Kelvin J. Bwalya

Decolonization of e-Government Research and Practice

Exploring Contextual Issues and Opportunities in Africa

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Peer Review Declaration

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Research Justification

With the rapid increase in the implementation of e-Government in Africa and across the world, the need to investigate the key bottlenecks (issues) owing to the failure of a large number of e-Government projects cannot be ignored. The main purpose of this book is to contribute to the current scholarly and intellectual discourse on different aspects of e-Government such as understanding the critical issues in design, implementation and monitoring. This book specifically intends to bring out contextual issues that hugely impact on the probability for e-Government failure or success. The book explores the different e-Government measurement tools, mechanisms and frameworks, especially with an African focus. It is not a secret that currently there is a dearth of information, especially with regard to understanding contextual issues for e-Government in the developing countries. E-Government has been slowly developing into a science, yet there are still weak areas especially in design methodology and implementation that need urgent attention from both the researchers and practitioners. Many researchers around the world are busy researching on the different domains of e-Government actively pursuing the different knowledge frontiers. However, the African story is missing from the development equation of e-Government. There are many books that have attempted to tell a story about e-Government development in Africa but mostly these have given piecemeal information on the actual contextual nuances of e-Government in Africa. Specifically, this book differentiates itself by carefully exploring the issue of context-awareness (informed by the local context) for e-Government design and implementation. This concept has not been pursued in any publication in e-Government before although it has been used in other information computational contexts. Therefore, the many theses of this book are that e-Government design approach, implementation policies and requirements and monitoring dimensions need to be informed by the contextual characteristics in which they are implemented. This book contributes to the body of knowledge by presenting an in-depth analysis of a case of e-Government implementation. Therefore, this book has its facts backed by intermittent reference to an empirical study done in Zambia to accentuate issues in design, adoption, usage and monitoring of e-Government projects. The case articulates the methodological issues in the design and measurement of e-Government. The use of a combination of structural equation modelling (SEM), exploratory factor analysis (EFA) and advanced techniques such as principal component analysis (PCA) in investigating different aspects of e-Government in a developing country context has not been done in any previous research. The novel methodological nuances articulated in this book can go a long way in understanding the factors explaining successful implementation of e-Government. The previous publications have used basic statistical approaches devoid of adequate scientific or statistical rigour such as descriptive statistics to arrive at factors influencing the success or failure of e-Government. Furthermore, this book contributes to the body of knowledge by emphasising the different dimensions and issues of the multidimensional perspectives of e-Government. The book explores tangible pointers for design and implementation of e-Government giving it the thrust to potentially guide actual implementation of e-Government in African setups. The book is intended to be used by university researchers and specialists in information management, applied information systems, computer science, organisations and institutions in research and consultancy in e-Government, freedom of information, big data analytics and data governance. Information officers, system designers and decision/policymakers in government organs and departments may use this book as a key reference source to guide their decisions. This book uses some content which has been tested for scholarly rigour in academic journals and conferences. No material has been reproduced in this book verbatim and if part of any book is used in any form, it has been rephrased or embedded in the discussions in this book, with due reference provided in each case. Therefore, the book presents content that has not been presented, published or plagiarised from any source(s).

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Abbreviations, Figures, Tables and Boxes Appearing in the Text

List of Abbreviations

ACSI	American Customer Satisfaction Index
AEGDDRD	Advances in Electronic Government, Digital Divide and Regional Development
AFLRA	Association of Finnish Local and Regional Authorities
AHP	Analytical Hierarchical Process
AITI	Authority for Info-communication Technology Industry
ANOVA	Analysis of Variance
API	Application Programming Interfaces
BI	Behaviour Intention
BOLD	Big and Open Linked Data
BSC	Balanced Scorecard
CFA	Confirmatory Factor Analysis
CHET	Centre for Higher Education Transformation
CIO	Chief Information Officer
CIRT	Computer Incident Response Teams
CM	Consultative Model
CMM	Capability Maturity Model
CMMI	Capability Maturity Model Integrated
COBIT	Control Objectives for Information and Related Technologies
CSPP	Computer Systems Policy Project
C-TAM-TPB	Combined Technology Acceptance Model and Theory of Planned Behaviour

CU	Continuous Usage
DESI	Digital Economy and Society Index
DOI	Diffusion of Innovation
DOT	Diffusion of Innovations Theory
DPME	Department of Performance Monitoring and Evaluation
DPSA	Department of Public Service and Administration
DSP	Digital State Paradigm
EAF	E-Governance Assessment Frameworks
EASSy	Eastern Africa Submarine Cable System
ECT	Electronic Communications and Transactions
EFA	Exploratory Factor Analysis
EFQM	European Foundation for Quality Management Model
EGAUM	E-Government Adoption and Utilisation Model
EGDI	E-Government Development Index
eGLF	E-Government Leadership Forum
eGMM	E-Government Maturity Model
EGRI	E-Government Readiness Model
eNATIS	National Traffic Information System
ERMS	Electronic Records Management System
ERP	Enterprise Resource Planning
ERR	Expected Rate of Return
ESIF	European Structural and Investment Funds
ESM	Enterprise Social Media
EU	European Union
FC	Facilitating Conditions
FOI	Freedom of Information
FPB	Film and Publications Board
GATT	General Agreement of Trade in Services
GBN	Gauteng Broadband Network
GCIO	Government’s Chief Information Officer

GCR	Gauteng Cities Region
GDF	Gaussian Distribution Function
GDP	Gross Domestic Product
GePS	Government e-Procurement System
GITO	Government IT Officers
GITOC	Government IT Officer's Council
GODI	Ghana Open Data Initiative
GOGP	Global Open Government Partnership
HCI	Human Capital Index
HO	Human Orientation
IAM	Access and Identity Management
IAP	Information Age Partnership
IC	Institutional Collectivism
ICT	Information and Communication Technology
IDC	International Data Corporation
IDT	Innovation Diffusion Theory
IEC	Independent Electoral Commission
IFMIS	Integrated Financial Management Information System
IGC	In-Group Collectivism
IGRF	Inter-Governmental Relations Forum
IoT	Internet of Things
IS	Information Systems
ISACA	Information Systems Audit and Control Association
IT	Information Technology
ITPSS	IT and Protective Security Services
ITU	International Telecommunications Union
KLT	Karhunen–Loeve Transform
KMO	Kaiser–Meyer–Olkin
KRA	Kenya Revenue Authority
LION	Lower Indian Ocean Network

LSE	Least Squares Estimator
M2M	Machine-to-Machine
MCDM	Multiple Criteria Decision-Making
MeGAP	Municipal e-Government Assessment Project
MIOS	Minimum Interoperability Standards
MISS	Minimum Information Security Standards
MM	Mathematical Modelling
MMR	Mixed Methods Research
MSA	Measure of Sampling Adequacy
MSC	Multimedia Super Corridor
MTSF	Medium Term Strategic Framework
MUST	Mosi-o-Tunya University of Science and Technology
NCPF	National Cybersecurity Policy Framework (South Africa)
NDP	National Development Plan
NGO	Non-governmental Organisations
NPM	New Public Management
NRI	Network Readiness Index
NTF	Non-traditional Funding
OC	Opportunity Cost
OGD	Open Government Data
OOADM	Object-Oriented Analysis and Design Method
OPEN	Online Procedures Enhancement for Civil Application
PAIA	Promotion of Access to Information Act
PAMA	Public Administration Management Act
PCA	Principal Component Analysis
PD	Power Distance
PDA	Personal Digital Assistants
PE	Performance Expectance
PEOU	Perceived Ease of Use

PERM	Perceived Readiness Model
PGM	Participatory Governance Model
PIAC-ISAD	Advisory Council on the Information Society and Development
PKI	Public Key Infrastructure
PLS	Partial Least Squares
PMEC	Public Management Establishment Control
PNC-ISAD	Presidential National Council on Information Society and Development
POPI	Protection of Personal Information
PPP	Public–Private Partnership
PSCAP	Public Service Capacity Building Project
PSI	Public Sphere Information
PSP	Public Service Platforms
PSRP	Public Service Reform Programme
PU	Perceived Usefulness
ROI	Return on Investment
RSA	Republic of South Africa
RSS	Really Simple Syndication
RUTAM	Rural Technology Acceptance Model
SaaS	Software as a Service
SADC	Southern African Development Community
SAP	Structural Adjustment Programme
SARS	South African Revenue Authority
SCT	Social Cognitive Theory
SDIP	Service Delivery Improvement Plan
SEM	Structural Equation Modelling
SI	Social Influence
SIDS	Small Island Developing States
SITA	State Information Technology Agency
SLAs	Service-Level Agreements
SME	Small and Medium Enterprises

SMM	Stage Maturity Model of m-Government
SMR	Social Media Readiness
SN	Subjective Norm
SOA	Service-Oriented Architecture
SRSP	Structural Reform Support Programme
SSA	Sub-Saharan Africa
SSADM	Structured Systems Analysis and Design Method
STOPE	Strategy, Technology, Organisation, People and Environment
TAM	Technology Acceptance Model
TEAMs	East African Marine Systems
TOE	Technology, Organisation and Environment
TOP	Technology, Organisation and Process
TPB	Theory of Planned Behaviour
TRA	Theory of Reasoned Action
TRIPS	Trade-Related Aspects of Intellectual Property Rights
UAP	Universal Access Programme
UB	Usage Behaviour
UKLGA	UK Local Government Authority
UNDESA	United Nations Department of Economic and Social Affair
US	United States
UTAUT	Unified Theory of Adoption and Use of Technology
VAT	Value-Added Tax
WACS	West African Cable System
WEF	World Economic Forum
WIPO	World Intellectual Property Organisation Treaty
WQ	Web Quality
WSIS	World Summit on the Information Society
YASS	Yunnan Academy of Social Sciences

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Biographical Note

Kelvin Joseph Bwalya is an associate professor at the School of Consumer Intelligence and Information Systems, Department for Information and Knowledge Management, University of Johannesburg. He has a PhD in Information Management (University of Johannesburg), Masters of Computer Science (Korea Advanced Institute of Science and Technology – KAIST) and Bachelors in Electronics and Electrical Engineering (Moscow Power Engineering Technical University). He is also a member of the Board of Directors – Mosi-o-Tunya University of Science and Technology (MUST). Kelvin is also a PhD supervisor and member of the Board of Exams at various universities around the world. He has supervised five PhDs to completion, and several master's and undergraduate projects. Kelvin has examined 24 PhD dissertations from nine universities in Africa and abroad and several master's theses. By the end of 2017, he had already published seven academic and research books and over 100 peer-reviewed articles and had also managed numerous research funds. He is also a member of various professional bodies and editorial teams. He is busy researching on big data and predictive analytics, data genomics, cloud and fog computing, spatial–temporal data modelling, competitive intelligence, database design, m-Government, open data and so on. Kelvin is actively pushing for establishing himself as a quality assurance expert on higher education and is currently a member of several higher education authorities in the Southern African Development Community region. Email: kbwalya@uj.ac.za, ORCID: https://orcid.org/0000-0003-0509-5515.

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I would like to thank the many people who helped me accomplish this book. All credit for this work should fittingly be attributed to them and any limitations and mistakes are truly mine. This book is a result of the commitment to effectively contribute to scholarly and intellectual discourse on design and implementation of e-Government systems. It is a result of the desire to narrow the void of the African voice on the advancement of e-Government as a field and a science. Furthermore, this book is a collective effort of the Department of Information and Knowledge Management, University of Johannesburg, as almost all members of this department showed interest and motivated me to go on writing to produce this masterpiece.

Firstly, I profusely thank Prof. Van Aarde (commissioning editor – AOSIS) for believing in my capability to embark on a project of writing two books simultaneously. He somehow managed to assure me that I had the necessary intellectual muscle and expertise to see this project to the end. I would also like to sincerely thank the entire production team at AOSIS for their patience and belief that this book for sure would see the light of the day.

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A special thanks to my family for their patience when I endlessly worked on my computer to create this book, depriving them of the love and attention they thoroughly deserve.

Last, but not least, I thank the Almighty God for the gift of life including the privilege to write a high-end book on e-Government, which I hope will lessen the burden of someone researching, designing, implementing and monitoring the progress of e-Government.

Disclaimer

Although care was taken not to include any information which is not factual and to only include information at the very end of the knowledge frontiers, there may be something that could change before this book makes it to print owing to the short lifecycle of this field which is hinged on technology. Therefore, I would like to acknowledge that any inconsistencies, non-factual information and mistakes are mine. I therefore regret any inconvenience that the use of this book may cause.

Foreword

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The use of information and communication technology (ICT) in public delivery value chains is not new. One wonders why there is suddenly so much interest and inquiry into e-Government. Probably it is because e-Government promises to revitalise and improve public service delivery on many fronts. For example, it is perceived that e-Government may increase efficiency, effectiveness and transparency in public service delivery and administration. Furthermore, e-Government is linked to mitigating corruption which is endemic in most developing countries and can significantly reduce the cost of delivery of public services. It is also known that despite the mentioned motivation points for e-Government, some countries still implement e-Government with a mere desire to jump onto the bandwagon of countries implementing e-Government, and nothing more. Unfortunately, a lot of countries belong to this bracket and their e-Government implementation initiatives mostly fail because they are implemented in haste and are not strategically thought through before implementation. The failure of many e-Government projects prompts investigation of the key issues influencing e-Government development.

Given the need to investigate contemporary issues in the e-Government domain owing to the rapid evolution of government design and implementation models, the need for responsive e-Government models is urgent and unavoidable given the huge opportunity cost paid if ignored. This book engages a current and a very interesting topic which is much

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debated by researchers and practitioners from diverse domains owing to its multidimensional nature – e-Government. There are many issues that influence the successful implementation of e-Government. In recognition of the 'metamorphosis' of governance models over time, this book explores pertinent issues that may enable a government to remain relevant and effective to its core mandate. Although a lot of research has been conducted from different vantage points given researchers' expertise and orientation, the body of knowledge is not yet developed to a point where e-Government can be a science in its own right and has largely relied on other disciplines, thus largely remaining multidisciplinary in nature. This book is an effort to contribute to advancing e-Government as a science and a discipline that has its own theories and epistemologies. It does so by questioning some shaky e-Government conceptualisations and standpoints, thereby inviting critical enquiry into e-Government as a whole.

A thorough understanding of e-Government entails understanding, to a greater extent, both the managerial and technical dimensions. This book explores both these aspects. Recent concepts such as freedom of information (FOI), electronic records management, metadata management, open data and open government data (OGD), the design of open and interoperable information systems (IS), cloud computing, the design of user-motivated access interfaces – all impact the design and implementation of contemporary e-Government. The presentation of a case study from Zambia explores the themes discussed in the book from a practical perspective. This, therefore, gives more substance and meaning to the book's content and accentuates a departure from theory to a balance of theory and practice.

The title of the book *Decolonisation of e-Government Research and Practice: Exploring Contextual Issues and Opportunities in Africa* is carefully chosen to ensure that it dovetails with the contents found in the book. Although other related topics are discussed, the book principally focuses on bringing out the different aspects of development with reference to e-Government. The understanding of the different dimensions of e-Government development, especially to agents gearing to implement it, is problematised so as to utilise resources, interventions and energy only to 'things that matter'. This book envelops together chapters carefully written with a huge potential to be the epitome of the global knowledge value chains in intelligent applications of information and communication technologies in different domains of the public sector. I declare this book to be a germane resource for both theory and practice with great potential to become one of the key reference sources in this topical area.

Aiming to touch upon many aspects of e-Government, the balanced composition of the chapters does a lot of justice to many aspects of contemporary issues in e-Government. The book has three parts: the first part explores the gamut of e-Government services by presenting three chapters that aim to understand what e-Government entails given the current socio-economic outlay of developing countries, discusses the different ways and scenarios in which e-Government contributes towards an efficient, effective and responsive public service delivery and articulates on how e-Government can bring about transparency and openness in the public administration contexts, especially in the African context which is riddled with corruption, and discusses the different policy dimensions of e-Government. The second part discusses the different approaches to measuring the development of e-Government. This part discusses at length the differences between measurement and evaluation and explores the effectiveness of the different models for measuring technology adoption that have been utilised to measure e-Government adoption and usage at the individual level. The different frameworks for measuring the varied stages of e-Government development are explored. In order to clearly understand what is entailed in measuring e-Government adoption and usage, a case of Zambia utilising PCA as a factor reduction methodology is presented. The use of PCA in understanding which factors have a higher variance and therefore explaining e-Government adoption is an intelligent way of understanding which factors influence the adoption of e-Government. The next chapter aims to understand institutional readiness in the adoption and use of e-Government. The second part concludes with the measurement of contextual factors influencing e-Government development using a rigorous multivariate analysis. The second part of this book, therefore, managed to showcase the different approaches to evaluating and measuring penetration, adoption and usage of e-Government. Now that the different methods in the evaluation of e-Government adoption and development have been explored, the third part of the book aims to understand the current status of e-Government development in sub-Saharan Africa and does a prognosis of the future models of e-Government in Africa. This is done by exploring the status of development of e-Government in different African countries and collating the key issues and pointers towards the design of a conceptual model for e-Government development. Although a model is not presented in this chapter, the pointers given can help researchers in conceptualising one in any given contextual setting.

