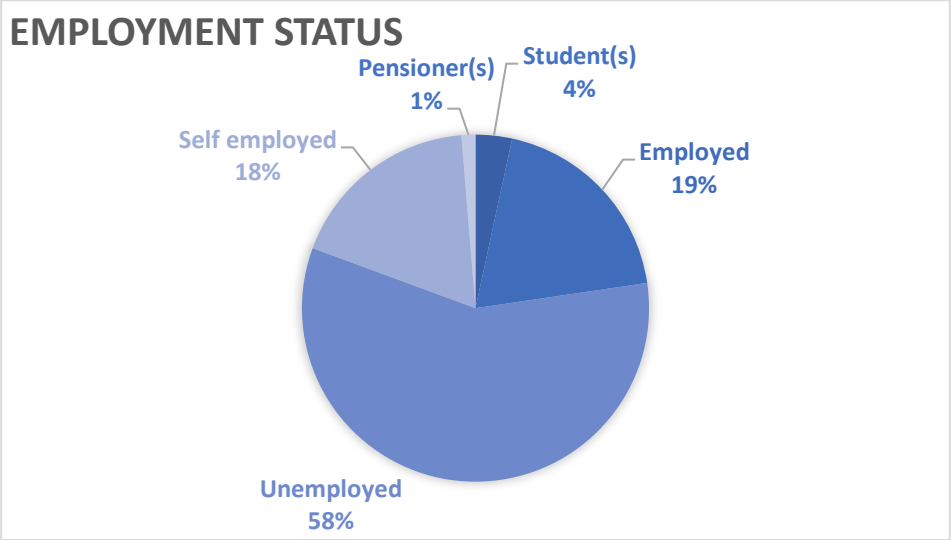

Figure 5.4: Employment status of participants summary

Participants' employment status and frequency distributions are shown in Table 5.4 and Figure 5.4. It was observed that 8 (23.4%) of the respondents were students, 46 (19.3%) were employed, 138 (58.0%) were unemployed, 43 (18.1%) were self-employed and 3 (1.3%) were pensioners.

5.3.2 Descriptive Statistics

According to Alshehri et al. (2012), Before conducting advanced statistical studies like structural equation modelling or regression analysis, it is essential to assess data homogeneity

to ensure that the distribution of all variables aligns with the normal distribution. In this study, the Kolmogorov-Smirnov and Shapiro-Wilk normality tests were used to evaluate the skewness and kurtosis of the data sets. The distributions of the constructs' mean and standard deviation are illustrated in Figures 5.5 and 5.6.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AC	238	0	4	1.31	1.284	.665	.158	-.896	.314
AC1	238	0	4	.86	1.271	1.563	.158	1.221	.314
AC2	238	0	4	.83	1.248	1.372	.158	.539	.314
AC3	238	0	4	.93	1.239	1.506	.158	1.227	.314
TeG	238	0	4	.94	1.256	1.317	.158	.514	.314
TeG1	238	0	4	1.11	1.200	1.044	.158	-.026	.314
TeG2	238	0	4	1.01	1.297	1.321	.158	.542	.314
TeG3	238	0	4	.67	1.085	1.652	.158	1.639	.314
IU	238	0	4	.77	1.114	1.593	.158	1.629	.314
IU1	238	0	4	.81	1.213	1.542	.158	1.242	.314
IU2	238	0	4	.86	1.257	1.370	.158	.572	.314
IU3	238	0	4	.75	1.196	1.558	.158	1.185	.314
AV	237	0	4	.92	1.236	1.530	.158	1.300	.315
AV1	238	0	4	.68	1.071	1.671	.158	1.784	.314
AV2	237	0	4	.84	1.249	1.427	.158	.742	.315
AV3	238	0	4	.75	1.182	1.522	.158	1.060	.314
PE	238	0	4	.60	1.058	1.727	.158	1.681	.314
PE1	238	0	4	2.43	1.470	-.457	.158	-1.300	.314
PE2	238	0	4	.98	1.215	1.142	.158	.149	.314
PE3	238	0	4	.89	1.175	1.237	.158	.333	.314
Valid N (listwise)	236								

Figure 5.5: Distribution for AC, TeG, IU, AV and PE

As shown in Figure 5.5, the minimum and maximum values for AC (Accessibility), TeG (Trust in e-Government), IU (Intention to use), AV (Availability) and PE (Performance Expectancy) were 0 and 4, respectively. The construct PE had the highest mean value of 2.43, while the standard deviation analysis shows that the model indicators only differ slightly from the mean (Field, 2009).

The skewness for all the variable constructs was positive (represented by a value above 0), which means that they were rightly skewed. Only one construct, PE, was negatively skewed, which means that the construct’s distribution was left-skewed (Field, 2009).

All the constructs with kurtosis greater than one are said to be following a leptokurtic distribution. In contrast, other constructs are considered to have a platykurtik distribution, which is a distribution that is considered to have values that are less than negative one (Field, 2009).

Similarly, the constructs in Figure 5.6 also have the same values of 0 and 4 as the minimum and maximum values. In this case, there seems to be a slight deviation of the mean with their

respective standard deviation. The constructs of the distribution are both positively and negatively skewed. Leptokurtic and platykurtic distributions are fully represented on the kurtosis part of the constructs.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
PENJ	238	0	4	.76	1.186	1.530	.158	1.114	.314
PENJ1	238	0	4	1.04	1.300	1.137	.158	.009	.314
PENJ2	238	0	4	.83	1.172	1.459	.158	1.068	.314
PENJ3	238	0	4	2.74	1.406	-.972	.158	-.433	.314
SI	238	0	4	.89	1.262	1.479	.158	.998	.314
SI1	238	0	4	.98	1.248	1.144	.158	.098	.314
SI2	238	0	4	.94	1.270	1.454	.158	.935	.314
SI3	238	0	4	.67	1.072	1.679	.158	1.799	.314
EE	238	0	4	3.20	1.031	-1.524	.158	1.870	.314
EE1	238	0	4	.72	1.079	1.656	.158	1.875	.314
EE2	238	0	4	3.12	1.077	-1.403	.158	1.383	.314
EE3	238	0	4	2.42	1.344	-.602	.158	-1.003	.314
FC	238	0	4	.82	1.179	1.369	.158	.660	.314
FC1	238	0	4	.94	1.266	1.389	.158	.757	.314
FC2	238	0	4	.95	1.216	1.211	.158	.280	.314
FC3	238	0	4	1.05	1.247	1.071	.158	-.056	.314
PC	238	0	4	.92	1.279	1.201	.158	.087	.314
PC1	238	0	4	2.62	1.405	-.804	.158	-.709	.314
PC2	238	0	4	.80	1.179	1.572	.158	1.407	.314
PC3	238	0	4	.79	1.183	1.510	.158	1.136	.314
Valid N (listwise)	238								

Figure 5.6: Distribution for PENJ, SI, EE, FC and PC

5.3.3 Component Analysis

IBM SPSS was used to create a measurement model and to assess the discriminant and convergent validity of the measurement scales (Shrestha, 2021). The primary objective was to ensure that the model accurately represented the data collected and to validate the measurement scales used for the constructs within the suggested model (Shrestha, 2021).

To assess the convergent validity of the constructs, two crucial tests were conducted: construct reliability and average variance extracted (AVE) following the approach by Gliem and Gliem (2003). These tests are widely used in the context of structural equation modeling (SEM) to evaluate the measurement model's quality (Pham-Gia & Choulakian, 2014). Construct reliability gauges the internal consistency and reliability of the items representing each construct in the model (Pham-Gia & Choulakian, 2014). On the other hand, AVE measures the extent to which a construct captures variance in comparison to the variance attributed to

measurement error. It represents the average amount of shared variance among the items of a construct relative to the total variance (Pham-Gia & Choulakian, 2014).

According to the guidelines provided by Shrestha (2021), AVE values above 0.70 are considered extremely good, while values falling between 0.50 and 0.69 are regarded as good. These thresholds serve as benchmarks to evaluate the level of convergence among the items within constructs.

The results of the study, as depicted in Figures 5.6a and 5.6b, showed that all of the constructs' AVE values were greater than the minimum threshold value of 0.50. This suggests that more than half of the variation in each construct is due to the underlying construct itself, rather than being influenced by measurement error (Shrestha (2021). The higher the AVE value, the stronger the evidence for convergent validity, indicating that the items within each construct consistently measure the intended underlying concept (Shrestha (2021). Essentially, the analysis demonstrated that the proposed measurement model had good convergent validity, evidenced by AVE values surpassing the minimum threshold.

Communalities

	Initial	Extraction
AC	1.000	.571
AC1	1.000	.897
AC2	1.000	.820
AC3	1.000	.878
TeG	1.000	.806
TeG1	1.000	.810
TeG2	1.000	.861
TeG3	1.000	.862
IU	1.000	.792
IU1	1.000	.835
IU2	1.000	.811
IU3	1.000	.847
AV	1.000	.882
AV1	1.000	.875
AV2	1.000	.789
AV3	1.000	.854
PE	1.000	.858
PE1	1.000	.746
PE2	1.000	.839

Figure 5.6a: AVE Component Matrix

PE3	1.000	.850
PENJ	1.000	.768
PENJ1	1.000	.813
PENJ2	1.000	.743
PENJ3	1.000	.542
SI	1.000	.811
SI1	1.000	.722
SI2	1.000	.873
SI3	1.000	.878
EE	1.000	.726
EE1	1.000	.810
EE2	1.000	.724
EE3	1.000	.793
FC	1.000	.763
FC1	1.000	.871
FC2	1.000	.832
FC3	1.000	.767
PC	1.000	.841
PC1	1.000	.612
PC2	1.000	.770
PC3	1.000	.847

Figure 5.6b: AVE Component Matrix

5.3.4 Reliability Analysis

Cronbach's alpha was used to measure the reliability of the scales developed. According to Gliem and Gliem (2003), Cronbach's alpha is a statistical tool used frequently by researchers to demonstrate that tests and scales developed or adopted for research projects are appropriate for the purpose Gliem and Gliem (2003). Cronbach's alpha is used to assess the reliability of a new scale or questionnaire designed to test a certain construct by researchers. A high Cronbach's alpha score suggests that the scale is likely to be consistent and dependable Gliem and Gliem (2003). Cronbach's alpha can also be used to examine the internal consistency of multiple scales that measure the same construct. This comparison can assist them in determining which scale is more dependable and appropriate for their research Gliem and Gliem (2003). The use of Cronbach's alpha in this study was relevant because the study sought to determine how consistently the items in the questionnaire measure the same construct amongst other things.

It is crucial to compute and report Cronbach's alpha coefficient for internal consistency reliability for any scales or subscales used when utilising Likert-type scales (Gliem & Gliem, 2003). The data must then be analysed using summated scales or subscales rather than individual items. Otherwise, the items' reliability is, at best, likely low and, at worst unknown (Gliem & Gliem, 2003).

The study's Cronbach's Alpha reliability results (Figure 5.7) reveal that the instrument attained an excellent internal construct reliability score, with a value exceeding the suggested cut-off value of 0.70 at 0.979.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.978	.979	40

Figure 5.7: Cronbach's Alpha measurement of reliability

5.3.4 Correlation Matrix

Appendix D represents the Correlation matrix – correlation coefficients between variables related to each other. The correlation matrix assesses the strength and directionality of a linear relationship between two variables (Pham-Gia & Choulakian, 2014). A correlation coefficient

can vary from -1 to +1, with -1 being a perfect negative correlation, +1 representing a perfect positive correlation and 0 representing no connection (Pham-Gia & Choulakian, 2014); A variable that is connected with itself has a correlation coefficient of one.

The correlation coefficients along the diagonal of the table are all equal to one, indicating that each variable is perfectly correlated with itself, according to the correlation matrix shown in Appendix D.