PART A

The Gamut of e-Government

Chapter 1

Understanding e-Government

Overview

This chapter has two parts: the first part introduces the concepts underpinning e-Government and the main concepts discussed in this book. The second part articulates the book's rationale in relation to contributing to the body of knowledge on e-Government. This chapter discusses the basic concepts of e-Government in order to lay the ground for readers' understanding of the concepts discussed in this book. Therefore, formulaic, general definitions together with semantic understanding of e-Government are explored. Furthermore, benefits and disadvantages of e-Government are presented given the contextual outlay of African countries and other developing countries. The second part specifically answers the question 'why this book now?' by articulating the rationale of this

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book with reference to growing e-Government implementation in the developing country contexts. Because many e-Government projects fail, there is an ever-growing interest in e-Government design and implementation from researchers and practitioners informed by the local context.

Introduction

Since the admission by the then South African President Thabo Mbeki in 2000 that there was a need for different socio-economic establishments in South Africa to jump onto the information superhighway where information was managed using technology platforms, government departments not only in South Africa but also all over Africa have jumped onto the bandwagon of implementing e-Government. Implementing e-Government has proved that it has massive benefits in as far as revitalising public service delivery is concerned.

Introduced in the 1990s, e-Government showed a lot of promise in as far as revitalising public service delivery is concerned although it is difficult in any given context to realise all the promises of e-Government given its multidimensional nature (Al-Tourki et al. 2012). Although only given intense attention now by various researchers and practitioners, it can be posited that e-Government has been around for over five decades. In an article titled 'The Automatic Handling of Office PaperWork', Bass and Heeks (2011) posit that the genesis of e-Government can be traced to as way back as 1954 (Gammon, Diebold & Davis 1954). This entails that the concept of e-Government has been around for quite some time although attention has recently tilted towards investigating the different multidimensional aspects of e-Government. It can thus be posited that although e-Government has been around for some time now, it is still relatively considered to be in its nascent stage, especially in the developing country contexts. Its relative nascence is accentuated by the lack of well-grounded theoretical or conceptual models guiding the e-Government development cycle (conceptualisation, design, implementation, and monitoring and evaluation).

Nowadays, it cannot be denied that e-Government is a buzzword, especially in the public service domains, owing to the fact that many governments around the world are delving towards public service transformation for competitiveness. The resolve towards public service transformation has been motivated as a result of pressure from businesses, the public sector and/or citizens who have realised the fact that government processes and information need to be properly managed to track efficiency and effectiveness of the public services. As a result of desired contemporary transformation, governments are now discussing and embedding new concepts such as business intelligence, big and open linked data (BOLD), cloud/fog computing, big data and predictive analytics, and semantic e-Government into their public service delivery value chains.

Implementation of e-Government the world over has proved that it offers many benefits to the government and the consumer. Yun and Opheim (2010) opine that e-Government aims to provide platforms where citizens, regardless of socio-economic status, can participate in the different governance and administration value chains. It cannot be overemphasised that e-Government increases transparency and improves communication between the government and the users (Alghamdi & Beloff 2016; Bwalya & Healy 2010). The e-Government portal facilitates accessibility of many e-Government services from a central location further translating into convenience to the e-Government consumers (Wirtz & Daiser 2015). On the government's side, e-Government has resulted in improved public service delivery where departments are able to share information seamlessly and integrate their services, reduce the cost of public service delivery and so on. For example, e-Government has ushered in a paradigm where government departments communicate effectively with its citizens culminating in transparency and further accountability on the part of the government (Ali & Gasmi 2017). There is an undoubted and uncontested belief that the universal usage of information and communication technologies (ICTs) in the delivery of public services will result in increased inclusion of ordinary citizens/businesses in the governance structures and processes regardless of their socio-economic standing, resulting in improved quality of life and a positive impact on economic growth (Magro 2012).

Strictu sensu, e-Government is a complicated undertaking which requires a lot of planning in order to translate into tangible sense (Gyaase 2014). Macueve (2008:2) posited that 'e-Government is a very complex undertaking' that requires careful planning. It is therefore vitally important that adequate strategic planning should be put in place before the commissioning of any e-Government project regardless of the context in which it is implemented. Thus, there is a need to explore the key principles and thinking on which e-Government is hinged in order to understand the emergent forms of e-Government, such as m-Government, e-Government 2.0, semantic e-Government and so on, and the new concepts upon which many of the contemporary e-Government designs are hinged, such as data governance, open government, cloud/fog computing, predictive analytics, big data and so on. Given the ever-changing technology on which e-Government is hinged, governments committed to retaining their service excellence need to continue re-engineering their business processes to accommodate the key enabler, technology, which has a shorter lifecycle considering the many technological innovations that are being designed every day.

Despite the many achievements in e-Government development around the world, there has generally been limited theoretical rigour and methodological weaknesses in the e-Government design and research. These weaknesses have translated into a lack of indigenous theory of e-Government to guide research and practice and flawed e-Government designs and implementation plans which end up failing. Because of a lack of indigenous conceptual and theoretical models and frameworks, e-Government has not been recognised as a mature field of scientific enquiry (Flak, Sein & Saebø 2007; Scholl 2006). It is against this background that there is the need for a book that can delve into the issues influencing the design and implementation of e-Government and therefore contribute to the body of knowledge of e-Government, which will be a germane resource to encourage critical enquiry in e-Government research and practice. This book is poised to contribute to that cause.

Although e-Government has been implemented for over half a century in many countries, there is still a dearth of information with regard to what exactly e-Government entails. The confusion around the lack of a global formulaic and globally agreed-upon definition of e-Government is exacerbated by a multiplicity of terms almost meaning the same thing, such as e-Governance, mobile government (m-Government), digital government and so on. The next section deals with different dimensions of e-Government.

Electronic Government

Although many researchers and e-Government practitioners have attempted to give definitions of e-Government, there is no global definition of what e-Government entails (Seifert & Bonham 2010). As a result, many of the e-Government researchers and practitioners have defined e-Government based on the context in which it is implemented. However, a careful consideration of the differences in the definition of what e-Government entails has shown that any acceptable form of e-Government is multidimensional. Simply, e-Government depends on many factors to be successful. The multidimensional nature of e-Government entails that although technology is considered the key enabler, there is a need for cognisance of the other dimensions to e-Government, which, if not carefully considered during the design stage, may render the whole e-Government project unsuccessful. Considering the many definitions of e-Government, it is important to consider some of the most prominent ones. The 'following are some of the key definitions of e-Government' (Bwalya & Mutula 2014).

The Bretton Woods Institutions have several formulaic definitions of what e-Government generally entails (Karmakar 2015):

> World Bank (www.worldbank.org) definition (AOEMA report): E-Government refers to the use by government agencies of information technologies (such as Wide Area Networks, the Internet, and mobile computing) that have the ability to transform relations with citizens, businesses, and other arms of government. These technologies can serve a variety of different ends: better delivery of government services to citizens, improved interactions with business and industry, citizen empowerment through access to information, or more efficient government management. The resulting benefits can be less corruption, increased transparency, greater convenience, revenue growth, and/or cost reductions*.* United Nations (www.unpan.org) definition (AOEMA report): 'E-Government is defined as utilizing the Internet and the world-wide-web for delivering government information and services to citizens'*.* (pp. 81–97)

The definition of the Working Group on e-Government in the Developing World (Romke 2013) states that:

> E-Government is the use of ICTs to promote more efficient and effective government, facilitate more accessible government services, allow greater public access to information, and make government more accountable to citizens. E-Government might involve delivering services via the Internet, telephone, community centres (self-service or facilitated by others), wireless devices or other communications systems*.* (p. 109)

The United Nations Educational, Scientific and Cultural Organisation definition states that (Palvia & Sharma 2007):

> E-governance is the public sector's use of ICTs with the aim of improving information and service delivery, encouraging citizen participation in the decision-making process and making government more accountable, transparent and effective. E-governance involves new styles of leadership, new ways of debating and deciding policy and investment, new ways of accessing education, new ways of listening to citizens and new ways of organizing and delivering information and services. E-governance is generally considered as a wider concept than e-Government, since it can bring about a change in the way citizens relate to governments and to each other. E-governance can bring forth new concepts of citizenship, both in

> terms of citizen needs and responsibilities. Its objective is to engage, enable and empower the citizen. (p. 3)

A careful look at the definitions above reveals that there are key attributes in the definitions of e-Government. Lungescu (2004) posits that despite the many definitions of e-Government given by different researchers and practitioners, the many attributes of e-Government include service automation, computerisation (use of ICTs) and new processes that support service distribution. In addition, although e-Government is defined as using ICTs to provide public services essentially focussing on channels for provision of services to citizens and businesses, it also focusses on internal operations of government departments, especially with regard to the use of ICTs. Collectively, e-Government's locus operandi includes the use of ICTs in business processes in both internal and external environments of the government (Novakouski & Lewis 2012). Furthermore, e-Government needs to be seen as an enabler for transformative governance implemented to the convenience of the citizens beyond the measurable outcomes of efficiency, effectiveness and reduction in the cost of service delivery. Contemporary e-Government is hinged on the following four factors (Meyaki 2010):

1. Technology – it is the key platform and enabler for accessing e-Government applications. A competitive e-Government implementation needs to have an IT governance structure that is commensurate to the contextual nuances in the area in which it is implemented. The IT governance structure should explicitly mention how the identified contextual factors need to be embedded into the design and implementation of e-Government.
2. People – individuals on both sides of the equation are important for the success of e-Government. On the demand side, it is anticipated that people need to effortlessly access e-Government and not be limited by their socio-economic status. Platforms have to be designed that will make it easier for citizens to engage with one another on the e-Government space (Cai 2014), participate in voting and in decision-making and so on. This brings us to the understanding of a

citizen-centric e-Government design which is informed by the characteristics of the would-be users. On the supply side, individuals need to have the necessary technical and managerial expertise to ensure that they design or customise e-Government solutions according to the people's characteristics and redesign them when technology changes. This, therefore, means that the management of people in their different roles is one of the most cardinal tasks for the success of e-Government.

3. Processes – e-Government should be looked not only as an automation of manual government business processes but also as a transformative power aimed at creating a reliable, transparent and trustworthy public service that can redraw the contours of the relationships between government and the citizens/businesses. Process revitalisation and transformation should culminate in redefined workflows, allowing seamless flow of information between government departments providing a whole array of government services. In order to retain relevancy given the ever-changing citizens' needs and technology evolution, government units and departments need to be ready to re-engineer their business processes at any time as and when needed.
4. Resources – resources of different kinds are cardinal to ensuring that there are no roadblocks to integrate technologies in the public business processes. Therefore, there is a need to consider the different implementation models in order to get an optimal solution commensurate to the local contextual characteristics. Among the various resources that are of paramount importance to e-Government, funding is a key component. It is desired that e-Government projects follow a self-funding model, for example, one following the public–private partnership (PPP). (n.p.)

Given the multifaceted nature of e-Government, it can be posited that there are diverse possibilities for the utilisation of e-Government within public service business processes. The scope of e-Government therefore runs along the different aspects of governance, people, technology and business processes. In each of these entities, the goal of e-Government lies within promoting information sharing, citizen participation and inclusion into the different governance processes, and focusses on public service innovation (Wirtz & Daiser 2015). In general, the loci of e-Government are along the following dimensions:

1. Provision of efficient and effective public services to citizens and businesses.
2. Offering an information platform for citizens/businesses to access public documents, laws, government programmes, the constitution, and so on.
3. Platform for achievement of e-Participation in the framework of electronic governance (e-Governance) and electronic democracy (e-Democracy).

E-Government is implemented in different forms given the current requirements in a specific situation. Depending on a government department, e-Government may involve one or more forms. Table 1.1 summarises the different forms of e-Government and their characteristics.

As can be seen in Table 1.1, the three most common and key service classifications for technology use in government public service value chains within the framework of e-Government include administration, services and participation. From the administration perspective of e-Government, the focus is on back-end and front-end business processes from the government's side, articulating the different forms of technology used in the administration of processes to provide public services. Services articulate the different service models such as e-Police that can be used to access e-Government applications and ultimately provide a competitive service. Participation model includes the different interaction types that e-Government consumers can explore in the e-Government domain.

From the above, it can be posited that e-Government is an opportunity for governments to utilise ICTs so as to harness the different opportunities from the information society. Any e-Government implementation is concerned with utilising technology and subsequent innovations in the different business processes of the public service delivery options or variants (Roy 2005). Contemporary e-Government implementation transcends beyond the boundaries of traditional governance

TABLE 1.1: Key characteristics of e-Government.

Model classification	E-Government model	Brief description	Reference
Participation	e-Participation	ICTs are used as a platform for allowing individuals to communicate and interact with other individuals, government departments, communities and so on, in order to usher in a paradigm of transparent policy-making and efficient decision-making.	Bailey and Ngwenyama (2011)
	e-Democracy	The use of ICTs by the citizens in the different citizen engagement models and democratic processes (voting, poling, discussion, etc.), thereby enhancing governance processes and enabling citizens' engagement in policy-making processes.	Freeman and Quirke (2013)
	e-Voting	The use of ICTs as a platform to accord citizens a voice on different national matters or civil matters (elections of representatives, legislations, etc.) by electronically voting either at a terminal in a polling station or remotely on a mobile gadget.	Zissis and Lekkas (2011)
	e-Rulemaking	ICTs are utilised at a global level to transform traditional rule-making processes towards allowing citizens access to electronic filing systems so that they can directly comment on rules proposed by public agencies and track the comments of other citizens.	Schlosberg, Zavestoski and Shulman (2007)
	e-Politics	The Internet is used as a platform for citizens to be aware of the decision-making procedures, thereby facilitating their participation in the governance processes so as to improve the overall decision-making process.	Watson and Mundy (2001)
	e-Poll	This entails the use of ICTs to obtain information, thereby gauging public opinions on policy agenda and administrative decisions.	Kim (2008)
	e-Petitions	The use of Web platforms by the government to allow citizens voice their grievances and petitions on different aspects of governance by giving them options to add their names and addresses.	Anderson (2007)

table continues next page

TABLE 1.1: Continued

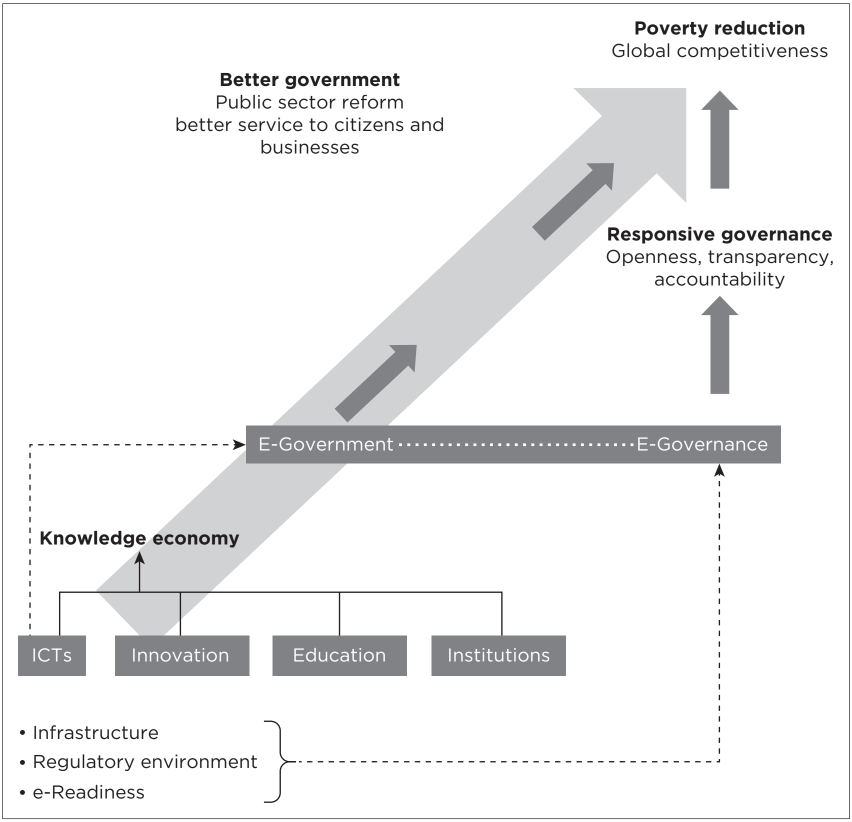
Model classification	E-Government model	Brief description	Reference
Services	e-Services	Delivery of government services, information, programmes, information, with e-Services accentuating the involvement of a citizen or business as a customer.	Saxena (2005)
	e-Police	The use of Web platforms to provide basic service information and reporting systems to the public.	Holliday and Kwok (2004)
	m-Government	Extension or supplement of e-Government with the difference being that this model specifically uses mobile platforms such as mobile phones, personal digital assistants (PDAs) to provide services to citizens, businesses and so on.	Lee, Tan and Trimi (2006)
Administration	e-Administration	Focusses on the computerisation and automation of back office management and administrative procedures of the public agencies.	Torres, Pina and Acerete (2006)
	e-Management	The use of ICTs to facilitate the enhancement of the management of government processes by streamlining the processes to promote seamless information flow within the different offices.	Saxena (2005)
	e-Governance	Utilisation of different ICT platforms towards enhancing government's governance processes such as online engagement of stakeholders, provision of information to the public, platform for debating and implementing public polices and so on.	Saxena (2005); Torres et al. (2006)
	e-Procurement	The use of ICTs in the government business processes focussing on procuring government goods and services and as a platform for engagement with suppliers.	Hardy and Williams (2008)
	e-Authentication	A single-on approach that gives an opportunity for a user to interact with multiple e-Government systems simultaneously.	Holden and Millet (2001)

domains because it is further utilised as an information management platform for managing diverse information that can be used for facilitating and enhancing information flow through the socio-economic infrastructure. Therefore, e-Government is a complex array of governance attributes that are put in place to principally put government information on public platforms (informed by data and Open Governance principles) and achieving transparent and accountable governance that allows effective and well-rounded citizen inclusion into the governance value chains.

In some instances, e-Government has been confused with e-Governance – the two mean different things and should never be used synonymously. In order to understand the difference between these two closely related terms, one needs to appreciate the definition of each of them. Just as e-Government, e-Governance does not have a formally agreed-upon global or universal definition. Using the 1997 Pacquet's classical definition, governance entails the mechanisms and processes for coordination of resources in a terrain where power and knowledge are increasingly distributed in different contexts. In this regard, e-Governance is therefore coordination of different resources hinged on the utilisation of different technology platforms and innovations as key enablers (Roy 2005). E-Governance is concerned with planning and policy, whereas e-Government is concerned with the actual implementation of ICT usage in different business processes of the public service delivery frameworks (Al-Sudairy & Vasista 2011). Furthermore, e-Government focusses on the provision of public information and services using ICTs to the external environments (citizens and businesses), whereas e-Governance focusses on the management dimensions of e-Government within an organisation implementing e-Government (Palvia & Sharma 2007; Nunes et al. 2017). E-Government is implemented using Internet and Extranet, whereas e-Governance is implemented using the Intranet. E-Governance basically involves the use of different technologies in facilitating appropriate service provision in intra-governmental operations, whereas e-Government allows the governance processes to be integrated and streamlined into one operational domain (Wirtz & Daiser 2015).

In this book, e-Government is defined as the exploration of the capabilities of ICTs in creating a seamless and integrated environment for revitalised public service provision towards enhanced efficiencies, improved information flow among e-Government constituents and stakeholders to support the overall governance and socio-economic agenda of a nation.

As shown in Figure 1.1, there is a close relationship between e-Government and e-Governance as both are geared towards contributing to reduce poverty as an overall agenda apart from



Source: Adapted from Lanvin 2008.

FIGURE 1.1: E-Government versus e-Governance.

anticipated improvements in public service delivery. Both concepts emanate from a desire to enshrine the principles of knowledge economy in the governance value chains. In order to transcend towards a knowledge economy, there is a need to consider the four key pillars in this regard: technology, institutions, education and innovation. These four pillars can be embedded onto public service delivery value chains if there is appropriate infrastructure, regulatory environment and adequate levels of e-Readiness.

E-Government is specifically targeted at ensuring that there is better overall government by encouraging public sector reform and ensuring that better services are given to the citizens and businesses. This reform can only be achieved in the ambit of knowledge economy and the utilisation of technology as a key enabler. E-Government presents itself as a progressive model for governance where citizens regardless of their socio-economic status are involved in the decision-making processes and can obtain any information they want at any time without any hindrances. In light of poverty reduction, e-Government provides information that can empower citizens to access the different digital opportunities that are evident in the information and knowledge societies. On the other hand, e-Governance focusses on establishing responsive governance by promoting openness, transparency and accountability. In essence, e-Governance focusses on administrative processes both at the back-end and front-end of e-Government implementation.

Proper implementation of technologies in public business processes entails understanding of both e-Government and e-Governance and comprehending how each of these can be included in the overall design. Many countries consider implementation of e-Government as one of the prerequisites for establishing themselves as a knowledge economy. As shown in Figure 1.1, the key pillars of a knowledge economy are ICTs, innovation, education and availability of requisite institutions to push the agenda and support all the different requirements.

Motivation for e-Government

There are many reasons that have motivated countries to implement e-Government. For example, some visionless countries have jumped onto the bandwagon for implementing e-Government just to *Keeping up with the Joneses.* Some countries have been motivated to implement e-Government not knowing exactly why they are doing so. In such scenarios, e-Government has been implemented with no careful planning with regard to its design, deployment, implementation and monitoring, therefore ending up in ultimate failure. This impromptu implementation of e-Government is a sheer waste of resources and usually does not achieve the desired results.

Well-informed countries have taken a cautious approach and have strategically followed a well-planned trajectory from design to implementation. In this context, e-Government has been implemented owing to the pressures emanating from the information society and a desire to offer cost-effective and better public services to the citizens. The information society, which is basically hinged on information democracy, has demanded that governments need to jump onto the bandwagon towards putting in place measures that will inculcate openness, transparency and accountability in its public information architecture and business processes. This means that the rules and regulations including the norms and standards or modus operandi in the government business processes need to be put in the open so that citizens or businesses can benefit from such information and can freely interact with government departments. Furthermore, all government information needs to be put in the open for the sake of accountability as all government information belongs to the people to whom public workers and politicians are accountable.

Within the ambit of public service delivery, e-Government can be implemented in all sectors without limitations. For example, e-Government can be implemented in health care to ensure that there is sanity in health care delivery, particularly with regard to information management practices such as implementing electronic health care records systems to effectively manage patient data. Implementation of e-Government in any government department demands that a specific guiding principle be developed. For example, in a bid to implement e-Government in the health care sector, Kakkar, Naushad and Khatri (2017) have proposed that there is a need for a framework to guide the implementation of technology. The implementation of e-Government in health care goes in tandem with telemedicine which has a plethora of tangible and intangible benefits, namely, allowing virtual real-time consulting, remote prognosis, remote patient monitoring in palliative care, electronic health records and so on (Kakkar, Naushad & Khatri 2017). The potential of e-Government to be implemented in different segments of the public service delivery infrastructure entails that, if carefully designed, e-Government can result in a plethora of digital opportunities for a country at large. Together with promoting innovation, contemporary public sector organisations also promote the promulgation of knowledge management in its public service delivery platforms (Martinsons, Davison & Huang 2017). The said promulgation of knowledge management into the public service setup can be made possible by the use of technology in the realm of e-Government. It is worth mentioning that appropriate implementation of e-Government can help propel a country into a knowledge economy.

Public organisations that are adept at continuously adopting ICTs in their business processes stand a chance to win the Digital Darwinism race. Digital Darwinism is a concept that places organisations in competition for unforeseeable future anchored on evolving technologies (Omar, Weerakkody & Sivarajah 2017). Implementing e-Government is a good strategy that may be used to accelerate public organisations towards effective participation in the Digital Darwinism race.

Uses and Impact of e-Government

The use of ICTs is gaining ground in many sectors of the socio-economic establishments throughout the world owing to the perceived benefits bordering on efficiency and effectiveness. As mentioned before, there are many potential uses of e-Government in any contextual setting. For example, ICTs are now being widely used in university business value chains so that vast amounts of information generated on an everyday basis are integrated into the various business processes (Nunes et al. 2017). Examples of the uses of ICTs in different parts of the socio-economic establishment are abundant. In the e-Government domain, technology has proved to be the key enabler. Despite the many potential uses and effect of ICTs in public service domains, e-Government is not to be considered as a panacea of the woes in public administration but as a lever towards improved governance.

E-Government allows for the re-engineering of traditional government administration processes endowed with varying degrees of red tape towards a transformed, more effective public service delivery capability. In corruption-infested countries, e-Government can be used as a lever to mitigate corruption in the public sector tendering processes by the introduction of e-Procurement where government transactions are conducted in the open space (Friedland & Muylkens 2009). On the citizen's side, e-Government is used in different aspects of information sharing between the government and businesses, namely, tax compliance, paying for public utility services, vehicle testing and registration, electronic voting, status of different statutes and so on (Friedland & Muylkens 2009). Some of the examples of the use of e-Government are the following:

1. In the Democratic Republic of the Congo, robocop is used to control traffic, and in South Africa there is serious digital transformation in the mines.
2. Implemented in cahoots with knowledge management, e-Government is earmarked to be used to position Johannesburg as a smart city. Hinged on artificial intelligence and cognitive computing, the city of Johannesburg is on the brink of deploying smart computers in repetitive, routine and mundane tasks such as in the call centres.
3. The Indian government's 'Jan Seva Kendra' implemented a transformed public service management anchored on provision

of services using technology and achieved reduced corruption levels in the public services delivery platforms, increased transparency and therefore confidence and trust in the government business processes by the general citizenry and businesses. Furthermore, there was massive reduction in the cost of public sector delivery (Friedland & Muylkens 2009).
4. Many Small Island Developing States (SIDS) use e-Government to diverge from being vulnerable on environmental sustainability. Using e-Government, information pertaining to environmental awareness or warnings of emerging environmental disasters can easily reach citizens and all the interested parties (Lee 2007). In the SIDS, there is a great promise on the use of e-Government as a multidimensional platform for information dissemination on agriculture, especially in advising farmers on land supplements such as fertilisers and insecticides that will not likely result in land degradation (Lee 2007).
5. The London City government introduced e-Government in the transport sector to reduce the inefficiencies that rocked this sector so as to transform public services delivery towards positioning them to be more accessible, convenient, cost-effective and responsive to the changing demands. An example of e-Government 2.0 includes seamless provision of information such as travel news, departure information, namely, providing exact location of the bus or train, journal planner, e-Commerce facilitating a wide range of transactions, m-Ticketing and so on (Leszczyński & Sajduk 2015).
6. Zambia is in the process of administering a system in public service delivery technology platforms that is going to bring process and information integration to reality. If one has not paid a traffic fine, this system will make it impossible for them to pay for utilities such as water and electricity or let alone pay for their vehicle or driver's licences because all these systems will be integrated.

The tangible uses and impacts of e-Government are numerous to mention. For example, cases of e-Government's impact on the reduction of corruption are abundant: South Korea's 'online procedures enhancement for civil applications (OPEN) project and Government e-Procurement System (GePS)' (Bwalya 2012:n.p.), India's e-Government project assessment, Pakistan's tax department restructuring, the Philippine's e-Procurement system have all demonstrated massive reductions in the corruption instances (Bhatnagar et al. 2007; Iqbal & Jin 2008; Pathak & Prasad 2006). It can thus be stated that the usage options for e-Government are innumerable.

Benefits of e-Government

There are many benefits attributed to e-Government implementation. In general, e-Government aims to increase the overall convenience and accessibility of public services so that citizens and businesses access public services and information at a reduced 'cost'. The good of e-Government cannot be doubted as many scientific discourses have accentuated the potential that e-Government has with regard to revamping the level of effectiveness of the public service in different contexts (Wirtz & Daiser 2015). The target of e-Government can be both back-end and front-end business processes, such as payroll automation, recruitment, aggregation of government information to support decision-making, process automation and coordination, citizens and businesses and so on.

On the part of the government, e-Government is envisaged and poised to offer a more cost-effective public service (Nunes et al. 2017). Among others, e-Government enables the reduction of corruption by promoting transparency (Ali & Gasmi 2017), accountability and trust, reduction in the cost of public service delivery and efficiency in public service delivery (Sun, Ku & Shih 2015). In general, the following are the key benefits of e-Government implementation on the part of the government:

- accountability in the different actions and decisions made by the different government organs (corruption is measured using the Corruption Perception Index [CPI])
- implementation of lean and agile processes in the government business processes and transactions
- managing of e-Waste from gigantic government departments
- increased transparency in the government
- enforcing environmental sustainability

- e-Government is a good platform for narrowing the gap between local and central governments and therefore acts as a bridge between the two (Al-jenaibi 2015)
- higher productivity (enshrining of efficient and effective public service delivery, etc.)
- freed up resources allowing the government to save on the cost of provision of public services
- sharing platforms, data and resources.

On the part of individuals, e-Government is used to save time in accessing public services and information, facilitate better user experiences, enhance service quality and so on. E-Government culminates in increased citizen participation in the governance processes (e-Inclusion) and allows government information to be easily accessed by citizens and businesses. The following are some of the basic benefits of e-Government for individual citizens and businesses (Kumar & Best 2006; Navarra & Cornford 2007):

- enabling of participatory democracy and social inclusion
- improved transparency in individual's interaction with government
- participation of the different businesses and ordinary citizens in the governance business processes
- e-Inclusiveness as the possibility of disadvantaged individuals such as those with disabilities to use technology platforms anywhere and at any time to obtain public information, engage with government departments and generally participate in the different decision-making processes.

It is worth noting that basic e-Government applications, such as applying for drivers' licence online, renewing passports, paying for utilities online, accessing policy and government information online and so on, may mean a great deal of public service delivery transformation for a majority of individuals in Africa and in other developing countries.

One of the other key benefits for e-Government is that it can result in substantial cost savings on the agenda of public service delivery. Ideally, governments in the developing countries are highly bureaucratic employing more than the requisite number of people to handle a single business process which could otherwise be handled by a few individuals. This, therefore, translates into bigger workspaces which are endowed with both visible and invisible costs. Employing ICTs results in cost reduction as the workforce assigned for a certain work will be considerably reduced. A change in the approach of business processes can change the cost involved in executing a given business process. For example, Oracle managed to save US$2 billion in the period 2000–2001 by implementing the following in their business processes:

1. reduced the number of email servers in the world from 100 to 2 by consolidating their ICT infrastructure, thereby saving the organisation about US$200 million
2. improved Oracle services with the introduction of the self-service functionality
3. procurement through different ICT platforms saved the company over $150 million (Kearns 2004).

Within the ambit of e-Government, there are several interventions that are now being propagated to achieve transparency and accountability of government business processes. The first point-of-call is opening up government data so that decisions made within government departments are accessible to a majority of the people and business entities. Putting data in the open online platforms or unhindered retrieval systems allows citizens to pervasively access public data and make informed decisions as they traverse the socio-economic landscape in a given context.

Barriers for e-Government Penetration

There are several roadblocks to the penetration of e-Government at the individual or public service level. Referencing previous studies, Nurdin, Stockdale and Scheepers (2011) recognised the following barriers to e-Government adoption:

- lack of adequate citizens' participation, seen in an unwillingness in citizen's engagement in different aspects of e-Government solutions within the public service offerings

- low leadership and lack of adequate personnel commitment in ensuring that public services are delivered using technology platforms
- lack of adequate collaboration among government departments and units; lack of responsibility on the part of government leaders
- rigid government strategies and lack of appropriate change management strategies
- limited transparency in government management and administrative procedures
- lack of general trust in employees and government institutions
- lack of learning organisations on the part of government departments, resulting in limited training opportunities for government employees
- lack of willingness on the part of government to learn from other governments' experiences
- unclear missions and visions, resulting in conflicting or unclear e-Government goals
- lack of implementation strategies informed by the local contextual characteristics
- restrictive laws and regulations with no formal rules to guide e-Transactions and ensure protection of personal data
- rigid organisational structures or hierarchies which cannot easily be repositioned to accept change or emerging trends
- weak coordination between the central and local governments.

The barriers articulated above have been found to be consistent in many countries throughout the world and should therefore be considered in the design of e-Government programmes and interventions.

In general, it can be posited that e-Government has three primary challenges spread across trust, access and management. Some of the key challenges to realising the full potential of e-Government include:

1. Privacy – in general, citizens are hesitant to share or disclose their personal information on public information management (e-Government) platforms owing to the possibilities of that

information being mishandled or intercepted on technology platforms and also misused. Some of the sensitive individual information includes medical records and history, employment history, education qualifications, residential address, travel habits, tax information, bank details and so on.
2. Security – although expensive to achieve, cyber security is the hallmark of privacy for any e-Government system. Security is a multidimensional aspect hinged on availability and reliability of e-Government services. It is defined by requisite back systems which are meant to facilitate continuity of operations and government, and vigilant protection of impending threats by viruses and malware.
3. Bureaucratic foot-dragging – can be avoided by the presence of leaders who are willing to put in place appropriate interventions to wipe out red tape and bureaucracy, remove organisational culture roadblocks to adopt new trends and draft requisite policies for the development of e-Government (Myeong, Kwon & Seo 2014). Bureaucratic foot dragging is evident in many parts of Africa and the developing countries and has acted as one of the main roadblocks with regard to integration of ICTs in the diverse business processes of the government. The understanding, in most cases, is that the implementation of e-Government will result in their reduced relevance in their different workplaces.