5.3.6 Regression Estimation Results

5.3.6.1 Hypothesis 1: Performance Expectancy (PE) positively influences Behavioural Intention to use (IU)

This hypothesis investigated if there was a favourable correlation between Performance Expectancy (PE) and citizens' Behavioural Intention to use (IU) e-Government. The testing of the hypothesis found that there is indeed a positive relationship between the variables, as witnessed by the positive coefficient of 0.988, see Figure 5.10. This was also revealed by the R squared value of 70.5%, demonstrating a strong relationship between the variables. This indeed suggests that Performance Expectancy is a critical factor affecting citizens' e-Government adoption in South Africa as it had a probability value of 0.000 which is less than the required 0.05. It follows that South African citizens will be more inclined to use e-Government services if they feel they could help them satisfy their needs, if they find them superior to traditional services, if they will increase productivity and if they will save them time.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.840[a]	.705	.704	2.39574	2.108

a. Predictors: (Constant), TPE

b. Dependent Variable: TIU

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3233.956	1	3233.956	563.450	.000[b]
	Residual	1354.536	236	5.740		
	Total	4588.492	237			

a. Dependent Variable: TIU

b. Predictors: (Constant), TPE

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	-1.652	.256		-6.446	.000
	TPE	.988	.042	.840	23.737	.000

a. Dependent Variable: TIU

Figure 5.8: Hypothesis 1 Results

5.3.6.2 Hypothesis 2: Age (moderating variable) positively moderates the relationship between PE and IU

This hypothesis investigated if age positively moderates the relationship between Performance Expectancy (PE) and citizens' Behavioural Intention (IU) to use e-Government. With an R-Square value of 71%, the model demonstrated that there is a relationship between age and Performance Expectancy, see Figure 5.11. However, with a probability value of 0.464, it can be concluded that the moderating effect of age on Performance Expectancy is statistically insignificant, thus failing to support the hypothesis that age is a moderating variable for PE.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.842[a]	.710	.706	2.38665	2.141

a. Predictors: (Constant), Moderator_TPE_AGE, AGE, TPE

b. Dependent Variable: TIU

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3255.600	3	1085.200	190.516	.000[b]
	Residual	1332.891	234	5.696		
	Total	4588.492	237			

a. Dependent Variable: TIU

b. Predictors: (Constant), Moderator_TPE_AGE, AGE, TPE

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	-1.935	.717		-2.697	.007
	TPE	.907	.112	.771	8.083	.000
	AGE	.123	.252	.029	.490	.625
	Moderator_TPE_AGE	.027	.037	.080	.734	.464

a. Dependent Variable: TIU

Figure 5.9: Hypothesis 2 Results

5.3.6.3 Hypothesis 3: Effort Expectancy (EE) positively influences Behavioural Intention to use (IU)

his hypothesis aimed to explore the possible association between Effort Expectancy (EE) and citizens' Behavioural Intention (IU) to adopt e-Government services. There was a poor relationship between EE and citizens' IU, as demonstrated by a very low R squared value of 21%. However, EE positively influenced citizens' UI, as demonstrated by a positive coefficient of 0.268 and a statistically significant probability value of 0.025 (less than 0.05), see Figure 5.12. This means that although EE affects IU, it is not a critical factor. Thus, it can be said, though not crucial, South African citizens are more likely to adopt e-Government services if they are simple and easy to understand, if learning how to use e-Government services is effortless and if e-Government services are user-friendly.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.145[a]	.021	.017	4.36277	1.423

a. Predictors: (Constant), TEE

b. Dependent Variable: TIU

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	96.525	1	96.525	5.071	.025[b]
	Residual	4491.967	236	19.034		
	Total	4588.492	237			

a. Dependent Variable: TIU

b. Predictors: (Constant), TEE

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.658	1.159		.568	.570
	TEE	.268	.119	.145	2.252	.025

a. Dependent Variable: TIU

Figure 5.10: Hypothesis 3 Results

5.3.6.4 Hypothesis 4: Age (moderating variable) positively moderates the relationship between EE and IU

This hypothesis investigated if age positively moderates the relationship between Effort Expectancy (EE) and citizens' Behavioural Intention (IU) to use e-Government. With an R-Square value of 49%, the model demonstrated no relationship between Age and Effort Expectancy, see Figure 5.13. This was further proven by a significance value of 0.102 which is greater than 0.05. This, therefore, means Age is not a moderating variable for EE and there is no relationship between the independent and dependent variables.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.222[a]	.049	.037	4.31781	1.398

a. Predictors: (Constant), Moderator_TEE_AGE, TEE, AGE

b. Dependent Variable: TIU

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	225.909	3	75.303	4.039	.008[b]
	Residual	4362.583	234	18.644		
	Total	4588.492	237			

a. Dependent Variable: TIU

b. Predictors: (Constant), Moderator_TEE_AGE, TEE, AGE

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	3.242	2.972		1.091	.276
	TEE	-.182	.312	-.098	-.582	.561
	AGE	-.990	.984	-.232	-1.006	.315
	Moderator_TEE_AGE	.174	.106	.436	1.643	.102

a. Dependent Variable: TIU

Figure 5.11: Hypothesis 4 Results

5.3.6.5 Hypothesis 5: Social Impact (SI) positively influences Behavioural Intention (IU)

This hypothesis investigated if Social Impact (SI) positively influences Behavioural Intention to use (IU) e-Government. The positive coefficient of 0.941 demonstrated a strong relationship between the variables Social Impact (SI) and citizens' behavioural intentions to use (UI), see Figure 5.14. With a probability value of 0.000, the relationship between the variables was revealed to be statistically significant. This means that South African citizens are more likely to use e-Government if people in their social group who use e-Government systems are respected, people in their social group who use e-Government are regarded as having a high profile, e-Government use as a status symbol and people who matter to them believe that I should use e-Government service.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.942[a]	.888	.888	1.47394	1.790

a. Predictors: (Constant), TSI

b. Dependent Variable: TIU

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4075.784	1	4075.784	1876.091	.000[b]
	Residual	512.707	236	2.172		
	Total	4588.492	237			

a. Dependent Variable: TIU

b. Predictors: (Constant), TSI

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	-.083	.122		-.682	.496
	TSI	.941	.022	.942	43.314	.000

a. Dependent Variable: TIU

Figure 5.12: Hypothesis 5 Results

5.3.6.6 Hypothesis 6: Age (moderating variable) positively moderates the relationship between Social Impact (SI) and Behavioural Intention to use (IU)

The hypothesis examined the potential positive moderating effect of age on the relationship between Social Impact (SI) and citizens' Behavioural Intention (IU) to adopt e-Government. The test indicated a strong relationship between Social Impact and Behavioural Intention to use (IU) with an R-squared value of 89%. However, the moderating effect of Age on IU was found to be insignificant with a probability value of 0.782, as shown in Figure 5.15.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.945[a]	.893	.892	1.44780	1.829

a. Predictors: (Constant), Moderator_TSI_AGE, AGE, TSI

b. Dependent Variable: TIU

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4097.997	3	1365.999	651.676	.000[b]
	Residual	490.495	234	2.096		
	Total	4588.492	237			

a. Dependent Variable: TIU

b. Predictors: (Constant), Moderator_TSI_AGE, AGE, TSI

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.721	.348		2.074	.039
	TSI	.939	.059	.941	16.053	.000
	AGE	-.327	.131	-.077	-2.503	.013
	Moderator_TSI_AGE	.005	.020	.018	.276	.782

a. Dependent Variable: TIU

Figure 5.13: Hypothesis 6 Results

5.3.6.7 Hypothesis 7: Facilitating Conditions (FC) positively influence Behavioural Intention to use (IU)

The hypothesis aimed to explore the potential positive influence of Facilitating Conditions (FC) on citizens' Behavioural Intention to use (IU) e-Government services. The test results showed a strong and positive coefficient of 0.899, with a probability value of 0.000, indicating a significant relationship between Facilitating Conditions and citizens' Behavioural Intentions, as depicted in Figure 5.16. Moreover, the R squared value of 84% indicated that FC positively influences IU. This suggests that South African citizens are more likely to adopt e-Government services if they have the necessary resources to access them, if the services meet their needs, if they possess the required skills to use the services, and if they receive support when facing

difficulties with e-Government services.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.918[a]	.842	.842	1.75044	1.723

a. Predictors: (Constant), TFC

b. Dependent Variable: TIU

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3865.379	1	3865.379	1261.532	.000[b]
	Residual	723.113	236	3.064		
	Total	4588.492	237			

a. Dependent Variable: TIU

b. Predictors: (Constant), TFC

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	-.186	.148		-1.257	.210
	TFC	.899	.025	.918	35.518	.000

a. Dependent Variable: TIU

Figure 5.14: Hypothesis 7 Results

5.3.6.8 Hypothesis 8: Trust in E-Government (TeG) positively influences Behavioural Intention to use (IU)

This hypothesis investigated if Trust in E-Government (TeG) positively influences Behavioural Intention to use (IU) e-Government. With an R-squared value of 84.4% and the independent variable is highly significant with a probability value of 0.000 (less than 0.05), it is apparent that there is a relationship between Trust and behavioural intention, see Figure 5.17. As a result, the hypothesis that Trust has a positive influence on behavioural intention is supported. This implies that South African citizens are likely to adopt e-Government services if they perceive e-Government services to be trustworthy, believe that e-Government applications and

websites can be trusted, feel that government acts in citizens' best interest and are comfortable interacting with the government online.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.919[a]	.844	.844	1.74012	1.813

a. Predictors: (Constant), TTeG

b. Dependent Variable: TIU

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3873.876	1	3873.876	1279.338	.000[b]
	Residual	714.615	236	3.028		
	Total	4588.492	237			

a. Dependent Variable: TIU

b. Predictors: (Constant), TTeG

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	-.200	.147		-1.356	.176
	TTeG	.909	.025	.919	35.768	.000

a. Dependent Variable: TIU

Figure 5.15: Hypothesis 8 Results

5.3.6.9 Hypothesis 9: Availability (moderating variable) positively moderates the relationship between Trust in e-Government (TeG) and Behavioural Intention (IU)

This hypothesis investigated if availability positively moderates the relationship between Trust in e-Government (TeG) and citizens' Behavioural Intention (IU) to use e-Government. There is a clear indication that the variables in question had a very strong relationship between them and the R witnessed this squared value of 93%, see Figure 5.18. This implies that 93% of the changes in the dependent variable was explained by changes in the independent and moderator variable, while the rest 7% explained other factors. There is also clear evidence that

availability moderates the relationship between Trust in e-Government and citizens' behavioural intention to use; This is supported by the probability value of the moderator variable being less than 0.05, implying that the moderator variable is statistically significant.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.964[a]	.930	.929	1.16990	1.879

a. Predictors: (Constant), Moderator_TTeG_TAV, TTeG, TAV

b. Dependent Variable: TIU

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4268.226	3	1422.742	1039.518	.000[b]
	Residual	320.265	234	1.369		
	Total	4588.492	237			

a. Dependent Variable: TIU

b. Predictors: (Constant), Moderator_TTeG_TAV, TTeG, TAV

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.214	.127		1.690	.092
	TTeG	.300	.041	.303	7.274	.000
	TAV	.387	.058	.392	6.688	.000
	Moderator_TTeG_TAV	.021	.005	.298	4.477	.000

a. Dependent Variable: TIU

Figure 5.16: Hypothesis 9 Results

5.3.6.10 Hypothesis 10: Accessibility (AC) positively influences Behavioural Intention to use (IU)

This hypothesis investigated if Accessibility (AC) positively influences Behavioural Intention to use (IU) e-Government. The positive coefficient of 91% demonstrated that Accessibility positively influenced citizens' Behavioural Intention, see Figure 5.19. The R-squared value was 86.3%, demonstrating a strong relationship between the variables. Accessibility was statistically significant, with a probability value of 0.000. This, therefore, implies that South African citizens are likely to adopt e-Government services if citizens have capabilities in their

area that allow them to utilise e-Government services, there are no perceived barriers preventing access to e-Government and e-Government services are readily available when requested.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.929[a]	.863	.862	1.63300	1.829

a. Predictors: (Constant), TAC

b. Dependent Variable: TIU

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3959.153	1	3959.153	1484.671	.000[b]
	Residual	629.338	236	2.667		
	Total	4588.492	237			

a. Dependent Variable: TIU

b. Predictors: (Constant), TAC

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	-.416	.141		-2.947	.004
	TAC	.919	.024	.929	38.531	.000

a. Dependent Variable: TIU

Figure 5.17: Hypothesis 10 Results

5.3.6.11 Hypothesis 11: Availability (moderating variable) positively moderates the relationship between Accessibility (AC) and Behavioural Intention to use (IU)