The different dimensions of the three challenges articulated above can be looked at from the following dimensions:

1. Technical issues – as technology is one of the key enablers of e-Government, many users are interested in knowing the different aspects of technology. The quality of technology depicts the perceived quality of e-Government experience by the users. There is a lack of general technology standards upon which e-Government can be designed. Even as of today, many African countries including South Africa have a higher cost attributed to Internet access and correspondingly e-Government. With the demand for ubiquitous e-Government applications growing at a higher rate, issues with design arise especially with the need for interoperable systems in different governments. The interoperability of e-Government systems

is aimed at providing the portability and compatibility of the different systems (Malinauskien 2013).
2. Political challenges – the general red tape and bureaucracy characteristic of traditional government systems should not be mapped to e-Government. There is a need to consider the different aspects of e-Government. In many of the cases, the depth, scope and breadth of e-Government are not carefully considered in its design stage and therefore not enough monetary resources are allocated to fund each aspect of e-Government. In many parts of Africa, e-Government is subjected to a 'short-term' approach owing to non-sustainable political players.
3. Concerns bordering on privacy and security – the need for privacy and security in e-Government applications emanates from the need to have e-Government applications be used for what they were meant for. The risk associated with lack of adequate and appropriate security in e-Government applications acts as a stumbling block for citizens to adopt them. Citizens have to be assured that their personal information is not going to be used for any purpose other than what it is meant for, and that there will be no eavesdropping on their information or transactions in the e-Government environment. The design of e-Government should include the participation of private entities who should validate the privacy and security modules included in the e-Government design. Users need to be assured that the technology utilised in e-Government applications has all necessary technical rigour to handle all the different aspects of privacy and security. Also, there should be strict implementation of the policies and guidelines related to privacy and security by all the government workers involved in any part of the e-Government value chain. E-Government should strive to meet the minimum expectations of citizens with regard to e-Government implementation (Lau 2003).
4. Understanding the key barriers in any environment in which it is implemented – this is one of the first steps before the actual design and implementation of e-Government.

Disadvantages of e-Government

Despite the many advantages of e-Government implementation, there are several disadvantages of e-Government that need to be considered during its design. In situations where e-Government is not properly aligned to the public business processes, there are higher chances that it can result in undesired outcomes. Thus, although coupled with a plethora of benefits, e-Government transcends towards greater complexity in that it promotes the change in culture and societies in an evolution-like manner (Janowski 2015). Many of the revolutions in the Middle East were ignited by individuals sharing information online.

Many researchers and practitioners have concentrated on the advantages of e-Government in different contexts. However, there are many disadvantages that need to be considered during the design and implementation of e-Government. Some of the disadvantages of e-Government include:

1. Encourages e-Exclusion. People on the left side of the digital divide not having access to the Internet owing to physical handicaps, high levels of poverty, limited ICT skills and literacy levels, advanced age, traditionally living in marginalised communities and so on are completely left out from the governance value chains and left in the dark with regard to government information and policies.
2. If not handled properly, citizens' personal data and information may end up in the wrong hands and their privacy may be compromised. The lack of guaranteed privacy in e-Government applications has made many people apprehensive as to whether they need to engage in e-Government or not (Davies 2015). Design of e-Government endowed with appropriate security and privacy strategies and informing would-be users of e-Government will positively impact on the trust levels of e-Government applications and ultimately encourage adoption and use of e-Government services.
3. When not well-planned, e-Government can consume many more public resources even in terms of public finances; hence, it is important to ensure that rigorous strategic feasibility studies are done before its commencement (Shan et al. 2011).
4. Unsafe or inefficient work might be experienced by government employees if e-Government is not carefully planned (Cajander & Eriksson 2007).

It can be posited that if not designed properly, promising e-Government platforms can be used to disadvantage other citizens. Although it is now increasingly evident that most African countries have developed e-Government to a certain extent, most of them are still not ready for e-Voting and these platforms are mostly used as election rigging platforms. Although some countries have attempted to implement e-Voting systems to showcase their advancement in e-Government, most have been used to rig the elections. There are several recent examples that can be sighted. In September 2016, there was a spirited fight from the opposition parties in Zambia owing to the perceived rigging of elections which was principally facilitated by an electronic transmission system in the rural areas. Another example is that of Kenya during the 2017 elections where it was considerably clear that the general elections were rigged during the transmission of results as the case in Zambia. These recent happenings have showcased how e-Voting platforms in the realm of e-Government can be used contrary to their intended purpose.

Adoption and Usage of e-Government Applications

The penetration of e-Government in different socio-economic setups in both the developing and developed countries is moving at a faster rate. For example, e-Government adoption and usage is now not only considered at the individual, local, organisational or national levels but also in transnational setups. The European Union (EU) is leading in this regard as it has put in place logistical and technical preparations towards its 2019 target to have EU e-Government agenda transcend beyond national borders. This will enable interlinked public information management which will wipe away a lot of roadblocks towards inclusive and participatory governance at the EU level across borders (Roy 2005). Many studies have been done in the world on different aspects of adoption of e-Government rendering technology adoption as the key focus of many e-Government researchers.

There are many barriers that prevent the penetration of e-Government across all corners of the socio-economic hierarchy in any place where it is implemented. E-Government adoption barriers include underdeveloped ICT infrastructure, low ICT skills among potential users, operational costs, limited direct foreign investment in ICTs, fragmented political landscape, lack of e-Government champions and so on (Munyoka & Maharaj 2017). These barriers need to be carefully measured at the beginning of any e-Government project and strategies of how to overcome them drafted thereof.

As mentioned earlier, intermittent and dominant leitmotif of e-Government has been the adoption of e-Government in developing country contexts. Not much attention has been paid to the design of e-Government, especially given the evolving technology platforms. There is clearly a dearth of information on e-Government, both in the developed or developing country contexts. Unfortunately, many researchers, such as postgraduate students or early career researchers, have shunned this area altogether owing to the general lack of literature in this domain. This gap needs to be filled owing to the interest shown by many of the countries planning to design contemporary e-Government applications such as those based on semantic technologies and e-Government 2.0 (Bannister & Connolly 2015).

Mistry and Jalal (2012) conducted a systematic investigation hinged on a longitudinal study approach on the impact of e-Government on corruption in both the developing and developed countries. Their results showed that the use of ICTs in public services resulted in a higher reduction of corruption in the developing countries than in the developed countries. Therefore, adopting e-Government as a tool to conquer the social ills and corruption in developing country contexts looks promising. E-Government platforms allow many political decisions to be made in the public domain, and when it is done secretly, it leaves a trail which can be revealed during the time of audit. For example, after a decision to purchase goods and services has been arrived at, it is possible to check who authorised the purchase, through which bank account the payment was made, at what time was the transaction effected, which government department received the goods after the purchase, which government officer accepted the goods and services and so on. In such an environment, it is very difficult to indulge in corruption as the action trail can expose the transaction(s) during the audit.

Designing e-Government Applications

Contemporary guidance on e-Government design has shown that the most relevant, responsive and sustainable e-Government applications are those that are designed with careful reference to the local contextual characteristics. Many e-Government initiatives that have been designed using mainly examples from the developing countries have mostly failed. This is because contexts differ and therefore an e-Government design using factors from a different area will be a mismatch and will not dovetail to the local contextual characteristics and ultimately fail. Therefore, it can be posited that the starting point for the designing of competent e-Government applications is understanding the contextual characteristics of the area in which it is to be implemented. This may involve ascertaining the language spoken and read by the majority of the citizens, their levels of ICT skills, cost with regard to access to the Internet, proportion of the population who have Internet-enabled mobile phones, cost of data bundles, capacity of the government to design citizen-centric e-Government applications, availability of requisite ICT infrastructure, competence of the government workers in mainstreaming ICTs in the different government business processes and so on. In a nutshell, a well-informed preliminary study needs to be done to inform the design of e-Government.

The understanding of the contextual characteristics of the majority of individuals in the area e-Government is going to be implemented needs to be embedded onto the design of the e-Government platforms. As e-Government is designed based on the concept of citizen-centricity which entails that governments focus on citizens so as to facilitate openness, transparency and collaboration in the provision of government services, the citizen is considered one of the key determinants in the design of e-Government. In this case, the citizen is the centre of reference determining the way e-Government interaction platforms are designed (Al-Khouri 2013).

The design of effective e-Government applications needs to consider the transformational nature of e-Government owing to the rapidly changing dimensions of e-Government such as technology or citizens' preferences on the access mechanisms of e-Government applications. Furthermore, one needs to consider the paradigm changes of e-Government such as those shown in Figure 1.2. Generally, e-Government has brought in a paradigm shift where traditional government has been transformed into

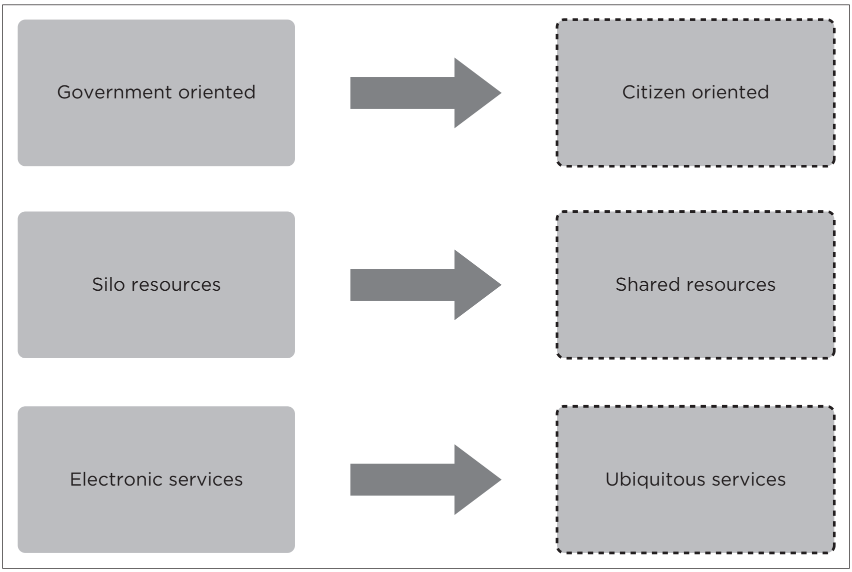


FIGURE 1.2: Paradigm changes in e-Government.

more responsive citizen-oriented governance. The older traditional government model focussed so much on itself (government-oriented); its departments or units were siloed and the public services, if offered on technologies, were offered on immovable platforms and one had to visit a government department to access a service.

Contemporary e-Government services have embraced ubiquity or pervasiveness. Because of shared resources among interconnected government departments, citizens and/or businesses are now able to access services within a short period of time without having to approach the different pertinent departments. The public services are now offered comprehensively at one source and can be accessed anywhere at any time. Contemporary e-Government models are progressive in that there is an urgent push to offer services through open and interoperable platforms which means that by the end of the day, it will be possible to ubiquitously access services in any platform (platform neutrality). The new models of e-Government have gone a step further in offering progressive services which allow all citizens to access them in the true spirit of e-Inclusiveness. Relevance and currency of e-Government is achieved by continuously integrating the evolving technologies into public service delivery platforms and continuously encouraging public service innovation (Wirtz & Daiser 2015).

Requirements for e-Government Implementation

Being a multidisciplinary phenomenon, there are many modules that need to be included in the implementation of e-Government. The first step is understanding the four basic principles that accompany a successful e-Government implementation. The first principle is that there is a need to implement e-Government using a stepwise process. The modules are included in the implementation agenda step by step. The second principle is that e-Government platforms need to be designed on open, interoperable and scalable platforms. The third principle is understanding that the focus of e-Government is changing from cost reduction to facilitating better government, enshrining metamorphosis from central to local and especially focussing on the individual citizens. These principles will guide how implementation should be handled. The fourth principle is to continuously observe the local context in which e-Government is implemented.

The second step is understanding the three basic dimensions of e-Government. The three different dimensions articulated below are the different models through which e-Government can be made available to the different customers:

1. Democratic dimension – focusses on the political platforms and processes allowing different constituents of the government to collaborate and exchange information for the enshrinement of democracy into the government processes. This looks at the different models of democracy and ascertains how they can be implemented in a given context. The democratic dimension is the mainstay of e-Democracy.
2. Service dimension – focusses on how the different public services are delivered. This concentrates on understanding the different desired levels of service and according to levels of service agreements (SLAs). The service dimension is the mainstay of e-Services in the realm of e-Government.
3. The administrative dimension – focusses on internal back-end business processes by looking at the management and control mechanisms in the public service provision frameworks. The administrative dimension is the major tenet of e-Governance.

In addition to the three dimensions, e-Government also requires a pertinent information infrastructure that can coordinate the different aspects of the technical and management routines both at the back-end and front-end business processes (Jansen 2005). The different dimensions of e-Government require different theories and frameworks when investigating the different aspects of the factors defining each of the dimensions.

Evaluating e-Government Implementation

Once e-Government has been designed, then the need is to come up with a strategy on how to embed technology onto the government's business processes. This integration involves the transforming of traditional government services into online services which can be accessed using ICTs. The first phase of development involves placing government information online so that citizens and businesses can access it through the Internet. This scenario presents a one-directional flow of information at a time. The second phase of development involves placing download and upload links on e-Government websites to allow simultaneous bi-directional flow of information between the citizens and businesses. The third level of development of e-Government is a highly interactive stage which allows bi-directional instantaneous flow of information. In this stage, citizens are able to engage with government agents in real-time and are able to participate in different government processes, namely, policy-making, decision-making, e-Voting and so on.

After a certain period of time from the onset of e-Government implementation, there is a need to evaluate and assess the level of development of e-Government (see Ch. 5). Evaluation and assessment allows the implementing agents to understand the rate at which their e-Government effort is developing and assess whether it is meeting expectations at that level of development.

When assessing each level of e-Government development, there is a need to understand the key benefits that are harnessed at that level. Understanding the whole array of benefits for e-Government is important so as to weigh whether e-Government is a worthwhile investment or not. It is important to understand the return on investment (ROI) as e-Government requires substantial capital investment and as such the investment needs adequate direct or indirect return to qualify to be a valuable investment. Understanding the level of benefits for e-Government is important so as to ascertain the opportunity cost involved in investing in e-Government. It is worth mentioning that e-Government is an expensive undertaking which needs a lot of monetary resources. These resources could potentially be utilised by the government and developing partners to provide other pressing public services like building hospitals, schools and so on. Therefore, the value obtained from government needs to surpass the anticipated benefits that can be obtained if the money were used to invest in other public services.

Conversely, the ROI measures the monetary aspects that come from investing in e-Government spread over a period of time (Savoldelli & Codagnone 2013). It is also important to measure the expected rate of return (ERR) so as to understand the key benefits of e-Government – whether intangible or not.

Book Rationale

The previous sections have shown that there are many dimensions of e-Government that need to be explored before implementation in any given environment. Unfortunately, limited text exists on each of the issues identified. This book aims to do justice to each of the issues by exploring them in detail, especially from African and developing country perspectives.

There are several pointers that exist as motivation for this book:

1. There are generally no models that can guide on how to appropriately encourage the adoption and usage of e-Government applications. Consequently, there are no global frameworks or models that guide the different aspects of e-Government implementation. This is because there is a dearth of studies documented that focus on e-Participation, especially from a quantitative point of view (Krishnan, Teo & Lim et al. 2013).
2. The lack of theoretical models has negatively impacted the development of methodology in the enquiry of e-Government in different contexts. The eminent gaps in methodology, research and practice of e-Government calls for more discourse around the different aspects of e-Government in different contextual settings.

3. E-Government is not recognised as a mature science owing to the lack of its own frameworks. Generally, apart from being a clearly defined domain of enquiry, a scientific field is characterised by a defined set of theories that define the conceptual backbone of the field. The absence of plainly defined and/or indigenous/native theory has led many scholars and practitioners to label e-Government as a field without adequate rigour and less connected to previous efforts or thought. The case of e-Government is different as the field largely relies on imported theory from other fields such as public administration, social sciences (focus on human behaviour), IS, psychology and so on, accentuating its multidisciplinary nature (Bannister & Connolly 2015). Unfortunately, many researchers and practitioners from the developing countries are left out of the key debates revolving around the development projectiles of e-Government (and its different emerging forms).
4. Given the fact that e-Government is developing at a faster rate in Africa, in other developing and developed emerging country contexts, it is important to understand the different contextual nuances that influence its effective development. This book intends to explore the different ramifications of e-Government.
5. With the lack of a universal model for public service digitisation efforts of governments, there is an urgent need for multidisciplinary cross-pollination of ideas, experiences and concepts. This book intends to lead this debate from the developing country perspectives.
6. Given that e-Government research and practice is generally in its nascent stage anywhere in the world where it is implemented apart from very few countries, it is important to collate the advances in this field. This book intends to provide a snapshot of achievements from the conceptual, innovative and implementation standpoints and further articulates the future development projectile of e-Government research and practice.
7. Although many publications on e-Government are now sprouting out of Africa and the rest of the world, there is generally a dearth of information in as far as context-aware (informed by the local context) e-Government design and implementation is concerned. Many publications have

generally been scratching the surface and not going in-depth in investigating the key issues accounting for the slow pace of e-Government penetration, especially in developing countries' context. This book intends to contribute to the body of knowledge by presenting chapters that bring in-depth analysis of the African context in as far as e-Government development is concerned and thereby position itself as a key reference source for e-Government research in Africa.

8. Furthermore, the developing countries lag behind in as far as the degree of utilisation of technology in their public business processes is concerned. As a result, there are no novel cases of reference that can be used to make a business case for e-Government implementation given the contextual nuances of the developing countries. Because of a lack of authoritative cases for e-Government development from the developing country contexts, much discourse on e-Government has been guided by case studies from the developed countries and conceptualisations guided by global north, Eurocentric and Asian thinking models.

As e-Government research and practice continues to grow given the large number of developed countries and countries from Africa jumping onto the bandwagon, a lot of issues are being discovered with regard to e-Government implementation. Given the need to investigate contemporary issues in the e-Government domain considering the rapid evolution of government design and implementation models, the need for responsive e-Government models is urgent and unavoidable owing to the huge opportunity cost if ignored. This book explores issues that come up given the 'metamorphosis' of governance models over time in order for government to remain relevant and effective to its core mandate. It can generally be posited that e-Government is adopted and used at low levels in almost all the developing countries than desired (Fakhourya & Aubert 2017). This has negatively impacted the levels of innovation in the public sector delivery frameworks. In the contemporary world where innovation is highly desired, it is important that public organisations also come up with strategic knowledge management initiatives in the realm of e-Government (Venkitachalam & Willmott 2017).

The implementation of e-Government involves integrating ICTs in the government business values chains such as allowing platforms for online passport or national ID applications, resident permit applications, online tax returns, access to a wide range of government/public information, procurement for government tenders online (e-Tendering), online public document verifications (e-Verification), accessing health care online (e-Health) and so on.

This book uses a variety of methodological approaches which are centred on both qualitative and quantitative approaches. The philosophical underpinning was informed by both the positivist and interpretivist paradigms. Some aspects of the research done demanded an in-depth analysis on why certain things happen the way they do when designing and implementing e-Government. In such cases, in-depth analysis and thematic analysis were conducted. In some case studies presented, especially that of e-Government in Zambia, factors influencing adoption and development were explored using a statistically oriented approach. Further, the book was hinged on the author's research and professional experience in the design and implementation of e-Government. A large section of the book aims to showcase the approaches and strategies in e-Government design and implementation given the varying contextual setups in different countries globally. This was necessary to contribute towards coming up with a matrix of best practices in design and implementation of e-Government. The book uses both systemic and comparative analysis coupled with generations given the recurring themes and findings. This book intends to contribute exactly to that cause and position itself as a germane source for research and practice of e-Government given the latest trends.

To understand the different issues that affect the e-Government development discourse, the book discusses the different conceptualisations of e-Government including its design and implementation. Furthermore, the book explores the different e-Government development measurement tools, mechanisms and frameworks. The last part of the book explores the current status of e-Government penetration in Africa with key references to the empirical case study of Zambia. Future prospects of e-Government in Africa, given the current development projectile, are explored.

Because of a dearth of research and information on the original aspirations for e-Government in the realm of information society as espoused in the 2003 World Summit on the Information Society (Berry 2006), there is a need to pursue the research agenda of 'e-Government for sustainable development'. It is worth mentioning that such a theme would be very appropriate in the case of Africa (Lee 2007). Chapter 10 of this book explores the current trends and future perspectives of e-Government.

Conclusion

This chapter has presented the basic tenets of e-Government and has articulated the key issues that define the success and effective development of e-Government. The thesis of this chapter, and therefore this book, is that e-Government is a multidimensional phenomenon that can be appropriately designed after carefully considering the local context. There are several key determinants of successful e-Government, namely, technology, citizens and so on. These determinants depend on the context in which e-Government is implemented. The book's rationale has shown that e-Government is still in its infancy as it almost entirely depends on other fields for its theoretical and conceptual bases. As a lot of e-Government implementation efforts fail, it is important that carefully thought strategic plans underpin the designs and implementation efforts of e-Government. This book is an effort to bring to the fore of research the different issues of e-Government design and implementation, especially in resource-constrained environments.

Chapter 2

E-Government and Effective Public Information Management

Overview

With the changing models of public administration, e-Government comes in as a lever for increased efficiency and effectiveness in public service delivery business value chains. Efficiency and effectiveness are the key attributes of the New Public Administration movement which demand that government information and services be easily and conveniently accessed by citizens and businesses. This chapter explores the emerging forms of e-Government such as Government 2.0 and Semantic Governance and presents scenarios of how these can be used to achieve effective public information management. Further, the chapter discusses the multidimensional aspects of e-Government applications, presents practical uses of e-Government and further

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articulates the impact of e-Government on public service delivery. As e-Government is being implemented in different parts of Africa and the world at large, it is important to look at the causes of success or failure of the e-Government projects. The chapter further presents synoptic case studies of failure and success detailing the different issues at the centre of e-Government design and implementation. Understanding these issues in different contextual settings helps to avoid failure in e-Government implementation.

Africa and e-Governments

As posited in Chapter 1, Africa lags behind the rest of the world in terms of the level of e-Government development. This is principally owing to underdeveloped ICT infrastructure, lower ICT skills and unwillingness of the leaders to implement e-Government, among others. In the contemporary world where service excellence is non-negotiable, the expectation and need for government departments to jump onto the bandwagon for implementing innovative public service solutions such as e-Government cannot be overemphasised. Adopting the mantra of public service excellence, e-Government is being adopted all over the world at a large scale (Parent, Vandebeek & Gemino 2014). E-Government is a contemporary undertaking which provides multichannel interaction and multi-service delivery platforms with a desire to further increase access to government services (Shan et al. 2011).

There are several structural, technical and socio-economic challenges that need to be overcome if e-Government were to stand a chance to succeed regardless of the area in which it is implemented. Worldwide, there are many challenges such as limited access to the Internet that need to be addressed if e-Government for universal access to public information and services were to be realised. Specifically, in the developing countries, slow penetration of e-Government is influenced by limited availability of requisite ICT infrastructure, limited readiness to integrate technology into the different public sector business processes owing to managerial and technological mismatches, lack of trust in the e-Government platforms by the general citizenry, lack of global awareness and a general lack of leadership. For example, the international telecommunication union (ITU 2014) reports that over 3 billion people have no access to the Internet in the developing countries. This means that the digital divide and therefore information seclusion is more evident in the developing countries, resulting in a cushion for developing country citizens to access digital opportunities. As posited above, for a long time, Africa has been labelled as a 'technological desert' and many prior initiatives for e-Government implementation have failed owing to, essentially, lack of requisite infrastructure, low ICT literacy rates, low economic development, and a variety of cultural factors (Rorissa & Demissie 2010).

The non-availability of adequate infrastructure and existence of design-reality gaps have been identified as one of the key bottlenecks for the success of e-Government in the case of Africa. The propensity to failure of e-Government projects is exacerbated by differing interests of the many actors involved in the e-Government establishment (Guha & Chakrabarti 2014).

Although the gloomy picture presented above is still evident in many parts of the African continent, there is a gleam of hope as this stereotype characteristic of Africa is quickly changing. The huge investments in ICT infrastructure in the continent with regard to erection of undersea optical cables (e.g. Eastern Africa Submarine Cable System [EASSy], East African Marine System [TEAMs], West African Cable System [WACS], Lower Indian Ocean Network [LION/LION2] submarine cable, etc.) have improved ICT literacy rates, revamped interest in investing in ICTs by African governments and resulted in huge Internet penetration rates, especially propagated by mobile Internet-enabled phones and so on. Many of the African countries (Botswana, Zimbabwe, Kenya, South Africa, Mauritius, Seychelles, etc.) have aimed at transforming themselves into knowledge-based economies by 2020, and it can be posited that this target is not far-fetched. The potential for e-Government is exacerbated by the fact that older leaders who did not appreciate the benefits of technology are slowly retiring and new, young blood is slowly taking up leadership positions. The new generation of leaders in Africa are promising to lead digital revolution where governance migrates online for increased efficiency, transparency and accountability. The chances of success of e-Government in Africa are further enhanced by the over 30% of the young population who are digital natives (Janowski 2015).

As demonstrated in Chapter 1, there are many positive and practical uses of technology both in the public and private sectors. For example, the extensive use of technology by the former US President Obama during his presidential campaign and his presidency showed the potential of e-Government in facilitating increased transparency and openness in government (Magro 2012). E-Government is a good lever for simplifying complex public services and facilitating unhindered collaboration among citizens and the different government departments (Dunleavy & Margetts 2010). Although e-Government is not a panacea for governance inefficiency and ineffectiveness, it has been empirically demonstrated that e-Government goes a long way in pushing towards improving efficiency and effectiveness in the government business processes (Parent et al. 2014). With regard to the potential of e-Government in reducing the cost of public service delivery, it is posited that the EU could save as much as $6 billion by 2020 by offering ‘whole of government’ services (Davies 2015). Despite the aforementioned accrued benefits of e-Government, it is surprising that the levels of adoption in many governments throughout the world are considerably low (Nunes et al. 2017). In many parts of the world, e-Government initiatives are still in their nascent stage in as far as implementation, adoption and diffusion is concerned.

The Value of e-Government

The value of e-Government is defined as the relative, cumulative return obtained out of the integration of technologies in public service delivery frameworks. This value depends upon the entity assessing the actual or perceived return on e-Government, for example, value from the perspective of a citizen is individual value, whereas value collectively perceived by a community is public value (see Ch. 3). In this chapter, we explore the general conceptualisation of value.

E-Government is focussed on the 'utilisation of ICTs towards transformation of internal and external public sector relationships with a view to optimise public service delivery and citizens' participation' (Bwalya 2017:2; Sarrayrih & Sriram 2015). Properly designed e-Government solutions present 'itself not only as a pathway to access or [engagement] with government but also [brings] about developmental opportunities to the local communities as a whole' (Bwalya 2017:2; Rorissa & Demissie 2010). Further, e-Government enables the 'use of technologies to provide citizens with information and services to enhance their participation in democratic institutions and processes' (Bwalya 2017:2; Joseph 2014). In many cases, the impetus of governments' drive to provide public services on electronic platforms emanates from the emergence of international trends of digital economy and information-based societies.

As posited in Chapter 1, not all governments are motivated to implement e-Government with noble goals of revitalising public service to benefit the citizens. Some of the other positive driving forces of e-Government include:

1. Desire of governments to jump onto the bandwagon of participation in the 'information society' as a direct response to the emergence of the information age.
2. Emergence of 'more demanding citizens' who are interested in the affairs of their governments and who hold them accountable for the development discourse and transparency and provision of services according to the desired Service Level Agreements (SLAs).
3. Wider adoption of ICTs making it a candidate platform for the provision and access of public services.
4. Increasing number of digital millennials who are less likely to engage with government departments using traditional ways

and so on. In situations where e-Government is implemented in an environment where there are siloed government departments and municipalities, the following problems in the business processes are evident: inconsistent access to information and citizens' experience, one-directional service, different service channels, lack of simplicity, no accountability and transparency, limited citizen participation, varying levels of ICT maturity, inefficiencies in cost and so on (GCR 2015).

E-Government presents itself as a platform that can be used to facilitate active participation of citizens in the decision-making processes of the government (Karokola & Yngström 2009). The use of ICTs in governance value chains could potentially create more participation or more exclusion of citizens in the governance processes (Magro 2012).

Further, in a bid to promote 'openness and transparency in public service business value chains' (Bwalya 2017:1), many governments have employed ICTs as 'a cost effective [...] enabler towards achieving responsive government to citizens' needs and control of corruption in government [businesses] as it encourages accountability' (Bwalya 2017:1; Bertot, Jaeger & Grimes 2010).

It is also worth mentioning that (Bwalya 2017):

> [*C*]orruption which is endemic in Africa and most of the developing nations can be eradicated principally using three main ways: through administrative reform (the idea of e-Government to promote openness), law enforcement and the social change approach. These three approaches can be enforced in tandem if e-Government is appropriately and contextually designed. (p. 3)

Although on paper it sounds easy to implement, e-Government is not a simple matter given the varying contextual characteristics in areas where it is implemented (Ke & Wei 2004). For example, Singapore presents a case where huge challenges had to be overcome in order to realise the true potential of e-Government. Starting on a slow note on e-Government in the 1990s, Singapore has now shown massive developments in e-Government and presents itself as one of the most competent countries in e-Government implementation in the world. A lot of initial challenges have been carefully and strategically overcome. Successful implementation of e-Government in Singapore is supported by integrated and coherent strategic approach, a highly wired environment, stable government and political establishment, relatively higher literacy rate among the citizenry, dedicated funding towards e-Government (such as the initial US$932 million funding for the first three years of e-Government implementation) and so on (Ke & Wei 2004).

True value of IT investment can be measured by considering the totality of economic and social benefit. The value of IT can be directly measured by considering the degree of productivity, cost effectiveness and the improvement in the overall degree of service delivery. Governments around the world are implementing e-Government to ensure they remain competitive and achieve their mandates (Raja & Ramana 2012). Examples abound which can accentuate the value of e-Government. For example, in addition to serving people with easy access to ICTs and who are highly literate, the strategic orientation of the e-Government programme in South Africa is that it should also be able to reach the marginalised communities, especially those that were secluded from technology and government systems by the apartheid system.

Unfortunately (Bwalya 2017):

> [*M*]any of the African governments have been found to promote e-Government merely as rhetoric because of the deep-rooted secrecy to information, which, in most cases, [*is*] engulfed into the cultural [*fibre*] of African nations. (p. 2)

Metamorphosis of Public Service Delivery

In a bid to remain relevant and operate according to expectations, the transformation of public administration is going (Bwalya 2017):

> [*T*]hrough different phases over the years from traditional administration styles where individuals need to visit physical offices to obtain a service to accessing public services through technology platforms (e-Government). (p. 4)

Regarding transformation (Bwalya 2017):

> Transformation is about change and when looked at through the lens of public administration may mean an improvement in the service and a perceivable change which brings about significant difference in the ex-ante and ex-post of the transformed entity. (p. 5)

As discussed in Chapter 1 (Bwalya 2017:n.p.), 'traditional public services [have been] characterised [by] rigidity, proceduralism, red-tape, inefficiency and incapability to serve clients.' Over the years, technology was recognised as a lever, catalyst or tool for administrative reform (Helbig, Gil-Garcia & Ferro 2009; Gil-Garcia & Pardo 2005). A further note on the use of e-Government in public service delivery is that (Bwalya 2017):

> The use of technology in public service delivery facilitates increased operational efficiency because overall cost of public service delivery is reduced; and improved (better quality) public services are provided by government departments. Using technology in the e-Government domain ensures that public service delivery is brought to the doorsteps of the people [*allowing even*] the socially disadvantaged individuals to be included (e-Inclusion) and participate in the decision-making and governance value chains. (p. 3)

The annals of governance development projectile show that government models have evolved from traditional governance where individuals had to visit a physical office to access public services, to the concept of New Public Management (NPM) which propelled citizen-centric government solutions. NPM brought about e-Government basically hinged on providing government services through technology platforms and mobile government (m-Government) enabling citizens access public services on mobile devices. 'The hallmarks of NPM were [hinged on] promoting efficiency, marketization, accountability, decentralization, and reinventing government so that it is more responsive to the needs of the citizens' (Bwalya 2017:4; Navarra & Cornford 2012). The concepts enshrined in the NPM advocate for radical re-engineering of public service business processes, efficient and low-cost public services and utilisation of the Public–Private Partnership (PPP) funding models (Dehkordi et al. 2012). In its entirety, the NPM is hinged towards adaptive information management models in the public service delivery models and enhanced citizen participation in the governance delivery value processes.

The genesis of government transformation to come up with e-Government was kick-started by the Digital State Paradigm (DSP), the NPM and completed with the emergence of the Digital Communitarianism (DC) movements. Specifically, e-Government was ushered in using the DSP which advanced the thinking of quality services and parallel social development (Dehkordi et al. 2012). 'E-Government research has concentrated on two dimensions – technological (inherent features of technology that determine the impacts of introducing it) and social (human choices within different social structures) determinism' (Bwalya 2017:5; Heeks & Bailur 2007). 'Based on NPM, Public Service Platforms (PSPs) are a new form of technology platform that support service provision to citizens in an e-Government framework' (Ranerup, Henriksen & Hedman 2016).