This hypothesis investigated if availability positively moderates the relationship between Accessibility (AC) and citizens' Behavioural Intention (IU) to use e-Government. The model's R-squared value demonstrated a very strong relationship between the dependent, explanatory and moderator variables. The R squared value stood at 92.5% and the variables accessibility and availability were highly significant in this model, see Figure 5.20. This, therefore, implies

that availability positively moderates the relationship between Accessibility and citizens' behavioural intention. The positive coefficient of the moderator variable further supports this.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.962[a]	.925	.924	1.21221	1.831

a. Predictors: (Constant), Moderator_TAC_TAV, TAC, TAV

b. Dependent Variable: TIU

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4244.639	3	1414.880	962.859	.000[b]
	Residual	343.853	234	1.469		
	Total	4588.492	237			

a. Dependent Variable: TIU

b. Predictors: (Constant), Moderator_TAC_TAV, TAC, TAV

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.164	.138		1.193	.234
	TAC	.313	.048	.316	6.493	.000
	TAV	.373	.062	.377	6.031	.000
	Moderator_TAC_TAV	.020	.005	.292	4.171	.000

a. Dependent Variable: TIU

Figure 5.18: Hypothesis 11 Results

5.3.6.12 Hypothesis 12: Perceived Enjoyment (PENJ) positively influences Behavioural Intention to use (IU)

This hypothesis investigated if Perceived Enjoyment positively influences Behavioural Intention to use (IU) e-Government. The model demonstrated that there is a moderately strong relationship between the variable's perceived enjoyment and citizens' behavioural intention, as witnessed by the R-squared value of 66.3%, see Figure 5.21. Perceived enjoyment also positively influences citizens' behavioural intention as it had a coefficient of 1.024, while the variable was also highly statistically significant at 0.000. This implies that citizens are likely to

adopt e-Government when they perceive them as interesting, enjoy using e-Government systems in general and find e-Government systems fascinating and using them e-Government to be enjoyable.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.814[a]	.663	.662	2.55858	1.677

a. Predictors: (Constant), TPENJ

b. Dependent Variable: TIU

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3043.560	1	3043.560	464.927	.000[b]
	Residual	1544.931	236	6.546		
	Total	4588.492	237			

a. Dependent Variable: TIU

b. Predictors: (Constant), TPENJ

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-2.305	.304		-7.581	.000
	TPENJ	1.024	.047	.814	21.562	.000

a. Dependent Variable: TIU

Figure 5.19: Hypothesis 12 Results

5.3.6.13 Hypothesis 13: Perceived cost (PC) negatively influences Behavioural Intention to use (IU)

This hypothesis investigated if the Perceived cost (PC) negatively influences Behavioural Intention to use (IU) e-Government. Contrary to what was hypothesised, the test suggested a positive relationship between Perceived Cost and citizens' behavioural intention to use (IU) as evidenced by the model's coefficient value of 1.064, see Figure 5.22. At the same time, the variable was statistically significant at 0.000. Thus, perceived financial losses do not negatively impact South African citizens' adoption of e-Government.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.848[a]	.720	.718	2.33471	2.257

a. Predictors: (Constant), TPC

b. Dependent Variable: TIU

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3302.091	1	3302.091	605.794	.000[b]
	Residual	1286.400	236	5.451		
	Total	4588.492	237			

a. Dependent Variable: TIU

b. Predictors: (Constant), TPC

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-2.273	.269		-8.462	.000
	TPC	1.064	.043	.848	24.613	.000

a. Dependent Variable: TIU

Figure 5.20: Hypothesis 13 Results

6 INTERPRETATION & DISCUSSION OF FINDINGS

This study aimed to investigate the impact of eight key constructs, namely Performance Expectancy (PE), Effort Expectancy (EE), Social Impact (SI), Facilitating Conditions (FC), Trust in e-Government (TeG), Accessibility (AC), Perceived Enjoyment (PENJ), and Perceived Cost (PC), on the Behavioral Intention of South African inhabitants to adopt e-Government services. To achieve this, a Hybrid model, drawing from the TAM and UTAUT models, was developed to establish the effect of these constructs on e-Government Adoption.

A field survey involving 238 respondents was conducted to test the proposed model and address theoretical, methodological, and practical gaps in South African e-Government adoption. The data collected were analyzed using IBM SPSS, employing various descriptive and inferential statistical methods, including mean, standard deviation, mode, median, skewness, T-tests, ANOVA correlation analyses, the Average Variance Extracted (AVE) component matrix, and regression analyses.

The summarized outcomes are presented in Table 6.1, where it can be observed that Performance Expectancy (PE), Effort Expectancy (EE), Social Impact (SI), Facilitating Conditions (FC), Trust in e-Government (TeG), Accessibility (AC), and Perceived Enjoyment (PENJ) all exhibited a positive effect on citizens' behavioral intention to use e-Government services in South Africa. The hypotheses associated with these variables are indicated by 'yes' in Table 6.1, indicating their significant role in influencing citizens' adoption of e-Government.

However, it is worth noting that while Effort Expectancy does influence citizens' adoption of e-Government, it is not considered a critical factor. This is evidenced by a positive but relatively low coefficient of 14% (0.145), a critical ratio of 0.21 (less than the recommended 0.70), and a significance value of 0.025. This implies that Effort Expectancy accounts for only a modest 14% of the change in behavioral intention to adopt e-Government services in South Africa.

Table 6.1: Outcomes of Hypotheses

Hypothesis	Construct Link	Coefficient	Critical Ratio	Significance	Hypotheses Supported?
H1	PE → IU	,840	,705	,000	Yes
H2	PE → Age → IU	,080	,710	,464	No
H3	EE → IU	,145	,021	,025	No
H4	EE → Age → IU	,436	,049	,102	No

Hypothesis	Construct Link	Coefficient	Critical Ratio	Significance	Hypotheses Supported?
H5	SI → IU	,942	,888	,000	Yes
H6	SI → Age → IU	,018	,893	,782	No
H7	FC → IU	,918	,842	,000	Yes
H8	TeG → IU	,919	,844	,000	Yes
H9	TeG → AV → IU	,298	,930	,000	Yes
H10	AC → IU	,929	,863	,000	Yes
H11	AC → AV → IU	,292	,925	,000	Yes
H12	PENJ → IU	,814	,663	,000	Yes
H13	PC → IU	,848	,720	,000	No

Perceived Cost (PC) was hypothesised to have a negative effect on citizens' behavioural intention to use e-Government. However, tests found that there is a positive relationship between the two variables. This suggests that perceived costs of using e-Government do not disenfranchise e-Government use as citizens would choose convenience over costs.

The moderating effect of Age on Performance Expectancy, Effort Expectancy and Social Impact was insignificant, disputing the hypothesis that age has any impact on these variables. Conversely, the moderating effect of Availability on Trust in e-Government and Accessibility was found to be strong, with positive coefficients and statically significant values.

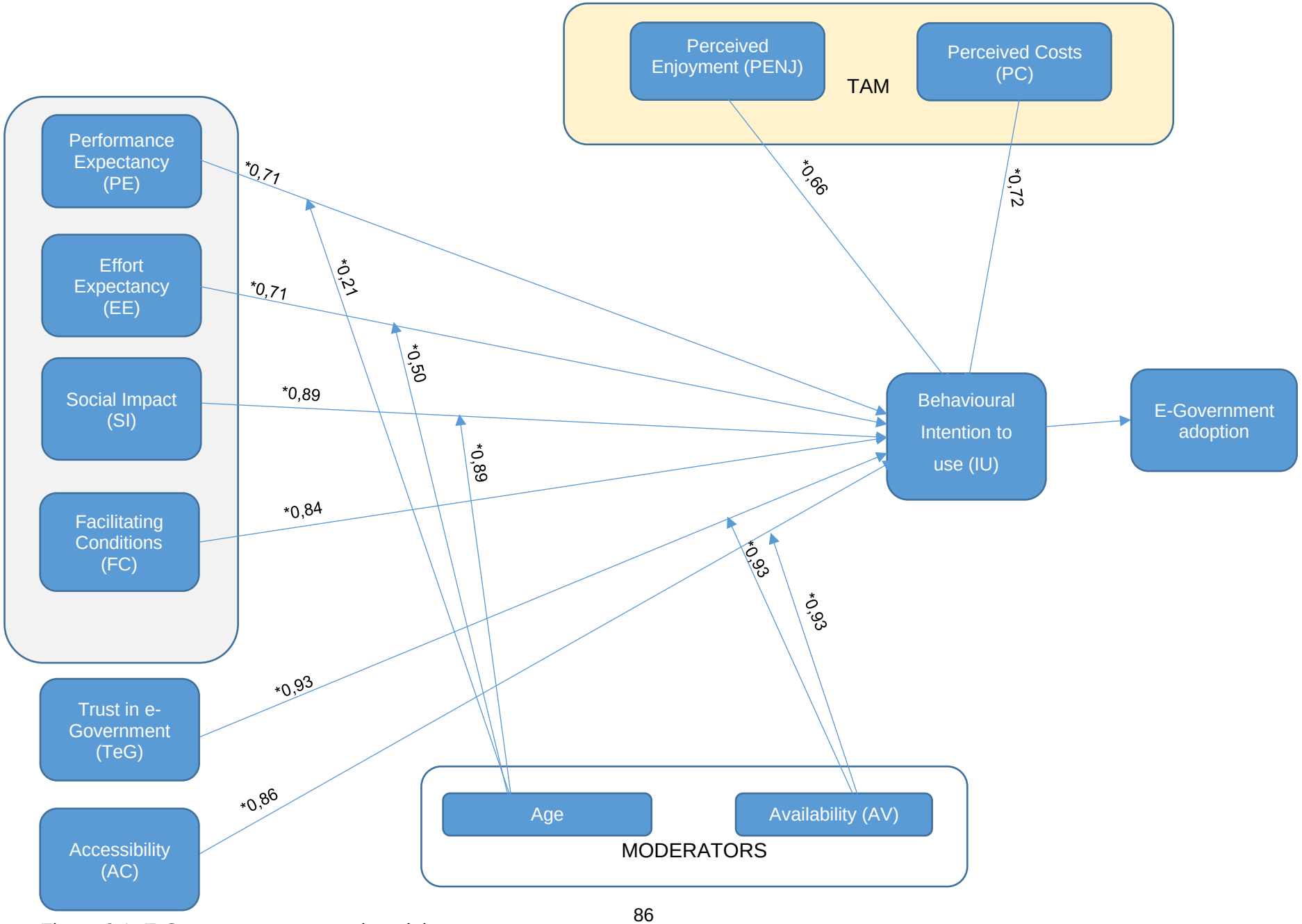

Figure 6.1: E-Government structural model

*=p<0.01,**p<0.05

6.1 Hypothesis 1

Hypothesis 1 intended to evaluate whether Performance Expectancy positively influenced South African citizens' behavioural intention to use e-Government. Previous research indicated that one of the most effective predictors of technology adoption is Performance Expectancy, which is the degree to which a user believes that using a certain e-Government service would help them achieve their intended goals (Chen et al., 2014; Nwankpa & Roumani, 2016; Utomo et al., 2021a; Venkatesh et al., 2012).