Regarding OGD and the NPM Management Model (Bwalya 2017):

> The NPM Managerial Model posits that the role of the state is to provide information and focuses on transactional activities such as tax filing, drivers' licences and for accessing government information. The Consultative Model promotes a limited degree of citizen/business-state interaction where e-Government is seen as an attempt to link various legacy systems in the governance hierarchy. The first point of call for e-Government implementation is e-Readiness which is the ability of an economy to utilise ICTs in order to tap into the different opportunities brought about by the new economy. The [*NPMMM further*] posits that the role of the state is to provide information and focus on transactional activities such as tax filing, drivers' licences and for accessing government information. [*Another model*], the Consultative Model [*(CM)*] promotes a limited degree of citizen/business-state interaction where e-Government is seen as an attempt to link various legacy systems in the governance hierarchy. The type of e-Government design envisaged in this [*chapter*] is the Participatory Governance Model [*(PGM)*] which aims to ensure that all citizens/businesses regardless of their social standing participate in the design and implementation of e-Government thereby increasing the representative base in the decision-making processes. However, because of changing times in the information environments

> and landscapes regardless of the contexts, NPM has generally outlived its usefulness due to its diminished anticipated impact on the overall government. Therefore, it is important to have adaptive e-Government solutions designed collaboratively which aim to ensure that managerial policies, technology and people are strongly coupled together. [*The*] e-Government [*movement*] has [*paid much attention to the*] OGD which argues that government information and decision-making processes should be put in the public domain where individuals regardless of their status can access them. The OGD [*movement*] opines that there should be accountability and transparency in public administration. [*In real-world scenarios*,] the OGD movement has been faced with considerable technical and social barriers that threaten its wider adoption [*the world over*] towards [*recognition as*] a hallmark for open and responsive government enshrined onto the FOI conceptualisation (Dawes, Vidiasova & Parkhimovich 2016). (pp. 4–5)

In light of the foregoing, there is a need for requisite legal framework for public information access. Other initiatives have attempted to fill the void for the lack of practical models or frameworks within the umbrella of open data initiatives. In Africa (Ohemeng & Ofosu-Adarkwa 2015), one of the notable ones is the (Bwalya 2017):

> Ghana Open Data Initiative (GODI). At the global level, the Global Open Government Partnership (GOGP) aims to encourage the development and proliferation of multi-stakeholder governance frameworks. On the other hand, national initiatives such as the GODI aim to advance the principles propagated by GOGP at the national level. The GODI aims to re-connect the supply and demand sides of e-Government in Ghana so that they exchange public information. (p. 5)

Contemporary e-Government involves digitisation, transformation, engagement and contextualisation stages (Janowski 2015). In order to encourage the agenda of contemporary e-Government, different forms of e-Government exists. These depend on the access parameters. One of them is mobile government (m-Government). 'M-Government has seen rapid growth especially in many of the developing world countries where the mobile penetration rate is relatively higher' (Bwalya 2017:5; Serra et al. 2015). In a bid 'to further link citizens and government and transform their interactions' (Bwalya 2017:5), a number of emerging or contemporary technologies are being adopted in e-Government designs. Some of these technologies include K8 (BOLD), Internet of Things (IoT), Web 2.0 applications and so on. K8 (BOLD) was conceived to metamorphose the interacting experience of citizens and businesses on different government platforms (Janssen & Van den Hoven 2015). The development and use of IoT is (Bwalya 2017):

> [/]ncreasing every day and new innovations appear to make our society more safe and secure, but at the same time threaten individual privacy (Janssen & Van den Hoven 2015). Web 2.0 platforms are slowly being utilised as e-Government tools especially for activities ranging from open policy-making, customer service to collaborative platforms. (p. 5)

Based on Web 2.0 technology platforms, e-Government has transformed into e-Government 2.0. E-Government 2.0 is currently used in many local government initiatives such as in the UK Local Government Authority (UKLGA). Convergence of different forms/models of government has culminated in a quest for semantic and Government 3.0 models which are governance systems equipped with capabilities for heterogeneous data management and analytics, dynamic back-end system integration, friendly data access points/dashboards, highly scalable systems, negligible spatial–temporal dimensions (access to government services done anywhere and anytime) and so on. With the proliferation of public data generated from multiple public service points, data-driven future, big data and predictive analytics and smart cities, governance systems need to be designed in such a way that they are capable of managing and analysing huge sets of data and are highly scalable to respond to changing trends in governance. The need for responsive governance systems facilitates ultimate inclusiveness of individuals into the governance and decision-making value chains regardless of their status. The new forms of e-Government also need to follow the design principles commensurate to the known e-Government requirements. For example, the need to design responsive Government 3.0 governance systems informed by contextual characteristics and lessons of success/failure cannot be overemphasised.

Table 2.1 shows the transformation agenda of e-Government by presenting a development prognosis of e-Government and its different entities until the year 2020.

Table 2.1 has brought out many anticipated changes of e-Government which are envisaged by the year 2020. In general, there is no much change with the orientation of e-Government on its focus although in 2020 there will be much emphasis on self-governance made possible by rapid penetration of technologies in

TABLE 2.1: The e-Government development projectile.

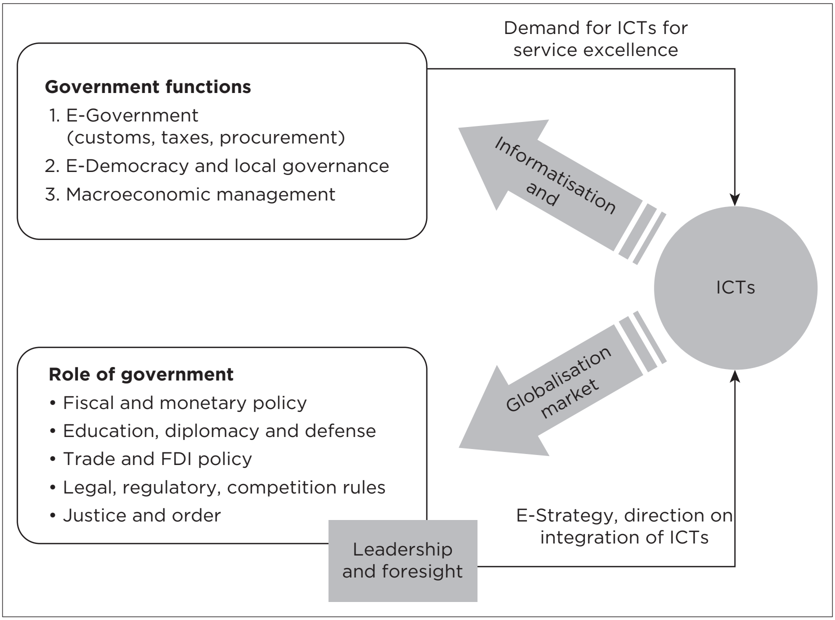
Development projectile	Years		
	2001	**2010**	**2020**
E-Government focus	- Security - Sharing of informational resources	- Security/privacy - Institutions/enterprise architecture - Service standards and interoperability - ROI	- Service innovation and change management - Inclusion in governance value chains - Cloud and fog computing - Transparency and self-governance - Intelligent public information processing
E-Government drivers	- IT department driving change - Public sector - Finance and accounting	- Public and private sector (PPP model) - Government as whole - Change agents - Local government	- PPPs and franchise models - Localised - Internationalised
Infrastructure	- Key to accessing WWW applications - BitNet - Secure, private networks	- Digital divide issues - Mobile or pervasive networks - Broadband access - Convergence	- Commoditised network - Pervasive broadband
Information exchange	- Electronic data interchange - Unsecured packet switching	- Web-based secured (https) - Web 2.0 - Open networks	- Two-tier Internet (security and pricing)
E-Government purpose	- Shared databases - Public spending	- Public spending - Better government - Governance - Economic development	- Local versus central government - Socio-economic efficiency

Source: Adapted from Lanvin 2008.
IT, information technology; ROI, return on investment; PPP, Public–Private Partnership.

public service delivery platforms. Self-governance entails an opportunity where one determines his or her own fate given his or her full participation in policy and decision-making, voting through electronic platforms, e-Access to various legislative documents and so on. By looking at political capital as that which intends to act as a public good, e-Government then presents itself as a potential tool for effective public service delivery (Parent et al. 2004). In 2020, there will be more participation in the e-Government agenda by private entities and a majority of e-Government applications are going to be accessed using pervasive platforms allowing any device, anywhere and at any time. The increased participation of the private sector in e-Government development through the PPP model will facilitate a more liberalised funding model for e-Government. The achievement of a more ubiquitous e-Government service will translate into the promotion of increased access to e-Government by citizens regardless of their socio-economic standing. It is anticipated that with the increased developments in the computing field, there will be possibilities for the enshrinement of intelligent public information processing and more reliable and secure off-site information management facilitated by the cloud or fog computing. Intelligent information processing involves big data and predictive analytics and a general capability of instantaneous processing of huge pieces of information to aid decision and policy-making. Given the many technology advancements happening every day, the future of e-Government looks good.

It has thus been seen that although basically attributed to as a technology project, e-Government continuously involves a great deal of business process re-engineering which has an impact on humans, businesses, the organisation, the economy and politics. As a result, social, political and cultural factors need to be considered in order to achieve successful e-Government implementation.

According to Figure 2.1, there are different relational bases between the government and ICTs. Other than the formulaic definition of e-Government, contemporary e-Government design



Source: Adapted from Lanvin 2008.

FIGURE 2.1: Relationship between technologies (ICTs) and government.

and implementation needs to consider the different intricacies such as how to facilitate e-Democracy through e-Government platforms, e-Participation for inclusiveness, aggregation of dynamic information as input for evidence-based decision-making (used as a platform for big data and predictive analysis), government as a whole (highly open, interoperable, integrated and scalable systems for seamless information flow and integrated business processes and adaptation to emerging technology platforms), platform for open data governance (e-Government systems for transparency, openness and accountability) and so on.

Given the above, and 'considering the many benefits that come with e-Government implementation, ignoring the use of ICTs in the public service business processes culminates into a very big opportunity cost' (Bwalya 2017:6). It is important to ensure that there is proper management and utilisation of ICTs in the different socio-economic frameworks 'in order to [harness] the [many] benefits that come with e-Government implementation' (Bwalya & Mutula 2014). Among others, the following needs to be done in a bid to integrate technologies into the different business processes of the government:

1. Managing the demand and supply for IT purchases – despite the players that may be involved in e-Government design and implementation, it is important for the government to take a leadership role in the transition and development of e-Government. On the supply side, even with the participation of the private players in the funding or design of actual e-Government solutions, the government should take a coordinating role to ensure that its key interests and that of the citizens are taken care of. On the demand side, the government needs to motivate its citizens to engage (adopt and use) in e-Government services. Citizens can be motivated by assuring them that they can obtain authentic government information online, can engage with government agents without having to go to the government departments, citizens' information is safe on e-Government platforms as they generally observe privacy and security norms when designing the e-Government platforms.
2. Technology supply, markets for IT – the government needs to ensure that requisite and appropriate technologies are made available to encourage migration of public services into technology platforms. Furthermore, the government needs to ensure that there is appropriate market regulation for IT products so that vendor behaviour is kept in check to ensure that only quality technologies are made available for the development of e-Government.
3. Limiting IT imports and exports – in order to ensure that adequate technologies are available for the development of e-Government on the local scene, the government needs to manage the volume of imports and exports of technologies. The lack of technology in any area where e-Government is implemented should never be an excuse.
4. Labour supply for the IT sector – in order for appropriate service innovations to be realised in public services, 'there is

need for the government and [other] co-operating partners to' (Bwalya 2012) ensure that there is an adequate number of technology experts who are able to design innovative e-Government solutions given the characteristics of the local context. These technology experts need to be pooled from the local human resource base as these have the necessary knowledge of the local context which can then be seamlessly embedded into the e-Government designs. Available IT experts need to adapt the e-Government designs given the changing and emerging technology platforms.

5. Incentives or limits for the IT market – the government and the individuals interested in e-Government need to ensure that there are incentives for the players in the IT market. This will encourage the participation of competent players who are going to make sure that the IT markets retain their vibrancy and ensure that there is a competent market environment which is able to provide any technology assets when called upon.

Furthermore, the three key views of e-Government need to be considered during the design, implementation and monitoring of e-Government if the true value of e-Government is to be realised. Gyaase (2014) articulates the three different views of e-Government:

1. Technology deterministic view – this view entails approaching e-Government design and implementation from a technology-centric standpoint by exploring the different software and hardware options. Questions of how different technology platforms are going to be integrated into e-Government service delivery domains are considered. Furthermore, one of the key technology questions such as integration concerning systems in multiple departments and government units are considered together with interoperability frameworks. The technology determinism view gives little attention to the managerial aspects and political organisation around e-Government (Dawes 2008). This view is hinged on technology and platform design.
2. Socio-technical view – this view focusses on adoption and usage of technology platforms especially drawing from Rogers' 1983 Diffusion of Innovation (DOI) and Davis' 1989

Technology Acceptance Model (TAM). This view investigates factors that influence diffusion, acceptance, adoption and usage of technology in different socio-economic realms. This view borrows a lot from sociology and IS and takes an unbiased view of the symbiotic relationship between public organisations and technology. The most important agenda pursued by this view is the transformation or restructuring of the public service to accommodate ICTs.

3. Socio-political view – this view is hinged on concepts from public administration and political science such as the New Public Administration, decentralisation and rapid reforms agenda in the public sector towards efficiency, effectiveness and relevance.

Web 2.0 and Semantic Government

The move towards implementing e-Government using Web 2.0 was necessitated by the need to inculcate more interaction in e-Government so that dynamic environments with bi-directional exchange of information is achieved rather than a static environment (Sankar 2014). Interaction is one of the most desired characteristics of e-Government in the contemporary world as it entails liveliness as compared to the traditional government system.

Tim O'Reilly and Dale Dougherty coined the term 'Web 2.0' at the dawn of the dot.com era as a transformation from a more static Web 1.0 to a more virtual participatory platform offering opportunities of varying degrees of interaction (Sankar 2014). It is anticipated that once fully integrated into e-Government design, Web 2.0 may make it possible for citizens to co-manage their own information held by government departments (Cavoukian 2009). The management of own information by the citizens and businesses is an important milestone towards self-governance.

Formally, Web 2.0 technologies are defined as collaboration workspaces (user interaction in an interconnected environment for sharing information and communication). The emergence of Web 2.0 has resulted in the use of new technologies on the e-Government space such as cloud and fog computing.

With regard to e-Government, software as a service (SaaS) is a cloud computing service model that is mostly preferred. SaaS articulates a set of interacting platforms made possible with software applications over a distributed Internet architecture without the user's knowledge of the hardware and software configurations (relocation transparency). There are other technology options actively being pursued in the implementation of a transformed e-Government service such as mashups (using integration platforms to aggregate content); online image sharing, for example, Flickr; online video sharing, for example, YouTube; Really Simple Syndication (RSS) – news or information entries from frequently updated sources; social gaming (platform for online games played by different users on the online environment); virtual learning environments (VLEs) – online spaces where teaching and learning can be conducted especially in the distance education mode and so on (Sankar 2014). These are the basic technology platforms that have sprouted out owing to the emergence of Web 2.0 and are used in revitalising e-Government applications for improved user interaction experience.

It can thus be posited that with the emergence of Web 2.0, e-Government has rapidly evolved to form new forms for the convenience of the citizens. Although new conceptualisations and designs of e-Government 2.0 have mushroomed all over the world, implementation and impact on the democracy discourse is still in its infancy. Actual adoption and use of e-Government 2.0 around the world in real government setups is still in its infancy owing to the fact that realising true e-Government 2.0 requires redefining the relationships between the government and citizens (Meijer et al. 2012). New designs for e-Government now tend to use interactive designs based on semantic technologies and Web 2.0. These platforms allow individuals to meet virtually and interact to an appreciable extent so as to exchange ideas on their topics of interest. The general aspirations of Government 2.0 are: increased agility in government services hinged on responsiveness and higher degree of flexibility in the management, administration and delivery of public services; inclination towards delivering optimal public value; and leverage and nurturing innovation at various levels of the socio-economic hierarchy driven by individuals regardless of their societal standing. This will culminate in increased e-Participation levels in the governance processes; ensure that power and knowledge are considered as public assets and therefore distributed broadly and evenly among the citizens and businesses; and instil accountability, legitimacy and transparency in the decision-making processes, thereby increasing the confidence and trust levels of the citizens in the government (Cavoukian 2009). Government 2.0 desires that there is a strong leadership in place to drive the transformation of traditional government systems towards more user-friendly communication platforms with advanced interactive capabilities. New interaction models will enable citizens grow in confidence of the government and its data (Meijer et al. 2012).

The benefits of e-Government 2.0 are abundant – further streamlining of government business processes, reducing the interaction distance space between the government and citizens/ businesses, allowing seamless flow of information, facilitating the transformation of government business models towards more ubiquity, increasing e-Participation and citizens' inclusiveness in the governance business value chains and so on. Furthermore, Web 2.0 culminates in increased access to e-Government services. Because of the actual implementation of e-Government 2.0, online participation into political discourse (e-Democracy) is on the rise. This allows individuals regardless of their socio-economic status to freely participate in matters of public interest using technology platforms. It can thus be posited that transition to e-Government 2.0 is a good recipe for achieving the original aspirations for increasing e-Participation and e-Inclusion of citizens. E-Government 2.0 is a powerful communication tool that can be used in organising the population in times of an epidemic or some other social occurrences. For example, the famous Egyptian (and Middle East) heist was started using Web 2.0 technologies. In Europe, e-Government 2.0

has penetrated to such an extent that it is now even introduced as a module in a university setup (Leszczyński & Sajduk 2015).

In search of competencies, there are further e-Government transactions targeting the use of semantic technologies. The design of e-Government platforms using semantic technologies translates into increased interaction capability and is called e-Government 3.0. The Government 3.0 models are governance systems further equipped with capabilities for heterogeneous data management and analytics, dynamic back-end system integration, friendly data access points/dashboards, highly scalable systems, negligible spatial–temporal dimensions (access to government services done anywhere and anytime) and so on. At the moment, very few e-Government 3.0 applications can be realised because the technology is still in its infancy and should be considered more of a concept, especially in developing country contexts.

With the ever-changing information age, the evolution of e-Government makes it possible for it to evolve into a platform promoting electronic democracy (e-Democracy) and social welfare. For the developing countries, such a scenario is very much desired as it enables many citizens and businesses to participate in the selecting of their leaders. E-Government is further transcending into smart government which is envisaged to be an intelligent type of government where technology systems are able to process government data without the intervention of human beings. Smart government involves the requisite streamlining of internal and external business processes of public services underpinned by law or regulations, defined processes and information channels within citizen-centric conceptualisations (Al-jenaibi 2015). Considering more developed countries (Eom, Choi & Sung 2016 in Bwalya 2017):

> In advanced e-Government environments, such as South Korea and Canada, smart government is now gaining ground. Smartness in the public administration domains entails the enshrinement of creative mix of emerging technologies and the cultivation of an innovation culture which allows timely response to service demands. (p. 6)

Contemporary designs of smart city governments tend to utilise environment-friendly technologies which can be recycled, can be used as enablers for increasing productivity and can ensure the work–life balance of the employees (Eom, Choi & Sung 2016).

Failure of e-Government Projects

Many e-Government projects, especially in resource-constrained countries, fail either completely or partially (Gunawong & Gao 2010; Heeks 2003; Lessa, Negash & Belachew 2016; Lines 2005; Pillay 2012). Understanding why e-Government projects fail is very important to provide informed input for future design and implementation of e-Government projects. In many cases, failure of e-Government is attributed to the lack of understanding of what e-Government entails: definition, processes and functions (Ndou 2004). The success or failure of e-Government depends on many factors depending on the environment in which it is implemented. According to many studies that have been done worldwide investigating the penetration of e-Government, the following are broader factors that impact on e-Government growth:

1. Social-cultural factors – social and cultural aspects have one of the key impacts on whether individuals are going to adopt e-Government services or not. It is anticipated that e-Government solutions are designed in such a way that they do not corrode the moral fibre of a society. For e-Government to be widely accepted, it is necessary that the services be delivered using multiple channels in ethnically diverse populations. For example, e-Government delivered in multi-lingual contexts like Zambia with 73 different ethnic languages needs to have options for content to be delivered in the key languages for universal inclusion into the e-Government effort. Another option that needs to be looked at is the need for e-Government services to be delivered using different level of technical or content sophistication targeting users with varying levels of ICT skills. Furthermore, e-Government needs to be delivered in multichannel platforms so as to accommodate the physically or visually challenged. The use of the multichannel approach ultimately

culminates in increased access, thereby promoting e-Participation. Another factor that is key to the success of e-Government implementation is the cost to access Internet applications. As e-Government applications are accessed via the Internet, it is desired that the cost to access the Internet be as minimal as possible to encourage global participation.
2. Political factors – the political context and environment in which e-Government is implemented is critical for the success of e-Government. Within the political context of e-Government, the key entities impacting on e-Government growth include policymakers, public service administrators, IT technocrats and accessibility issues of e-Government implementation (Malotaux et al. 2007). The political establishment needs to ensure that they provide leadership in the e-Government environment in order to ensure that the right policies are followed, e-Government follows the desired development projectile and so on.

It is worth mentioning that the actual factors pertinent in each of the domains of the group of factors articulated above depend upon the context in which e-Government is implemented. Success of e-Government, therefore, depends on the balance between the supply and demand side of e-Government creating the needed equilibrium. This equilibrium entails that the investments in e-Government should culminate in citizens' adoption and usage of available e-Government services (Rabaa 2015; Gangwar, Date & Raoot 2014).

Competitiveness in e-Government Development

Developing competent and successful e-Government applications depends on a whole array of resources and competencies given its multidimensional nature. Because of huge investments in establishing e-Government, there should not be any room for tolerance of failure or negligence. Any movements in the design and implementation space of e-Government should be carefully and strategically considered. Given the above, there are so many approaches that are used to achieve competitiveness in e-Government and some of them are discussed in this section.

Achieving competitiveness in e-Government implementation entails that the expectations upon which e-Government was designed are achieved to a more or less appreciable extent and that the design withstands the impending pressures in the context the fast-evolving technology and citizens' expectations. In this regard, e-Government is able to achieve service excellence at all times and there are no significant issues with regard to adoption and usage of e-Government applications by the general citizenry. Such kind of a competitive e-Government is only a dream in many developing countries, but it is a reality in South Korea, Singapore, Canada and so on.

With the drive to achieve competitive e-Government implementation, e-Government keeps evolving so that it is implemented on new technologies (Elkadi 2013; Bwalya 2017):

> Since public administration continually reveals itself as a multi-dimensional phenomenon with complex interlinked factors, it is inconceivable to look at e-Government as a panacea to all the problems public administration faces. (p. 3)

Contemporary developments in e-Government have accentuated the fact that e-Government is a multidimensional phenomenon whose different entities need to logically and coherently fit together in a jigsaw puzzle so as to form an integrated and holistic information and service platform. Given the aforementioned, there has been a paradigm shift from overemphasis on technology to holistically look at how the different entities (people, organisational culture, individual perceptions and beliefs, language, etc.) dovetail together to achieve the overall competitive e-Government agenda. The complication of achieving a desired competitive e-Government design is worsened by the different technology platforms in each government department. Furthermore, because of different configuration styles of business processes in each department within the same government, it is apparent to assume that even the technologies in each of those departments differ. Differing technology types and platforms entail that the goal of achieving logical and physical interconnection of business processes and seamless flow of information between different systems (workflow automation and synchronisation) may not be easily achieved. Therefore, there is a need to design interoperability and integration platforms that would be geared towards achieving interconnected and logically whole government systems.

Another dimension of e-Government design and implementation is the high cost to design effective e-Government which is disadvantageous to developing countries. Recognising that e-Government design and implementation takes in a lot of money, the EU has several e-Government funding options such as the European structural and investment funds (ESIF), Connecting Europe Facility (CEF), H2020, ISA[2] programme, e-Justice and Structural Reform Support Programme (SRSP) to support the implementation of different e-Government modules (European Commission 2016). With multiple sources of funding, it becomes easier for e-Government applications to continuously adapt to emerging trends. Gartner (2016) estimates that around $11.5 billion was spent to procure requisite IT in the Middle East in 2016 alone. Such massive investments underscore the importance which governments accord to the need to implement e-Government in their public service delivery value chains (Fakhourya & Aubert 2017). In developing countries, such amounts of money cannot possibly be invested in e-Government development because the anticipated immediate value of e-Government cannot be equated to such sums in most of the cases. However, it can be argued that when e-Government is rightly developed to include advanced public service applications, the savings that can come out of such e-Government platforms can rightly be justified with reference to such degree of investments. It is worth mentioning that a majority of the developing countries have lagged behind in as far as investments are concerned in e-Government because they are not ready to pay the cost before harnessing the returns. The leaders need to recognise and appreciate the potential value of e-Government before they can encourage its penetration into the different public service value chains.

According to Caldow (2001), from a leadership perspective, competitiveness in e-Government can be achieved by leadership providing the following milestones:

1. Integration of inter-governmental services – process and technology integration culminating in one-stop-shops or portals (e.g. poor process integration at the kazungula border in Zambia owing to the different tasks that need to be paid in different offices: Council Levy payable to Kazungula Council which is under the Ministry of Local Government and Housing, Carbon emissions tax payment to Zambia Police, Motor Vehicle Insurance Tax to Zambia State Insurance Company, Pontoon Tax which is payable to a department under the Ministry of Works and Supply, Customs and Excise tax payable to Zambia Revenue Authority). An individual driving through this border has to hop from office to office finally visiting five offices and enduring long queues before they can be cleared to cross into Zambia from Botswana. The reason why this happens is because of disparate IS among these government agents and lack of cross-organisational process integration because of 'high-walled' organisational structures. The public service delivery at this border is very poor and highly inefficient beyond nominal expectations.
2. Universal economic development – poor countries such as Zambia find no convincing reasons to invest huge sums of money in e-Government owing to the fact that the anticipated benefits do not materialise immediately. This is because there is no realisation that implementation of e-Government has multiple benefits which cannot be equated to the investments in the long run owing to the numerous public challenges that e-Government can solve. Given such a scenario, resource-constrained countries like Zambia need to implement e-Government using a phased approach.
3. E-Democracy – the lack of appreciation of e-Democracy possibilities facilitated by e-Government platforms allows the government and citizen to stay out from radical implementation of e-Government.

4. E-Communities – the existence of e-Communities is a good occurrence for the sustenance of e-Government implementation.
5. Inter-governmental – integration of inter-governmental IS can go a long way in facilitating sustained development of e-Government.
6. Policy environment – a responsive and strategic policy environment is one of the key ingredients for a healthy e-Government development.
7. Next generation Internet – willingness of the current e-Government to embrace emerging innovation and technology possibilities makes e-Government retain its relevance during the whole implementation cycle. It cannot be posited that any genuine drive towards modernisation of government can be done so without the use of technology (Lin, Fofanah & Liang 2011).

E-Government has many other technical and managerial challenges that need to be considered during its design and implementation. These challenges make it difficult to effectively implement e-Government. The difficulty in meaningful e-Government implementation is the integration of the heterogeneity of e-Government applications that can be designed and implemented by different government departments. During the design of e-Government applications, it is important to always remember that successful e-Government development depends on both internal and external factors. Another important requirement for effective e-Government applications is the desired quality levels. Quality in e-Government entails that citizens and businesses can find the services they need and can easily access them and use them as deemed fit (Gronier & Lambert 2010). Quality of e-Government can be achieved by designing a quality portal with carefully thought information architecture. It is worth noting that portals are indispensable access points to e-Government which is at the centre for e-Inclusion (Kanaan, Bin Hassan & Shahzad 2016).

To showcase the importance of context in designing e-Government applications, let us consider some examples of e-Government implementation in different contextual settings.

In Estonia, the key success factors for e-Government can be attributed to a robust data exchange layer, the X-Road, and the electronic or digital identification (eID) which have gone a long way in enforcing e-Participation in different e-Government solutions (Ströbele, Leosk & Trechse 2017). These different attributes of e-Government in Estonia were procured at exorbitant costs and were made possible only by the commitment from the Estonian e-Government leadership. In Kuwait, citizens' attitudes and perceptions, including trust on e-Government, have had some significant impact on the adoption and usage of e-Government services (Al-Awadhi & Morris 2009). The heterogeneity in the culture of the people found within Kuwait accentuated the need for e-Government to be designed taking into consideration the cultural differences (Al-Awadhi & Morris 2009). In many contexts, the application of network concepts such as partner selection, achievement of network goals, institutionalisation processes, network structuring and incentive design can culminate in the realisation of anticipated benefits of e-Government (Guha & Chakrabarti 2014).

Transparency and openness to information are the hallmarks of FOI which has been recognised as one of the key focusses in the new understanding of e-Government (Bertot et al. 2010). The drive for e-Government was built upon the pillars and principles of FOI enacted in different countries in the region (Porrúa 2013). A general understanding emanating from research and practice is that there is no degree of transparency and accountability with regard to public service delivery which can be achieved if FOI is not enacted. Transparency is the hallmark of any democracy. Transparency can be achieved by providing direct access to government information the citizens are interested in so that they can monitor government performance and significantly reduce corruption (Kim, Kim & Lee 2009). As mentioned, many countries in the world (e.g. India, South Korea, Philippines, Pakistan, Chile and the USA) have claimed success in using ICTs in their government contexts with a goal of reducing corruption (Bertot et al. 2010). In the case of South Korea, the 'anti-corruption system called Online Procedures Enhancement for civil application OPEN in the Seoul Metropolitan Government' (Bwalya 2017:3; Kim, Kim & Lee 2009). The value of ICTs in enforcing sanity in the government's operations and correspondingly public service delivery platforms cannot be overemphasised (Bwalya 2017):

> ICTs are an enabler that helps countries enforce their laws to fight corruption and lack of accountability among government workers. This can be achieved if ICTs are embedded into government's business processes so that there is universal access to government information and decisions through accessible ease-to-use technology platforms. (p. 3)

In any environment where e-Government is implemented, it is worth mentioning that the development of e-Government introduces a different governance model which requires that strategies be made mostly at a national level to guide the implementation of e-Government. Thus, countries have made national strategies for e-Government design, implementation and monitoring. However, the problem is that harmonising decentralised development of technology solutions with the centralised strategies of e-Government becomes a big problem. The strategies need to dovetail to the decentralised governance agenda being encouraged in many of the countries worldwide. In future e-Government implementations, researchers need to find ways as to how e-Government strategies formed at the local level can be harmonised with the national strategies or how they can be used to design national strategies.

Competitive e-Government designs allow the use of computing networks using meshed topologies to facilitate seamless flow of information among government departments in any possible direction, and intelligent processing of both structured and unstructured data. In many instances, government departments or units have their own systems which may not be linked to other systems in the governance ecosystems. This means that systems within the same governance hierarchy may not be able to seamlessly exchange data and information and therefore information integration is needed. Implementing well-thought out e-Government solutions based on appropriate e-Government interoperability frameworks will translate into improved public services, more accountability, lesser cost of service provision and more people collectively participating in decision-making processes (increased e-Participation) and so on (Lallana 2008).

Research Themes in e-Government

To have a competent e-Government implementation experience, there is a need to ensure that the research component is ongoing in order for the e-Government solutions to be changed according to the changing technologies and consumer preferences. The outcome of each of the researches conducted depends on the context in which e-Government is being implemented. With special reference to Mistry and Jalal (2012), the following are the key research themes for e-Government that e-Government researchers, innovators and practitioners have focussed on:

1. The impact of e-Government on transparency, accountability and general resource utilisation (Rodríguez Bolívar, Muñoz & López Hernández 2010) – in order to ascertain the true value of e-Government implementation, there is a need for researchers to use longitudinal research paradigms in most cases to understand the impact e-Government has on different aspects of governance over a period of time. For example, longitudinal empirical studies in South Korea and India have substantiated the impact of e-Government on mitigating corruption in public services (Bertot et al. 2010; Kim, Kim & Lee 2009).
2. E-Government project evaluation and policy analysis – evaluation of the impact of the different public services implemented using ICTs on e-Government to the overall agenda of e-Government. Researchers can also focus on the role of government policies in facilitating effective governance in or outside the realm of e-Government.
3. Government transformation and modernisation and technological innovation – use of different ICT platforms to

foster innovation, responsiveness and efficiency in the public service delivery systems. Transformation is high on the e-Government agenda as e-Government researchers have continued researching on how the emerging forms of public service innovation and technology evolution can be embedded into contemporary e-Government designs.

4. E-Participation and digital democracy – the changing dimensions in the relationships between citizens, businesses and the government given the use of ICTs in managing different government information resources and provision of public services.
5. E-Services – transformation of service models for e-Government. With the emergence of new service models such as SaaS in cloud and fog computing, there is a need to understand how these technologies are going to change the way e-Government is designed and implemented. Cloud computing changes the conceptualisation of networks, security and privacy issues, and the ability of information processing by thin clients as e-Government platforms.
6. Barriers and factors influencing e-Government adoption – analysing the level of adoption of e-Government services at individual, organisational and societal levels using different theoretical and conceptual frameworks.
7. E-Government maturity models – articulating stages for e-Government development. At the moment, there is no global e-Government maturity model that can be used to measure the status of e-Government development. There is a need to work towards coming up with a model that can have minimal aspects that need to be observed to reach a certain level of development. This model should potentially be used in any given context. This is a grey area in e-Government research and needs urgent attention.
8. Technological determinism as one of the key perspectives of e-Government implementation – as technology is a key enabler of e-Government, there is a need for dedicated research on the possible developments of technology and how these developments are going to impact on e-Government research and practice.