Other related studies showed that citizens' adoption of e-Government is dependent on certain performance expectations (Alraja et al., 2016); concluding that citizens are more likely to adopt e-Government if they have good expectations about the aforementioned impacts (Alraja et al., 2016).

Citizens' performance expectations for e-government can be affected by a variety of factors, such as users' past digital technology use, their degree of confidence in the government and how valuable they believe the particular e-Government service to be (Alraja et al., 2016; Venkatesh et al., 2003; Weerakkody et al., 2013). People who have used digital technology successfully in other aspects of their lives may have higher expectations for how well e-Government services would function; Similar to this, people are more likely to have higher expectations of a government's performance if they believe in it and find a particular e-Government service to be helpful (Alraja et al., 2016; Al-Shafi & Weerakkody, 2010; Venkatesh et al., 2003).

The outcomes of this study's data analysis strongly support Hypothesis 1 and the conclusions of past research, demonstrating that Performance Expectancy is a critical factor affecting citizen’s behavioural intention to use e-Government in South Africa. This is supported by a positive coefficient of 0,840, a critical ratio of 0,705 and a statistical significance value of 0,000, as shown in table 6.1. These findings are consistent with findings by Lallmahomed et al. (2017), Rodrigues et al. (2016) and Verkijika & De Wet (2018), who all concluded that Performance Expectancy is a critical factor in e-government adoption.

These finding suggest that to satisfy citizens' performance expectations, e-Government services must be dependable and simple to use while keeping in mind the user experience in order to satisfy citizens' Performance Expectations (Alraja et al., 2016; Chen et al., 2014; Utomo et al., 2021a). E-Government services further need to be a considerable improvement

over conventional means of receiving government services, such as in-person meetings, paper-based procedures, or phone conversations (Lew et al., 2018). E-government services may boost adoption rates, boost citizen satisfaction and eventually boost the efficacy and efficiency of government services by fulfilling people' Performance Expectations.

6.2 Hypothesis 2

Hypothesis 2 intended to evaluate whether Age (the moderating variable) positively moderates the the association between Performance Expectancy and the intention to use e-Government services.

In a study by Venkatesh et al. (2003), it was concluded that age is a crucial demographic component that impacts and moderates behavioural intents to use, embrace and accept technology. According to Kumar and Benbasat (2006) and Lin et al. (2021), age has great explanatory power of adoption models. Younger users, in contrast to older users, are less likely to experience acceptability issues and age is a key moderator in the UTAUT model, according to Venkatesh et al. (2003).

Other research has established that the correlation between age, Performance Expectancy, and the intention to use e-Government services is likely to be nuanced and multidimensional, as additional variables such as previous exposure, digital literacy, technological attitudes and the nature of the e-Government services themselves may all influence users' proclivity to use these services (Datta et al., 2005; Eberhagen & Naseroladl, 1992; Tripathi, 2018; Venkatesh et al., 2012).

The findings of the data analysis in this study do not provide support for Hypothesis 2, suggesting that age is not a moderating variable in the relationship between Performance Expectancy and the behavioural intention to use e-Government services among South African citizens. As shown in Table 6.1, this is corroborated by a positive but low coefficient of 0.080, a critical ratio of 0.710, and a statistically significant value of 0.464.

These findings suggest that although there is moderation between Performance Expectancy and behavioural intention to use e-Government, the moderation effect is insignificant, represented by a statistical significance value above 0,05. Essentially, the outcomes of this study support the notion that behavioural intention to use e-Government services is likely to be nuanced and multidimensional.

The explanation behind these results could be the fact that majority of the responses received in this study are between ages 25-34 and 35-44 years, making up 70% of the total responses. According to Otieno (2019), although the two age groups constitute a mix of two generations, there are far greater similarities caused by shared experiences. This could be a driver of similar adoption tendencies between the age groups.

6.3 Hypothesis 3

Hypothesis 3 intended to evaluate whether Effort Expectancy positively influenced South African citizens' behavioural intention to use e-Government. According to studies reviewed in this paper, Effort Expectancy, which is the amount of effort needed to use a technology, was found to be a significant predictor of e-Government adoption (Lin et al., 2021; Venkatesh et al., 2003). Several other research revealed that citizens' e-Government attitudes and interactions were connected to prior interactions (Bwalya, 2009; Bwalya & Healy, 2010).

The outcomes of this study's data analysis invalidate Hypothesis 3 as evidenced by a positive but low coefficient of 14% (0,145), a critical ratio of 0,21, which is less than the recommended 0,70 and a significance value of 0,025 in Table 6.1. These results suggest that while there is a relationship between Effort Expectancy and behavioural intention to use e-Government, Effort Expectancy is not a critical factor affecting citizen’s adoption of e-Government in South Africa. Effort Expectancy accounts for only 14% of the change in behavioural intention to use e-Government. According to Manamela (2021), these outcomes could be attributed to poor service delivery in the South African public sector.

In studies looking at the South African public sector enterprises, it was concluded that State-owned enterprises (SOEs) are essential instruments that assist governments accomplish economic growth and service delivery while also lowering a country's tax burden (Fourie, 2021; Manamela, 2021). SOEs are said to be critical to the expansion of the South African economy and the development of the country's important sectors, including energy, transport, telecommunications and manufacturing (Fourie, 2021; Manamela, 2021).

However, due to shortcomings in the public sector caused by a variety of factors and further exacerbated by political influences, potential of South African SOEs is not realised, leading to poor and inconsistent service delivery to the citizens (Manamela, 2021). A study by van Antwerpen & Ferreira (2016) concluded that public sector employees lack the practical skills

such a as typing and keyboard abilities and further emphasised that if the problem is not addressed, poor service delivery will almost certainly persist, resulting in cost hikes, increased community discontent and a drop in foreign investment (van Antwerpen & Ferreira, 2016).

In light of this, conclusions may be drawn from these data; the results may point to the fact that South African citizens would rather deal with sophisticated e-Government services than receive subpar services at various public sector walk-ins (van Antwerpen & Ferreira, 2016).

6.4 Hypothesis 4

Hypothesis 4 intended to evaluate whether Age (the moderating variable) positively moderates the relationship between Effort Expectancy and behavioural intention to use e-Government services (Datta et al., 2005; Eberhagen & Naseroladl, 1992; Tripathi, 2018; Venkatesh et al., 2012).

Several studies have zoned-in on the moderating effect of age on Effort Expectancy and e-Government adoption (Lin et al., 2021; Rokhman, 2011; Venkatesh et al., 2012). According to prior research reviewed in this paper, older users lag behind younger users when it comes to adapting to changing technology which can be attributed to things like cognitive skills that fade with age, a lack of time required to adapt and so on (Lin et al., 2021; Rokhman, 2011; Venkatesh et al., 2012). However, as shown in section 6.3, the moderation effect of age on Performance Expectancy and behavioural intention to use e-Government is insignificant, owing to the fact that e-Government adoption is nuanced and multidimensional and that the majority of the responses received in this study (25-34 and 35-44 years) share similarities that could drive similar adoption tendencies between the age groups.

The outcomes of this study's data analysis invalidate Hypothesis 4, meaning that age is not a moderator of the relationship between Effort Expectancy and behavioural intention to use e-Government services. As shown in table 6.1, this is evidenced by a positive but low coefficient of 0,436, a critical ratio of 0,049 and a statistical significance value of 0,102.

The results suggest that while e-Government services vary in the experiences they offer, as Tripathi (2018) points out, they are typically made to be easy to use regardless of age (Gefen & Straub, 2000; Ofori-Dwumfuo & Paatey, 2011; Van de Walle et al., 2018). This is consistent with findings by Hyytinen et al. (2022), who emphasized that e-Government services are

intended to be user-friendly, accessible and intuitive, with minimal effort necessary for all age groups.

Furthermore, despite potential impediments associated with age-related declines in cognitive and physical skills, older people are more likely to require e-Government services (Liang et al., 2017; Shambare, 2020; Tripathi, 2018). This might be because older people anticipate to have more responsibilities, such as requiring e-Government services for household accounts, tax filing services and more, making them more accustomed with and trusting of digital devices and services (Datta et al., 2005; Heerink et al., 2008; Hsieh, 2005). As a result, while age may influence the relationship between other technology adoption factors and technological intentions, it is not a moderator for critical factors affecting e-Government adoption in South Africa.

6.5 Hypothesis 5

Hypothesis 5 intended to evaluate whether Social Impact positively influences citizen's behavioural intention to use e-Government. Social impact measures how strongly users believe that other people in their circle (such as friends and family) think they should use a technology (Rana & Dwivedi, 2015; Venkatesh et al., 2012; Zhao et al., 2019). According to prior studies reviewed in this research paper, people are more affected by their close friends and family members when selecting whether or not to embrace a technology (Lin et al., 2021). Additionally, citizens may be more likely to use e-Government services if they believe that e-Government projects are improving society (Bwalya & Healy, 2010; UN E-Government Survey, 2020).

In general, social impact and social influence can both have a significant impact on how individuals perceive and intend to use e-government services (Bwalya, 2009; Manamela, 2021; Mathe, 2022; Mawela et al., 2017). Governments may boost e-Government service acceptance rates and enhance their general efficacy in serving residents by comprehending and using these aspects (Blom & Uwizeyimana, 2020; Naidoo, 2012).

The results of the data analysis performed in this study significantly support Hypothesis 5, which contends that Social Impact is a critical factor affecting behavioural intention to use e-Government. As shown in table 6.1, this is supported by a positive coefficient of 0,942, a critical ratio of 0,888 and a statistical significance value of 0,000.

Governments should engage in a range of measures targeted at boosting public image and enhancing positive feelings about e-Government use to leverage these characteristics and raise adoption rates of e-Government services and improve their efficacy in providing services to citizens (Bwalya & Healy, 2010; UN E-Government Survey, 2020).

These include efforts with a positive social impact to boost citizens' trust in the government and its capacity to deliver services successfully (Hyytinen et al., 2022; van Antwerpen & Ferreira, 2016). Governments could further improve direct attempts to increase access to government services and information, particularly for individuals who may experience impediments to regular government services (Gefen & Straub, 2000; Witarsyah et al., 2017). Improved comfort and efficiency in accessing government services and finally, efforts that can boost citizen engagement in government decision-making processes by decreasing the need to physically visit government offices or fill out paperwork (Al-Shafi & Weerakkody, 2010; Papadopoulou et al., 2010; Venkatesh et al., 2012; Zhao et al., 2019).

6.6 Hypothesis 6

Hypothesis 6 intended to evaluate whether Age (the moderating variable) positively moderates the relationship between Social Impact and behavioural intention to use e-Government services (Datta et al., 2005; Eberhagen & Naseroladl, 1992; Tripathi, 2018; Venkatesh et al., 2012). Similar to hypotheses 2 and 4 (sections 6.2 and section 6.4), the results of the data analysis in this study, do not support the hypothesis that age positively moderates the relationship between Social Impact and behavioural intention to use e-Government. This is shown in table 6.1. The positive coefficient of this relationship is 0,018, the critical ratio is 0,893 and the statistical significance value is 0,782, which is above the required 0,05.

These findings suggest that, while there is a positive association between Age, Social Impact and behavioural intention to use e-Government, Age does not significantly influence or change the relationship between these two factors. In other words, regardless of age, the positive influence of Social Impact on individuals' behavioural intention to use e-Government services is consistent.

This suggests that, regardless of age, Social Impact influences all citizens' behavioural intentions to use e-Government services in South Africa. The rationale could be that because the South African government has a monopoly on e-Government services and related initiatives are steadily gaining popularity, individuals of all ages are compelled to use these

services; consequently, the positive impact of Social Impact on behavioural intention is likely to be consistent across all age groups (Abdullah & Kalianan, 2009; Nkwe, 2012; Rana & Dwivedi, 2015).

6.7 Hypothesis 7

Hypothesis 7 intended to evaluate whether Facilitating Conditions positively influenced South African citizens' behavioural intention to use e-Government services. Facilitating Conditions refer to the means and support available to individuals to accomplish an activity (Utomo et al., 2021b; Venkatesh et al., 2003; Weerakkody et al., 2013). Access to technology, training and support and the availability of information and resources are examples of facilitating conditions in the context of e-Government adoption (Utomo et al., 2021b).

Prior research reviewed in this research paper found that when people have access to the necessary information and support, they are more likely to regard e-Government as simplistic and convenient (Utomo et al., 2021b; Venkatesh et al., 2003). This, in turn, can boost their motivation to use e-Government services, leading to actual adoption (Utomo et al., 2021b).

The outcomes of the data analysis conducted in this study significantly support Hypothesis 7, indicating that Facilitating Conditions are a critical factor influencing citizen's behavioural intention to use e-Government in South Africa. As shown in table 6.1, this is confirmed by a positive coefficient of 0,918, a critical ratio of 0,842 and a statistical significance value of 0,000. This suggests that Facilitating Conditions can account for 92% of the change in behavioural intention to use e-Government.

This suggests that governments and organizations should invest in providing South African citizens with the resources and assistance they need to use e-Government services (Mkwizu & Sichone, 2019; Mohammed & Hakizimana, 2019; Van de Walle et al., 2018). These might include measures like providing free training programs, ensuring access to technology and stable internet and enhancing the user experience of e-government platforms, among others (Utomo et al., 2021b).

6.8 Hypothesis 8

Hypothesis 8 intended to evaluate whether Trust in e-Government positively influences citizen's behavioural intention to use e-Government services. Trust in e-Government refers to

the degree to which individuals think the government will preserve their privacy and security, deliver trustworthy and accurate information and provide efficient and effective services through digital channels (Akkaya et al., 2011; Benazić et al., 2015; Carter & Bélanger, 2005; Papadopoulou et al., 2010)

Previous research that cantered on the influence of trust on e-Government indicated that trust is a critical factor influencing citizen adoption of e-Government (Carter & Bélanger, 2005; Nirmawan & Astiwardhani, 2021).

Citizens who trust e-Government are more likely to see e-government services as safe, dependable and user-friendly, increasing their incentive to use these services (Benazić et al., 2015; Munyoka & Maharaj, 2019). Trust in e-Government may also generate good views about government, positively influencing Social Impact and increasing individuals' willingness to use e-Government services (Akkaya et al., 2011; Khan et al., 2020).

The outcomes of the data analysis conducted in this study significantly support Hypothesis 8, indicating that Trust in e-Government positively influences the citizen's behavioural intention to use e-Government. As shown in table 6.1, this is confirmed by a positive coefficient of 0,919, a critical ratio of 0,919 and a statistical significance value of 0,000. This suggests that Trust in e-Government accounts for 92% of the change in behavioural intention to use e-Government.

Building and maintaining citizens' trust in e-Government is critical to encouraging their use and adoption of e-Government services (Munyoka & Maharaj, 2019). Governments should foster confidence in e-Government by providing clear and dependable information, adopting strong security measures and assuring accountability and timeliness in service delivery (Carter & Bélanger, 2005; Khan et al., 2020; Nirmawan & Astiwardhani, 2021). By doing so, they may boost citizens' trust in e-Government and promote their use of e-Government services, resulting in enhanced efficiency, convenience and accessibility of government services (Akkaya et al., 2011; Colesca, 2009; Khan et al., 2020).

6.9 Hypothesis 9

Hypothesis 9 intended to evaluate whether Availability (the moderating variable) positively moderates the relationship between Trust and Behavioural Intention to use e-Government services. Availability refers to how easily citizens may obtain government services through digital means (Esegine Diejomaoh et al., 2015; Munyoka & Manzira, 2014; UN E-Government

Survey, 2020). Infrastructure, technology and finance may all have an impact on availability (UN E-Government Survey, 2020).

Previous research on the moderating effect of technology availability on the relationship between user attributes and IS success for e-Government implementation found a significant relationship between user attributes and IS success, as well as evidence that technology availability does moderate the relationship between user attributes and IS success (Esegine Diejomaoh et al., 2015; Mkwizu & Sichone, 2019).

The outcomes of the data analysis conducted in this study significantly support Hypothesis 9, indicating that Availability positively moderates the relationship between Trust and behavioural intention to use e-Government services. As shown in table 6.1, this is confirmed by a positive coefficient of 0,298, a critical ratio of 0,930 and a statistical significance value of 0,000.

When individuals have easy access to e-Government services, it increases their perceived ease of use and convenience, which can impact their willingness to use these services (Gefen & Straub, 2000; Ramayah & Ignatius, 2005). Furthermore, when individuals trust e-Government and view e-government services to be trustworthy and safe, the constant availability of e-Government services can reinforce this impression, increasing their willingness to use these services (Colesca, 2009; Esegine Diejomaoh et al., 2015; Gefen & Straub, 2000; Khan et al., 2020).

Governments should promote availability by investing in infrastructure, offering numerous channels for service delivery and ensuring citizens have access to the appropriate technology and resources (Esegine Diejomaoh et al., 2015; Shambare, 2020; Toader et al., 2018). They can do so by increasing the accessibility and convenience of e-Government services, reaffirming citizens' faith in e-Government and encouraging the adoption and use of e-Government services (Esegine Diejomaoh et al., 2015; Shambare, 2020; Toader et al., 2018).

6.10 Hypothesis 10

Hypothesis 10 intended to evaluate whether Accessibility positively influences the citizen’s behavioural intention to use e-Government. Accessibility refers to easy and convenient access to technology and infrastructure that allows citizens to use e-Government services (Agangiba & Kabanda, 2016; Leist & Smith, 2014). Accessibility further extends to the degree to which

people with disabilities, restricted technical access, or limited internet connection may access and use government services that are available online (Mthembu, 2018).

The UN E-Government Survey (2020) identified accessibility and cost as important factors in the adoption of e-Government by citizens, particularly in developing countries. Several studies on the barriers to e-commerce adoption in African countries revealed that access to and the cost of using the Internet are significant impediments to e-commerce adoption in developing countries (Mthembu, 2018).

The outcomes of the data analysis conducted in this study significantly support Hypothesis 10, indicating that Accessibility positively influences the citizen's behavioural intention to use e-Government. As shown in table 6.1, this is confirmed by a positive coefficient of 0,929, a critical ratio of 0,863 and a statistical significance value of 0,000. This suggests that Accessibility accounts for 93% of the change in behavioural intention to use e-Government.

Governments should improve accessibility by ensuring consistent e-Government accessibility across devices, providing alternative formats (ensuring that e-Government services are made available in alternative formats, such as text-to-speech, large print, or braille, to accommodate individuals with visual or hearing impairments), allowing compatibility with assistive technology (services designed to be compatible with various technologies) and allowing for accessibility (have simple and intuitive interfaces that are easy to navigate, especially for individuals with limited technology skills) (Alghamdi & Beloff, 2014; Leist & Smith, 2014).

6.11 Hypothesis 11

Hypothesis 11 intended to evaluate whether Availability (the moderating variable) positively moderates the relationship between Accessibility and behavioural intention to use e-Government services. As stated in section 6.9, Availability refers to the ease with which individuals can receive government services through digital methods (Esegine Diejomaoh et al., 2015; Munyoka & Manzira, 2014; UN E-Government Survey, 2020).

Previous research reviewed in this research report found that Availability positively moderates the relationship between Accessibility and behavioural intention to use e-Government, implying that as e-Government services become more available and accessible to users, the relationship between Accessibility and behavioural intention strengthens (Agangiba & Kabanda, 2016; Esegine Diejomaoh et al., 2015; Leist & Smith, 2014; UN E-Government

Survey, 2020). Individuals are more likely to have a higher intention to use e-government services when those services are more easily accessible to them.

The outcomes of the data analysis conducted in this study significantly support Hypothesis 10, indicating that Accessibility positively influences citizen's behavioural intention to use e-Government services. As shown in table 6.1, this is confirmed by a positive coefficient of 0,292, a critical ratio of 0,925 and a statistical significance value of 0,000.

As with conclusions in section 6.9, governments can promote Availability by making infrastructure investments, offering several channels for service delivery and ensuring citizens have access to the necessary technology and resources (Esegine Diejomaoh et al., 2015; Shambare, 2020; Toader et al., 2018).

6.12 Hypothesis 12

Hypothesis 12 intended to evaluate whether Perceived Enjoyment positively influences the citizen's behavioural intention to use e-Government. Perceived Enjoyment refers to the degree to which an individual anticipates using e-Government services to be an enjoyable and delightful experience (Balog & Pribeanu, 2010; Heerink et al., 2008; Ramayah & Ignatius, 2005).

According to Heerink et al. (2008), Perceived Enjoyment is a powerful predictor of technology use and further concluded that Perceived Enjoyment has a greater impact than perceived usefulness. Several other studies found that perceived enjoyment (PENJ) and perceived cost (PC) have an impact on technology use (Al-Shafi & Weerakkody, 2010; Colesca, 2009; Weerakkody et al., 2013; Witarsyah et al., 2017).

The outcomes of the data analysis conducted in this study significantly support Hypothesis 12, indicating that Perceived Enjoyment positively influences the citizen's behavioural intention to use e-Government services. As shown in table 6.1, this is confirmed by a positive coefficient of 0,814, a critical ratio of 0,663 and a statistical significance value of 0.000.

As a result, it is critical that e-Government services be designed in a way that makes them enjoyable and simple to use. This can improve individuals' perceived satisfaction of utilizing the services and, as a result, their behavioural intention to use them (Balog & Pribeanu, 2010; Colesca & Liliana, 2008; Ramayah & Ignatius, 2005).

6.13 Hypothesis 13

Hypothesis 13 intended to evaluate whether Perceived Costs negatively influence the citizen's behavioural intention to use e-Government. Perceived costs are the perceived effort, time and monetary costs associated with using of e-Government services. These costs might include the time it takes to learn how to use the services, the time it takes to conduct transactions and the financial expenses of utilizing the services (Al-Shafi & Weerakkody, 2010; Weerakkody et al., 2013).

Several studies concluded that if individuals believe that the costs of using e-Government services are high, they are less likely to have a good attitude about using those services, which affects their desire to use them (Al-Shafi & Weerakkody, 2010; Weerakkody et al., 2013).

The outcomes of the data analysis conducted in this study do not support Hypothesis 13, indicating that Perceived Cost positively influences the citizen's behavioural intention to use e-Government services. As shown in table 6.1, this is confirmed by a positive coefficient of 0,848, a critical ratio of 0,720 and a statistical significance value of 0,000.

In contrast to prior research, the findings of this study indicate that South African citizens are prepared to pay the price of accessing e-Government services if they believe the costs are less than those incurred from the use of traditional service delivery channels such as walk-ins.

6.14 Summary

The behavioural intentions of South African citizens to use e-Government were empirically investigated using a Hybrid TAM-UTAUT model with eight constructs and two moderators. Prior research with similar objectives were used to construct the proposed model.

A link to the survey questionnaire, which had 44 questions, was distributed to participants via social media platforms using SurveyMonkey, an online survey tool for generating, delivering and analysing surveys. Participants had to respond to demographic questions and were asked to indicate whether they strongly agreed or disagreed with questions meant to elicit their perspectives on using e-Government on a 5-point Likert scale. As a result, 13 hypotheses were constructed to address the research question.

The overall response rate to the study instrument was 95%. This rate is regarded excellent and acceptable because it ranges from 5% to 95% (Oates, 2006). The instrument was validated before and after data collection for content and construct validity. The proposed constructs of the selected model were tested to determine if they strongly interpreted South African citizens' intention to adopt e-Government.

The strongest association was found between Perceived Enjoyment and behavioural intention to use e-government (1,024). Whilst Performance Expectancy was the second highest predictor of behavioural intent to use e-government (0,988) and Social Impact being third (0,941). The moderating effects of Age with other constructs accounted for the poorest correlations with behavioural intention to use e-Government.

Perceived Enjoyment, Performance Expectancy, Social Impact, Accessibility, Trust In E-Government and Facilitating Conditions were all found to be critical factors affecting South African citizen’s adoption of e-Government. This study also shows that these factors do not merely reflect the relationship between the variables, but they also have a significant positive influence on the intention to adopt e-Government, represented by statistical significance values below 0,05. Effort Expectancy is not be a critical factor affecting adoption in South Africa as shown in table 6.1. Governments can increase the adoption of e-government services and improve their efficacy in providing services to citizens by promoting these factors.

7 CONCLUSION

7.1 Study Results

The study's results suggest that there are six critical factors affecting the adoption of e-Government services in South Africa. It is therefore critical for the South African government and government agencies to develop ways to enhance these factors in order to boost e-Government adoption (Figure 7.1).



Figure 7.1: Critical factors in South Africa

To enhance the identified factors influencing citizens' adoption of e-Government services, several practical approaches can be implemented to maximize their effectiveness and appeal:

Enhancing Service Practicality: Government organizations should focus on improving the user-friendliness and practicality of services offered on e-Government platforms. By conducting usability tests and gathering feedback from users, potential barriers and complexities can be identified and addressed, leading to smoother and more efficient service delivery. This way, residents can derive maximum benefit from using e-Government services.

Public Advertisements and Awareness Campaigns: Government agencies can launch public awareness campaigns highlighting the advantages and convenience of utilizing e-Government

websites and services. These advertisements can showcase real-life scenarios where e-Government has made a positive impact on citizens' lives, encouraging more individuals to adopt and explore these digital platforms.

Social Outreach Programs: Implementing social outreach programs can create a positive perception of e-Government services. Leveraging the power of social influence, government organizations can encourage their personnel to advocate e-Government services within their close networks, including family members, friends, and co-workers. Positive experiences shared by trusted individuals can influence others to embrace e-Government services, gradually building a critical mass of adopters.

Engaging Social Media: Social media platforms present an excellent opportunity to promote e-Government services and reach a broader audience. Government agencies can leverage the power of social media to share success stories, user testimonials, and educational content about the benefits of using e-Government services. Engaging content and interactive campaigns can spark interest and encourage citizens to explore and utilize these digital platforms.

Training and Support: To address potential barriers faced by certain segments of the population in accessing e-Government services, governments should offer training and support programs. Workshops, online tutorials, and assistance centers can be established to help individuals navigate the digital landscape and make the most of available services.

Continuous Evaluation and Feedback: Regular evaluation of the impact and effectiveness of e-Government initiatives is crucial. Gathering feedback from users and analyzing usage patterns can provide valuable insights for further improvement and refinement of services.

Digital Inclusion Efforts: Ensuring digital inclusion is essential to cater to citizens who may face limitations in accessing e-Government services due to factors like age, income, or disability. Governments should consider developing accessible interfaces and offering alternative channels to accommodate diverse user needs.

By implementing these practical strategies, governments can create a more conducive environment for e-Government adoption, fostering positive attitudes among citizens and promoting the seamless integration of digital technology in public services. Ultimately, these efforts can lead to a more efficient, transparent, and citizen-centric government-citizen relationship.

7.2 Recommendations

Based on the outcomes of this study, the following recommendations are proposed to the South African government and related departments:

Critical Factor(s): Performance Expectancy, Accessibility

- E-Government services should be developed with citizens' needs in mind. This entails creating services that are simple to use, accessible and available on numerous platforms with simple designs and layouts.
- South African citizens should be taught how to use e-Government services. This can be achieved through training & education campaigns.
- E-Government services should be available to citizens who speak a variety of languages, use a variety of devices and are spread across the country.
- E-Government services should be compatible with other government systems and services. This can aid in the reduction of duplication and the streamlining of processes for citizens.
- E-Government services should be inclusive and accessible to all people, including those with impairments. Governments should guarantee that their services meet accessibility criteria and accommodate those who require them.
- The cost of using e-Government should be lower than the cost of other alternatives.

Critical Factor(s): Trust in e-Government Services

- E-Government services should be secure and preserve the privacy of citizens. To protect data, strong security mechanisms such as encryption and authentication should be employed.
- Government should ensure that the data on e-Government platforms is accurate, current and relevant to the needs of the citizens. This may be accomplished by including stakeholders in the creation and evaluation of e-Government services and by regularly allowing citizens to submit feedback on the level of the services.

Critical Factors: Perceived Enjoyment

- Governments should constantly monitor and assess the efficiency of e-Government services. Tracking usage, user happiness and finding areas for improvement. This data

may be utilized to make educated decisions about future e-Government growth and investment.

Critical Factors: Social Impact, Facilitating Conditions

- Governments should be willing to experiment with new technologies in order to improve e-Government services. Artificial intelligence, blockchain and the Internet of Things are examples of such technology. They should, however, examine the possible hazards and put adequate precautions in place.
- E-Government initiatives should be created with input from stakeholders such as people, corporations and civil society groups. Early involvement of stakeholders can help to guarantee that e-government services suit their demands.
- Government should make sure that support is provided to citizens for their e-Government needs.

Governments may enhance acceptance and usage of e-government services by complying with these recommendations, enhancing citizen participation and satisfaction.

7.3 Areas for Future Research

Future research in South Africa on e-Government can cover the following:

- Further study on the behaviour and experiences of citizens using different e-Government services. This might involve researching how users engage with various forms of e-Government services (e.g., e-Voting, e-Natis, e-Filing), what variables impact their decision to use or not use these services and how to enhance user experience.
- Factors such as socioeconomic position, age, education level and geographic location can all impact e-Government adoption. Future study might investigate the digital inclusion and equality challenges associated with e-Government adoption and offer solutions.
- As e-government services evolve, it is necessary to investigate how new technologies and innovations may be incorporated into these services. Future study can look into the benefits and drawbacks of incorporating future technologies like artificial intelligence, blockchain and the Internet of Things into e-Government services.

- Various nations have varying degrees of e-Government adoption and cross-cultural comparison is required to understand the elements that drive e-Government adoption in various contexts. Examining the influence of cultural elements, political considerations and legal frameworks on e-Government adoption is one example.
- Because e-Government services include the gathering and management of sensitive personal data, it is necessary to investigate how cybersecurity and privacy issues affect e-Government adoption. Future study can look into the possible hazards and advantages of e-Government services, as well as solutions for risk mitigation and privacy protection.
- Policy and governance frameworks at the local, national and international levels impact e-Government adoption. Future study might look at the influence of policy and governance structures on e-government adoption, as well as ways for improving the policy and governance frameworks that enable e-government services.

7.4 Limitations

Like any study, research on e-Government adoption may have limitations that can impact the validity and generalizability of the findings. This study had some limitations.

Firstly, because this relied on voluntary participation, self-selection bias may have occurred. This indicates that people who are more likely to use e-Government services are likely to be overrepresented in the study's sample, while those who are less likely to use these services are likely to be underrepresented.

Though this study did not focus on specific services or geographic locations, the study did not account for the entire breadth of e-Government services and adoption patterns across various groups.

Due to time constraints, this study used cross sectional sampling approach. More longitudinal research are needed to investigate e-Government adoption over time. Longitudinal studies can discover factors that impact changes in adoption patterns over time and record changes in adoption trends.

The study further only focused on South African citizens; however, non-South African citizens may also require e-Government services for different things.

There are many other e-Government adoption models that could result in similar or different outcomes from this study. This study only looked into one model for investigation.

7.5 Study Conclusion

This study aimed to investigate the factors influencing citizens' adoption of e-Government services in South Africa. To gather data, an online survey was conducted, and questionnaires were distributed using convenience and snowball sampling methods through various social media platforms. The response rate was substantial, with 238 responses collected, representing a 95% response rate.

The collected data underwent a thorough analysis using Structural Equation Modeling (SEM). The study's findings indicated that six key factors play a crucial role in influencing citizen's adoption of e-Government in South Africa. These factors were identified as follows: Perceived Enjoyment, Performance Expectancy, Social Impact, Accessibility, Trust in E-Government, and Facilitating Conditions.

Based on the research outcomes, the study concludes that e-Government practices hold significant potential for enhancing the government's interactions with its citizens. Embracing e-Government can lead to improved delivery of public services and administrative procedures, as well as foster connections with the external world.

To fully harness the benefits of e-Government services, it is essential for the South African government to develop and execute e-Government initiatives in an equitable and accessible manner, catering to the diverse requirements of all citizens. Achieving this goal necessitates active involvement and collaboration with communities and stakeholders during the design and implementation of e-Government services.

Furthermore, the study emphasizes the importance of providing training and support to citizens who might face barriers in accessing these services. Additionally, continuous monitoring and evaluation of the social impacts of e-Government services over time are crucial to ensure their effectiveness and address any emerging challenges.

Overall, e-Government services have the potential to enhance the quality of life for individuals while improving the functioning of the government. Through e-Government, governments can foster confidence, promote transparency, and accountability, thereby contributing to a more

engaged and participatory democracy. The study highlights the significance of governments working proactively and collaboratively to develop and deliver these services to fully realize their potential benefits. By doing so, e-Government can become a transformative tool for progress, facilitating an improved relationship between citizens and their government.

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APPENDIX A: INVITATION TO PARTICIPATE & CONSENT FORM

E-Government Adoption in South Africa

Hello, thank you for taking the time to participate in my survey.

My name is Phumelele Jumbe and I am a Master's student in Information Systems at the University of the Witwatersrand. You are invited to participate in my study looking at the Factors influencing South African citizens' adoption of e-Government services such as SARS e-Filing, e-Joburg, Natis, e-Voting and etc. Participation should take **approximately 7 minutes** to complete.

This survey will use a 5-point Likert scale questionnaire style (Strongly Agree - Strongly Disagree) and includes nine sections: Section A will ask for information about your demographics and Sections B through J will ask for your thoughts on various study-related topics.

Please note:

PARTICIPATION
Participation in this survey is entirely voluntary. You may refuse to participate in the study or leave the survey at any time without penalty.

BENEFITS & RISKS
Participating in this research study will not provide you with any direct benefits. Your responses, on the other hand, may help us learn more about South Africa's adoption of e-Government services. There are no known risks associated with participation in this study other than those faced in ordinary life.

CONFIDENTIALITY
Your privacy will be protected throughout the survey and your participation will be kept strictly confidential.

CONTACT

If you have any questions during or afterwards about this research study, feel free to contact me or my supervisor at the details listed below. If you have any concerns or complaints about the ethical procedures of this research study, you are welcome to contact the University Human Research Ethics Committee (Non-Medical) telephone +27(0) 11 717 1408, email hrecnon-medical@wits.ac.za.

Researcher: Phumelele Jumbe - 2492608@students.wits.ac.za.
Ethical clearance reference: CBUSE2023

By choosing to continue, you agree that:

· You have read the above information
· You voluntarily agree to participate
· You are 18 years of age or older

APPENDIX B: SURVEY QUESTIONNAIRE

Instructions

Answer questions as they relate to you. For most answers, check the box(es) most applicable to you or fill in the blanks.

About you

1. Your Age

(Select only one.)

- ☐17 or less
- ☐18-25
- ☐26-35
- ☐36-45
- ☐46-55
- ☐56-65
- ☐66-75
- ☐76 or more

2. Your Gender

(Select only one.)

- ☐Female
- ☐Male
- ☐Prefer not to say

3. Your employment status

(Select only one.)

- ☐Student
- ☐Unemployed
- ☐Employed
- ☐Pensioner
- ☐Other

4. Your level of education

(Select only one.)

- ☐Some high school
- ☐High School
- ☐Diploma
- ☐Bachelors and above
- ☐None of the above

About the use of e-Government (Digital government services)

Likert five-point scales

	1=strongly agree	2=agree	3=uncertain/ not applicable	4=disagree	5=strongly disagree
PERCEIVED ENJOYMENT (PENJ)					
(Balog & Pribeanu, 2010) (Khurshid et al., 2022)					
1. "E-Government systems make government services interesting (e.g., SARS e-Filing, NATIS Car and License Registration)."	☐	☐	☐	☐	☐
2. "I enjoy using e-Government systems in general."	☐	☐	☐	☐	☐
3. "In general, I find e-Government systems to be fascinating."	☐	☐	☐	☐	☐
4. "I find using e-Government to be enjoyable."	☐	☐	☐	☐	☐

	1=strongly agree	2=agree	3=uncertain/ not applicable	4=disagree	5=strongly disagree
PERCEIVED COST (PC)					
(Mensah et al., 2020)					
1. "The use of e-Government services may cause me financial losses."	☐	☐	☐	☐	☐
2. "Using e-Government is more expensive than the other government alternatives."	☐	☐	☐	☐	☐
3. "I believe that using e-Government services may have negative financial effects."	☐	☐	☐	☐	☐
4. "In general, I believe there is some financial risk connected with using e-Government services."	☐	☐	☐	☐	☐

	1=strongly agree	2=agree	3=uncertain/ not applicable	4=disagree	5=strongly disagree
PERFORMANCE EXPECTANCY (PE)					
(Khurshid et al., 2022) (Zafiropoulos et al., 2012)					
1. "I find e-Government services to be beneficial in meeting my needs."	☐	☐	☐	☐	☐
2. "E-Government services are better than traditional government services."	☐	☐	☐	☐	☐
3. "I am more productive when I use e-Government services."	☐	☐	☐	☐	☐
4. "I save time by using e-Government services."	☐	☐	☐	☐	☐

	1=strongly agree	2=agree	3=uncertain/ not applicable	4=disagree	5=strongly disagree
EFFORT EXPECTANCY (EE)					
(Zafiropoulos et al., 2012) (Kayali & Alaaraj, 2020) (Rodrigues et al., 2016)					
1. "My interaction with this e-Government service is simple and easy to comprehend."	☐	☐	☐	☐	☐
2. "I find it simple to learn how to use e-Government services."	☐	☐	☐	☐	☐
3. "I find e-Government services to be very user-friendly."	☐	☐	☐	☐	☐
4. "I find it simple to learn how to use the features of e-Government services."	☐	☐	☐	☐	☐

	1=strongly agree	2=agree	3=uncertain/ not applicable	4=disagree	5=strongly disagree
SOCIAL IMPACT (SI)					
(Zafiropoulos et al., 2012)					
1. "People in my circle who use e-Government systems have more prestige than those who do not."	☐	☐	☐	☐	☐
2. "People in my circle who use e-Government systems have a high profile."	☐	☐	☐	☐	☐
3. "Using e-Government systems is a status symbol in my community."	☐	☐	☐	☐	☐
4. "People who are important to me think that I should use e-Government services."	☐	☐	☐	☐	☐

	1=strongly agree	2=agree	3=uncertain/ not applicable	4=disagree	5=strongly disagree
FACILITATING CONDITIONS (FC)					
(Zafiropoulos et al., 2012)					
1. "I have the resources I need to access e-Government services."	☐	☐	☐	☐	☐
2. "My requirements are met by e-Government services."	☐	☐	☐	☐	☐
3. "I have the necessary skills to use e-Government services."	☐	☐	☐	☐	☐
4. "I have support with difficulties I experience with these e-Government services."	☐	☐	☐	☐	☐

	1=strongly agree	2=agree	3=uncertain/ not applicable	4=disagree	5=strongly disagree
TRUST IN E-GOVERNMENT					
(Zafiropoulos et al., 2012)					
1. "E-Government services are trustworthy."	☐	☐	☐	☐	☐
2. "E-Government systems, applications and websites can be trusted."	☐	☐	☐	☐	☐
3. "I feel that government acts in the citizens' best interest."	☐	☐	☐	☐	☐
4. "I feel comfortable interacting with the government online."	☐	☐	☐	☐	☐

	1=strongly agree	2=agree	3=uncertain/ not applicable	4=disagree	5=strongly disagree
ACCESSIBILITY					
(Komba & Ngulube, 2015) (Munyoka, 2019) (Bwalya, 2017)					
1. "I have easy access to e-Government services anytime I require them."	☐	☐	☐	☐	☐
2. "I have capabilities in my neighbourhood that allow me to use e-Government services."	☐	☐	☐	☐	☐
3. "There are no barriers preventing me from accessing e-Government services."	☐	☐	☐	☐	☐
4. "E-Government services are readily accessible whenever they are required."	☐	☐	☐	☐	☐

	1=strongly agree	2=agree	3=uncertain/ not applicable	4=disagree	5=strongly disagree
INTENTION TO USE					
(Rabaai et al., 2015) (Khurshid et al., 2022)					
1. "I would use e-Government services for my different governmental transactions."	☐	☐	☐	☐	☐
2. "Using e-Government services for handling governmental-related transactions is something I would do."	☐	☐	☐	☐	☐
3. "I would see myself using e-Government services for handling governmental-relate-dated transactions."	☐	☐	☐	☐	☐
4. "I predict I will use e-Government services in the future."	☐	☐	☐	☐	☐

	1=strongly agree	2=agree	3=uncertain/ not applicable	4=disagree	5=strongly disagree
AVAILABILITY					
(Komba & Ngulube, 2015)					
1. "The network in my area is reliable and provides a substantial up-time "	☐	☐	☐	☐	☐
2. "I have the required/necessary hardware and software components for the use of e-Government "	☐	☐	☐	☐	☐
3. "E-Government services are dependable enough for me to rely on them for required services"	☐	☐	☐	☐	☐
4. "I can access e-Government services whenever I need them "	☐	☐	☐	☐	☐

APPENDIX C: ETHICAL CLEARANCE CERTIFICATE

UNIVERSITY OF THE WITWATERSRAND JOHANNESBURG

SCHOOL OF BUSINESS SCIENCES ETHICS COMMITTEE
CONSTITUTED UNDER THE UNIVERSITY HUMAN RESEARCH ETHICS COMMITTEE (NON-MEDICAL)

CLEARANCE CERTIFICATE	**PROTOCOL NUMBER: CBUSE2023**
PROJECT TITLE	Investigating the Critical Factors Affecting Citizen's Adoption of E-Government in South Africa.
INVESTIGATOR	Phumelele Jumbe
SCHOOL/DEPARTMENT OF INVESTIGATOR	School of Business Sciences
DATE CONSIDERED	13 September 2022
DECISION OF THE COMMITTEE	Approved Unconditionally
RISK LEVEL	Low Risk
EXPIRY DATE	31 December 2024

ISSUE DATE OF CERTIFICATE 22 September 2022 **CHAIRPERSON** _____
(Neetu Ramsaroop)

cc: Supervisor: Dr Thembekile Mayayise

DECLARATION OF INVESTIGATOR

To be completed in duplicate and ONE COPY returned to the Chairperson of the School/Department ethics committee.

I fully understand the conditions under which I am are authorized to carry out the abovementioned research and I guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee.

_____ _____/_____/_____
Signature **Date**

PLEASE QUOTE THE PROTOCOL NUMBER ON ALL ENQUIRIES

APPENDIX D: CORRELATION MATRIX

Correlations

		AC	AC1	AC2	AC3	TeG	TeG1	TeG2	TeG3	IU	IU1	IU2	IU3	AV	AV1	AV2	AV3	PE	PE1	PE2	PE3
AC	Pearson Correlation	1	.585**	.591**	.542**	.632**	.614**	.613**	.573**	.563**	.585**	.552**	.554**	.566**	.523**	.506**	.557**	.585**	.245**	.604**	.599**
	Sig. (2-tailed)		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	238	238	238	238	238	238	238	238	238	238	238	238	237	238	237	238	238	238	238	238
AC1	Pearson Correlation	.585**	1	.844**	.861**	.837**	.774**	.863**	.890**	.804**	.853**	.843**	.845**	.870**	.833**	.783**	.847**	.863**	.105	.788**	.837**
	Sig. (2-tailed)	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.106	.000	.000
	N	238	238	238	238	238	238	238	238	238	238	238	238	237	238	237	238	238	238	238	238
AC2	Pearson Correlation	.591**	.844**	1	.813**	.771**	.748**	.845**	.831**	.773**	.849**	.832**	.803**	.820**	.776**	.746**	.829**	.798**	.175**	.769**	.799**
	Sig. (2-tailed)	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.007	.000	.000
	N	238	238	238	238	238	238	238	238	238	238	238	238	237	238	237	238	238	238	238	238
AC3	Pearson Correlation	.542**	.861**	.813**	1	.724**	.664**	.801**	.840**	.798**	.831**	.785**	.814**	.928**	.860**	.776**	.835**	.831**	.091	.708**	.737**
	Sig. (2-tailed)	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.162	.000	.000
	N	238	238	238	238	238	238	238	238	238	238	238	238	237	238	237	238	238	238	238	238
TeG	Pearson Correlation	.632**	.837**	.771**	.724**	1	.777**	.806**	.790**	.716**	.768**	.775**	.765**	.739**	.731**	.725**	.777**	.749**	.120	.782**	.796**
	Sig. (2-tailed)	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.065	.000	.000
	N	238	238	238	238	238	238	238	238	238	238	238	238	237	238	237	238	238	238	238	238
TeG1	Pearson Correlation	.614**	.774**	.748**	.664**	.777**	1	.810**	.725**	.688**	.716**	.740**	.719**	.678**	.671**	.671**	.743**	.716**	.086	.797**	.793**
	Sig. (2-tailed)	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.187	.000	.000
	N	238	238	238	238	238	238	238	238	238	238	238	238	237	238	237	238	238	238	238	238
TeG2	Pearson Correlation	.613**	.863**	.845**	.801**	.806**	.810**	1	.840**	.755**	.825**	.806**	.815**	.816**	.792**	.757**	.817**	.797**	.041	.819**	.817**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.525	.000	.000
	N	238	238	238	238	238	238	238	238	238	238	238	238	237	238	237	238	238	238	238	238
TeG3	Pearson Correlation	.573**	.890**	.831**	.840**	.790**	.725**	.840**	1	.799**	.899**	.823**	.836**	.827**	.800**	.786**	.837**	.857**	.137*	.783**	.816**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.034	.000	.000
	N	238	238	238	238	238	238	238	238	238	238	238	238	237	238	237	238	238	238	238	238
IU	Pearson Correlation	.563**	.804**	.773**	.798**	.716**	.688**	.755**	.799**	1	.786**	.751**	.779**	.795**	.806**	.762**	.824**	.848**	.177**	.751**	.732**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.006	.000	.000
	N	238	238	238	238	238	238	238	238	238	238	238	238	237	238	237	238	238	238	238	238
IU1	Pearson Correlation	.585**	.853**	.849**	.831**	.768**	.716**	.825**	.899**	.786**	1	.810**	.823**	.814**	.794**	.766**	.824**	.838**	.140*	.780**	.809**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.030	.000	.000
	N	238	238	238	238	238	238	238	238	238	238	238	238	237	238	237	238	238	238	238	238
IU2	Pearson Correlation	.552**	.843**	.832**	.785**	.775**	.740**	.806**	.823**	.751**	.810**	1	.824**	.792**	.762**	.861**	.809**	.834**	.119	.772**	.773**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.067	.000	.000
	N	238	238	238	238	238	238	238	238	238	238	238	238	237	238	237	238	238	238	238	238
IU3	Pearson Correlation	.554**	.845**	.803**	.814**	.765**	.719**	.815**	.836**	.779**	.823**	.824**	1	.844**	.829**	.892**	.872**	.816**	.067	.729**	.755**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.307	.000	.000
	N	238	238	238	238	238	238	238	238	238	238	238	238	237	238	237	238	238	238	238	238
AV	Pearson Correlation	.566**	.870**	.820**	.928**	.739**	.678**	.816**	.827**	.795**	.814**	.792**	.844**	1	.892**	.801**	.861**	.815**	.100	.704**	.706**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.125	.000	.000
	N	237	237	237	237	237	237	237	237	237	237	237	237	237	237	236	237	237	237	237	237
AV1	Pearson Correlation	.523**	.833**	.776**	.860**	.731**	.671**	.792**	.800**	.806**	.794**	.762**	.829**	.892**	1	.803**	.855**	.837**	.104	.712**	.699**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.108	.000	.000
	N	238	238	238	238	238	238	238	238	238	238	238	238	237	238	237	238	238	238	238	238
AV2	Pearson Correlation	.506**	.783**	.746**	.776**	.725**	.671**	.757**	.786**	.762**	.766**	.861**	.892**	.801**	.803**	1	.848**	.800**	.065	.742**	.698**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.319	.000	.000
	N	237	237	237	237	237	237	237	237	237	237	237	237	236	237	237	237	237	237	237	237
AV3	Pearson Correlation	.557**	.847**	.829**	.835**	.777**	.743**	.817**	.837**	.824**	.824**	.809**	.872**	.861**	.855**	.848**	1	.836**	.118	.770**	.770**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.068	.000	.000
	N	238	238	238	238	238	238	238	238	238	238	238	238	237	238	237	238	238	238	238	238
PE	Pearson Correlation	.585**	.863**	.798**	.831**	.749**	.716**	.797**	.857**	.848**	.838**	.834**	.816**	.815**	.837**	.800**	.836**	1	.169**	.773**	.779**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.009	.000	.000
	N	238	238	238	238	238	238	238	238	238	238	238	238	237	238	237	238	238	238	238	238
PE1	Pearson Correlation	.245**	.105	.175**	.091	.120	.086	.041	.137*	.177**	.140*	.119	.067	.100	.104	.065	.118	.169**	1	.160*	.120
	Sig. (2-tailed)	.000	.106	.007	.162	.065	.187	.525	.034	.006	.030	.067	.307	.125	.108	.319	.068	.009		.014	.064
	N	238	238	238	238	238	238	238	238	238	238	238	238	237	238	237	238	238	238	238	238
PE2	Pearson Correlation	.604**	.788**	.769**	.708**	.782**	.797**	.819**	.783**	.751**	.780**	.772**	.729**	.704**	.712**	.742**	.770**	.773**	.160*	1	.841**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.014		.000
	N	238	238	238	238	238	238	238	238	238	238	238	238	237	238	237	238	238	238	238	238
PE3	Pearson Correlation	.599**	.837**	.799**	.737**	.796**	.793**	.817**	.816**	.732**	.809**	.773**	.755**	.706**	.699**	.698**	.770**	.779**	.120	.841**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.064	.000	
	N	238	238	238	238	238	238	238	238	238	238	238	238	237	238	237	238	238	238	238	238

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

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

Correlations

		PENJ	PENJ1	PENJ2	PENJ3	SI	SI1	SI2	SI3	EE	EE1	EE2	EE3	FC	FC1	FC2	FC3	PC	PC1	PC2	PC3
PENJ	Pearson Correlation	1	.747**	.730**	-.048	.820**	.732**	.775**	.788**	-.413**	.741**	-.279**	.156*	.751**	.813**	.759**	.727**	.766**	-.055	.708**	.761**
	Sig. (2-tailed)		.000	.000	.458	.000	.000	.000	.000	.000	.000	.000	.016	.000	.000	.000	.000	.000	.402	.000	.000
	N	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238
PENJ1	Pearson Correlation	.747**	1	.766**	-.112	.800**	.708**	.812**	.714**	-.368**	.750**	-.299**	.112	.729**	.819**	.759**	.785**	.839**	-.091	.734**	.828**
	Sig. (2-tailed)	.000		.000	.084	.000	.000	.000	.000	.000	.000	.000	.086	.000	.000	.000	.000	.000	.160	.000	.000
	N	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238
PENJ2	Pearson Correlation	.730**	.766**	1	-.089	.741**	.641**	.770**	.745**	-.315**	.787**	-.232**	.091	.730**	.798**	.735**	.687**	.706**	-.044	.758**	.818**
	Sig. (2-tailed)	.000	.000		.173	.000	.000	.000	.000	.000	.000	.000	.164	.000	.000	.000	.000	.000	.500	.000	.000
	N	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238
PENJ3	Pearson Correlation	-.048	-.112	-.089	1	-.078	-.145*	-.102	-.094	.255**	-.105	.316**	.439**	-.113	-.097	-.052	-.097	-.101	.472**	-.131*	-.069
	Sig. (2-tailed)	.458	.084	.173		.229	.025	.118	.147	.000	.106	.000	.000	.082	.135	.428	.138	.120	.000	.044	.288
	N	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238
SI	Pearson Correlation	.820**	.800**	.741**	-.078	1	.738**	.857**	.769**	-.408**	.789**	-.298**	.114	.753**	.825**	.772**	.781**	.774**	-.090	.765**	.802**
	Sig. (2-tailed)	.000	.000	.000	.229		.000	.000	.000	.000	.000	.000	.078	.000	.000	.000	.000	.000	.166	.000	.000
	N	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238
SI1	Pearson Correlation	.732**	.708**	.641**	-.145*	.738**	1	.745**	.667**	-.381**	.688**	-.287**	.041	.741**	.747**	.761**	.695**	.771**	-.122	.685**	.718**
	Sig. (2-tailed)	.000	.000	.000	.025	.000		.000	.000	.000	.000	.000	.534	.000	.000	.000	.000	.000	.059	.000	.000
	N	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238
SI2	Pearson Correlation	.775**	.812**	.770**	-.102	.857**	.745**	1	.822**	-.423**	.834**	-.319**	.090	.810**	.850**	.843**	.767**	.779**	-.127	.828**	.857**
	Sig. (2-tailed)	.000	.000	.000	.118	.000	.000		.000	.000	.000	.000	.167	.000	.000	.000	.000	.000	.050	.000	.000
	N	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238
SI3	Pearson Correlation	.788**	.714**	.745**	-.094	.769**	.667**	.822**	1	-.415**	.813**	-.292**	.105	.784**	.824**	.713**	.703**	.707**	-.077	.759**	.804**
	Sig. (2-tailed)	.000	.000	.000	.147	.000	.000	.000		.000	.000	.000	.107	.000	.000	.000	.000	.000	.237	.000	.000
	N	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238
EE	Pearson Correlation	-.413**	-.368**	-.315**	.255**	-.408**	-.381**	-.423**	-.415**	1	-.344**	.489**	-.002	-.391**	-.398**	-.366**	-.332**	-.411**	.168**	-.377**	-.360**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.972	.000	.000	.000	.000	.000	.009	.000	.000
	N	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238
EE1	Pearson Correlation	.741**	.750**	.787**	-.105	.789**	.688**	.834**	.813**	-.344**	1	-.236**	.102	.772**	.808**	.758**	.696**	.727**	-.096	.828**	.816**
	Sig. (2-tailed)	.000	.000	.000	.106	.000	.000	.000	.000	.000		.000	.116	.000	.000	.000	.000	.000	.142	.000	.000
	N	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238
EE2	Pearson Correlation	-.279**	-.299**	-.232**	.316**	-.298**	-.287**	-.319**	-.292**	.489**	-.236**	1	.149*	-.256**	-.289**	-.215**	-.215**	-.294**	.336**	-.228**	-.212**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.021	.000	.000	.001	.001	.000	.000	.000	.001
	N	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238
EE3	Pearson Correlation	.156*	.112	.091	.439**	.114	.041	.090	.105	-.002	.102	.149*	1	.115	.092	.146*	.119	.152*	.527**	.058	.154*
	Sig. (2-tailed)	.016	.086	.164	.000	.078	.534	.167	.107	.972	.116	.021		.077	.155	.024	.066	.019	.000	.374	.017
	N	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238
FC	Pearson Correlation	.751**	.729**	.730**	-.113	.753**	.741**	.810**	.784**	-.391**	.772**	-.256**	.115	1	.818**	.774**	.709**	.758**	-.131*	.727**	.766**
	Sig. (2-tailed)	.000	.000	.000	.082	.000	.000	.000	.000	.000	.000	.000	.077		.000	.000	.000	.000	.044	.000	.000
	N	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238
FC1	Pearson Correlation	.813**	.819**	.798**	-.097	.825**	.747**	.850**	.824**	-.398**	.808**	-.289**	.092	.818**	1	.839**	.793**	.802**	-.139*	.771**	.850**
	Sig. (2-tailed)	.000	.000	.000	.135	.000	.000	.000	.000	.000	.000	.000	.155	.000		.000	.000	.000	.032	.000	.000
	N	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238
FC2	Pearson Correlation	.759**	.759**	.735**	-.052	.772**	.761**	.843**	.713**	-.366**	.758**	-.215**	.146*	.774**	.839**	1	.772**	.793**	-.025	.741**	.797**
	Sig. (2-tailed)	.000	.000	.000	.428	.000	.000	.000	.000	.000	.000	.001	.024	.000	.000		.000	.000	.700	.000	.000
	N	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238
FC3	Pearson Correlation	.727**	.785**	.687**	-.097	.781**	.695**	.767**	.703**	-.332**	.696**	-.215**	.119	.709**	.793**	.772**	1	.762**	-.060	.686**	.776**
	Sig. (2-tailed)	.000	.000	.000	.138	.000	.000	.000	.000	.000	.000	.001	.066	.000	.000	.000		.000	.358	.000	.000
	N	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238
PC	Pearson Correlation	.766**	.839**	.706**	-.101	.774**	.771**	.779**	.707**	-.411**	.727**	-.294**	.152*	.758**	.802**	.793**	.762**	1	-.050	.695**	.770**
	Sig. (2-tailed)	.000	.000	.000	.120	.000	.000	.000	.000	.000	.000	.000	.019	.000	.000	.000	.000		.445	.000	.000
	N	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238
PC1	Pearson Correlation	-.055	-.091	-.044	.472**	-.090	-.122	-.127	-.077	.168**	-.096	.336**	.527**	-.131*	-.139*	-.025	-.060	-.050	1	-.129*	-.053
	Sig. (2-tailed)	.402	.160	.500	.000	.166	.059	.050	.237	.009	.142	.000	.000	.044	.032	.700	.358	.445		.046	.415
	N	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238
PC2	Pearson Correlation	.708**	.734**	.758**	-.131*	.765**	.685**	.828**	.759**	-.377**	.828**	-.228**	.058	.727**	.771**	.741**	.686**	.695**	-.129*	1	.814**
	Sig. (2-tailed)	.000	.000	.000	.044	.000	.000	.000	.000	.000	.000	.000	.374	.000	.000	.000	.000	.000	.046		.000
	N	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238
PC3	Pearson Correlation	.761**	.828**	.818**	-.069	.802**	.718**	.857**	.804**	-.360**	.816**	-.212**	.154*	.766**	.850**	.797**	.776**	.770**	-.053	.814**	1
	Sig. (2-tailed)	.000	.000	.000	.288	.000	.000	.000	.000	.000	.000	.001	.017	.000	.000	.000	.000	.000	.415	.000	
	N	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238

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

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