As the outcome to any research conducted has an impact on the e-Government design, it is important to consider the tri-category conceptual framework of ‘Context, Creation process, and Content’ in the design of any e-Government projects at any time a design is to be made. In situations where one of the three pillars is omitted in the design conceptualisation, there is a higher likelihood that whatever is being designed is likely to fail (Dehkordi et al. 2012).

Conclusion

The use of technology in different government business processes shows that e-Government can transcend the boundaries of many government business processes and ultimately offer an improved public service delivery. Many governments around the world have succumbed to the decentralisation reforms motivated by the World Bank where governance was to be taken closer to the doorsteps of the people. As such, many African countries have implemented the different phases of the structural adjustment programmes (SAPs) to transfer government functions from the central governments to districts and municipalities, so that these entities do not have to wait for the central government to make decisions to problems or situations which needed urgent solutions. The SAP has created a precursor for the implementation of e-Government.

Implementation of e-Government does not only depend on monetary investments by the government and other partners involved. For example, in the Middle East, apart from huge monetary investments, it has been established that there are other factors involving social, political and demographic perspectives that influence the success of e-Government implementation (Al-Sobhi, Weerakkody & El-Haddadeh 2011). Success of e-Government design and implementation involves considering both the technical and managerial attributes of e-Government. Competitive e-Government entails that there is a need to ensure that the new technology innovations are incorporated into the e-Government designs. However, it can generally be posited that the new innovations in e-Government entail that the cost of its design and implementation keeps going up, and given the general reduced public budgets, realising robust and dynamic e-Government generally becomes difficult (Sankar 2014).

In conclusion, e-Government is an adaptive information management platform which is actively transcending towards ubiquity and intelligence of public service delivery. Apart from being a technology platform for accessing public information and services by citizens and businesses, e-Government is transcending towards an active interactive platform that is going to further advance the e-Participation and e-Inclusion agenda.

Chapter 3

Leadership and Policy Dimensions of e-Government

Overview

The role of policy and leadership in facilitating successful e-Government implementation cannot be overemphasised. A requisite and dynamic policy, and institutional and regulatory environment are prerequisites for competitive e-Government implementation. It is a well-known fact that e-Government thrives in environments with 'appropriate institutional, legal and regulatory frameworks' (Bwalya & Mutula 2014). This chapter intends to present scenarios of how policy can be used to support e-Government growth. The chapter presents cases of how e-Government needs to be designed so that it is hinged on the different policy frameworks in the environment it is implemented. Further, e-Readiness, the digital divide and the relationship between the economy and e-Government are explored.

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Principle of Operationalisation

In the wake of consistent and rapid transformation of e-Government to keep pace with the changing technologies and citizens' expectations, one of the anticipated attributes is the operationalisation of the principles informed by the local contextual setting. The principles emanating from contextual nuances of the area in which e-Government is implemented need to be embedded in the design and followed up during the implementation process. A sound leadership and policy environment is desired if this were to be achieved. The different leadership and policy configurations for the success of e-Government are explored in this chapter.

The role of leadership and affluent policy frameworks in the design and implementation of e-Government applications cannot be overemphasised. The design ethos and aesthetics linked to e-Government services have changed to focus more on the citizen characteristics and embedding these characteristics into the e-Government design. There are also other dimensions of e-Government that keep changing in the contemporary world. For example, unlike the focus of traditional e-Government, there has been a shift from internal and supply-driven technological change to focus on citizens not only as users but also as active contributors to e-Government in e-Government 2.0. This shift is not a techno-deterministic process but a socio-technological process. Managing such a shift requires robust leadership capable of making decisions in the interest of e-Government development. With regard to the actual design itself, it is evident that various e-Government resources need to be appropriately managed to achieve the overall goal of the e-Government project. The design of e-Government requires a lot of capital in advanced technologies given the context, repositioning (transformation) of public institutions' organisational structures, training of e-Government leaders and champions, change management, re-designing of IS and so on.

Today, South Africa is pursuing a rapid transformation agenda geared towards ensuring that the wealth of the country is equally shared among the citizens and that the country is able to overcome the contemporary socio-economic challenges. It is worth mentioning that this agenda cannot be appropriately executed if it does not emanate from the public service. The public sector needs to be endowed with appropriate ICTs in order for it to lead this transformation agenda by first ensuring that public information is appropriately managed, and its business processes are as efficient and effective as possible. This will ensure that all citizens regardless of their status are included (e-Inclusion) in the decision-making process and can readily access the right public information at an appropriate time. In order to do that, there is a need to sort the issue of digital divide. Digital divide brings with it the issue of unequal access and thereby lack of access to government information culminating in the concept of second-class citizenship (Magro 2012). Given the foregoing, it therefore goes without saying that e-Government can be used as an appropriate tool to lead the transformation agenda. For example, when the Latin American countries understood the need to revitalise their countries by pursuing a rapid transformation agenda in the 1990s and early 2000s, the most effective tool thought to lead this agenda was massive utilisation of technologies in their public services. Therefore, different technology platforms were enshrined into the different public service delivery channels to ensure open, transparent and accountable public service delivery. The thinking was that by using technologies in the public sector, the rampant corruption which was slowly becoming endemic in Latin American countries could be mitigated. The result of this move was that corruption and inefficiency were significantly mitigated from the public service spheres paving way for the effortless implementation of the transformation agenda.

As already mentioned, for ensuring that e-Government transforms to a form which appropriately addresses the task to which it is allocated in any given context, there is a need to understand the pillars and principles upon which it is hinged. The other key principle that needs to be considered in the design and implementation of e-Government is the anticipated value for citizens and businesses (Castelnovo & Simonetta 2007). E-Government need not be designed strictly only from a public good perspective but should also clearly establish a business case whence all the e-Government solutions are going to be designed. All these different dimensions of e-Government need a vibrant e-Government leadership structure supported by affluent policies.

E-Government as a Public Good

The overemphasis for the need to rethink public administration throughout the world, especially in the light of ever-evolving ICTs, hasn't sprung *ex nihilo* from nothing. In order for e-Government to make sense (McDermott 2010), there is an urgent need to combat corruption in the public service business processes, put in place (Bwalya 2017):

> [*R*]esponsive governments to citizens' needs and ability of governments to be mainstreamed into the global socio-economic value chains, participatory and collaborative governance, and to have transparent/open governance value chains. (p. 3)

It is important to emphasise that any transformation of the public administration endeavour should benefit the public in the spirit of 'public good' regardless of its motivation. Vibrant leaders are needed to ensure that e-Government adapts to the external pressures to remain relevant to its users but at the same time observe the principles espoused in 'public goodness'.

The public value is conceptualised as having increased productivity in terms of efficiently performing e-Government tasks and effortlessly exploring territories. Hard tasks are traditionally the limits of e-Government, seeking to reduce cost of providing public services and generally improved service delivery (Qureshi 2005). In simple terms, public value is the perceived benefit obtained by the public from any given entity. The value obtained from the use of a given entity culminates in benefitting the community and is considered a social good. Public value is considered as a value that has been created by the government through its various platforms and interventions such as policies, law, regulations and other relevant actions (Savoldelli & Codagnone 2013). Value prepositions for e-Government are intertwined within the provision of public services on technology platforms informed by a high level of professionalism, efficiency, service and engagement (Rose et al. 2015). 'It is [also] worth mentioning that the concept of "value" can be looked at from several contextual standpoints as the word has multiple meanings and ambiguity' (Bwalya 2017:4; Bannister & Connolly 2015).

It can thus be posited that the meaning of e-Government needs to be ascertained by measuring not only the technical and usability issues surrounding public services delivered on diverse technology platforms but also using the concept of public value. Public value (Kearns 2004) is enveloped in:

1. the degree to which e-Government delivers quality public services, general perceptions on the e-Government services, cost, fairness to accessibility
2. achievements of the desirable outcomes such as a revamped and better health delivery system, reduced time in accessing the e-Government services, improved access to government information
3. increased trust in overall government services. (n.p.)

Some researchers and practitioners have proposed models to discuss public value of e-Government. For example, Savoldelli, Misuraca and Codagnone (2013) discussed the public value of e-Government and proposed the eGEP-2.0 model. In this model, public value is conceptualised within the following dimensions: importance of service application; fairness of provision; cost (considered in reflection to opportunity cost [OC]); anticipated or real citizen participation levels; service availability and reliability and so on. At the centre of the conceptualisation of value are elements such as ethos, equity and accountability.

With reference to eGEP 2.0, as the perception of public value is perceived by the individual citizens, public value of e-Government needs to be conceptualised around citizen-centricity. Citizens need to experience the many benefits of engaging in e-Government if public value were to be realised.

Proper e-Government discourses are evaluated using a public value framework which is the return or benefit obtained from an undertaking in the public domain where strategic public management initiatives are exploited to ensure that there is maximum value obtained through the provision of efficient and effective public services (Yıldız & Saylam 2013). On the part of government departments, with regard to achieving public value, these are assessed by their ability to achieve the expectations espoused in their mandates. Accordingly (Bwalya 2017):

> Public value is a relative abstractive phenomenon because it depends on the individual/entity perceiving public interest and that the notion of value may force actors in the public ecosystem to compete for legitimization, acceptance and hegemony. (p. 4)

E-Government researchers and practitioners have shown great interest in evaluating the impact of e-Government within the confines of public good. Impact evaluation of e-Government studies is performed to assess the extent to which e-Government can be considered as a public good (Bertot & Jeager 2008). However, many of these studies are riddled with inconsistencies that are technical or conceptual in nature around methodology, evaluation, measurement, assessment and so on (Savoldelli & Codagnone 2013). The evaluation of public value should emanate from understanding what elements are perceived by the citizens with regard to value prepositions of the government services and public administration using ICT platforms as a whole (Savoldelli & Codagnone 2013).

The value of e-Government should be considered from the point of view of the supply and demand sides of e-Government. From the demand side, it means consideration of the perceived value of e-Government implementation by the citizens and businesses, and from the supply side we are principally looking at the OC and ROI although other attributes such as the reduction of cost of service delivery, and the degree of efficiency and effectiveness in service offering are also rightly considered. The OC considers the value of various options upon which the money used to erect the infrastructure of e-Government could have been used for alternative investments. Plainly, if e-Government was not implemented, the money used to set it up would have been used by the government to provide other public services. The OC is therefore measured with regard to the missed chances of investing in alternative public investment opportunities (Savoldelli & Codagnone 2013). Considering the conceptualisation of e-Government for the good of the public (González-Zapata & Heeks 2015; Bwalya 2017):

> In order to realise the conceptualisation of e-Government as a public good, there is need for government information to be placed in the public domain so that all necessary stakeholders participate in the governance value chains and decision-making. In order to [*achieve this*], the [...] concept of OGD comes in. OGD entails putting in the public domain all government data so that different stakeholders can have access to it and use it as reference for decision-making. This, therefore, ushers in paradigmatic [*change*] where there is a reduction in the cost of public service provision and improvement of the quality of internal public administration processes. (pp. 3–4)

The true value of e-Government is obtained when its implementation results in a move from the more bureaucratic organisation of business processes, characterised by massive red tape, to massive integration systems, resulting in streamlined business processes.

Following the suggestion by President Obama on the need to change the way public administration is done towards more openness, transparency and responsiveness, many governments around the world have done or are doing the same by encouraging global utilisation of ICTs in the public service value chains. The end result is that e-Government is not looked at as government-as-usual only enabled by the use of ICTs but as a platform which can facilitate participatory governance where all information and decisions are in the public domain for increased transparency. There is consensus among a great number of researchers and practitioners that e-Government will usher in an environment where governance is done on public platforms where all citizens regardless of socio-economic status can participate. The implementation of e-Government on open platforms and interfaces is important as it also helps in the implementation of the FOI initiatives being propagated in many countries the world over (McDermott 2010).

For contemporary dynamic e-Government, there is a need for progressive leadership and policy frameworks that recognise e-Government as a public good, ensuring that a conducive environment for its proliferation is available. Countries that have strong leadership and policy establishments have seen e-Government grow to unprecedented levels. In the African context, the South African Public Service IT Policy Framework recognises e-Government as one of the most important vehicles for leading the public services towards competitiveness. It is therefore not surprising that South Africa is only second to Mauritius in as far as progressive and sustainable e-Government development is concerned. In both South Africa and Mauritius, there are currently aggressive campaigns geared towards ensuring that citizens appreciate the benefits of e-Government implementation and its role in service excellence.

Contextual Nuances of e-Government

Leaders and policy frameworks of e-Government need to ensure that the contextual nuances are taken into consideration during design and implementation. Depending on the context, the pillar upon which e-Government is designed in one area may differ from another area implementing e-Government with the same or similar focus. In this section, we look at a few cases of e-Government considering the killer-punch factors that may determine the direction e-Government may take, whether towards success or failure. The role of e-Government leaders as drivers of e-Government in the different scenarios presented is to understand the key success factors and determine ways of appropriately integrating them into design and implementation.

Competitive e-Government implementations are now conceptualised based on the network theory towards the concept of connected government brought about by highly integrated systems. It is worth mentioning that in the contemporary world, value prepositions in different socio-economic contexts are amassed based on the degree of network an actor has. Network denotes the level of connections, individuals or processes that are there in a given contextual setting. Further, the concept of inter-dependence and cohesion among human beings is measured by engagement with other human beings. Successful e-Government designs are those that have highly integrated systems which are able to seamlessly exchange information using network conceptualisations.

With special reference to the Hofstede's cultural dimensions (Power Distance, Uncertainty Avoidance, Individualism, Masculinity and Long Term), Sabri, Sabri and Al-Shargabi (2012) proposed an e-Government readiness model focussing on the cultural aspects of the area in which it is implemented and posited that, not mentioning other factors influencing e-Government, culture needs to be carefully considered when assessing e-Government adoption and usage. Many current e-Government adoption assessment models fall short on measuring the cultural or language dimensions. Future empirical studies need to carefully consider the role of culture and language in e-Government by measuring the level of variance for each of the factors on e-Government adoption and usage.

The implementation of e-Government in developed countries and regions such as Germany and the United Kingdom has faced considerable roadblocks, owing to non-core factors such as managerial attributes, consideration of people's culture and communication skills being overlooked. Despite having a highly developed and sophisticated telecommunications infrastructure in the world, e-Government in general has not met its full potential in Germany (Akkaya, Wolf & Krcmar 2012). Of the 72% of the population in Germany that use Internet, 49% use online banking with only 39% downloading forms for government services (Akkaya et al. 2011). Many ordinary citizens in Germany interact on social networking sites substantially, use e-Commerce applications on a large scale and perform online banking transactions, but are surprisingly hesitant to transact or interact with public institutions (government departments) online (Akkaya et al. 2012). From the citizens' point of view, the low penetration of e-Government in Germany has been attributed to the conviction that the government scrutinises all that citizens do online once they supply personal information to a government department. In the Asian context, the relevance of e-Government in China is measured against the public value perspective (Bai 2013). In the case of Vietnam, the e-Government drive has been a success because it has focussed on citizen-centric applications and therefore the characteristics of the citizenry have shaped the e-Government agenda (Khanh, Trong & Gim 2014). In the case of the United Kingdom, a well-developed legislation establishment was put in place to support e-Government implementation. Some of the policy establishments include: *The Public Interest Disclosure Act* 1998, *Computer Misuse Act* 1990, *Data Protection Act* 1998, *Freedom of Information Act* 2000, *Electronic Communications Act* 2000, Electronic Signatures Regulations 2002, Electronic Commerce Regulations 2002 and Re-use of Public Sector Information Regulations 2005 (Shareef, Jahankhani & Dastbaz 2012). The competitive policy environment put in place ensured that the different aspects of e-Government were appropriately supported. In other environments where e-Government has been implemented, it has been shown that some of the most common factors for failure of expected development of e-Government has been lack of stakeholder involvement in the preliminary (early) stages of the planning and design phase (early involvement of stakeholders in the design phase is paramount for the understanding of the project and e-Government application requirements and therefore defining the scope) (Sarantis, Charalabidis & Askounis 2010).

In the contemporary world, one of the key requirements for sustainable and meaningful e-Government services is an effective public sector governance programme and culture which is flexible enough to incorporate emerging changes in governance models. Also required is a highly competent telecommunications sector which can provide requisite ICT infrastructure for e-Government implementation. Equally important for successful implementation of e-Government is the culture and practices in the everyday business processes that shape the e-Government development projectile (Williams, Gulati & Yates 2014).

Shortfalls in e-Government Development

With the different forms of e-Government, its implementation is further complicated as more analysis and strategic alignment with the contextual terrain becomes more pronounced. As has been mentioned, the implementation and integration of technology into different business processes is a very expensive undertaking with low success rate (Legris, Inghamb & Collerette 2003). The goal of informed e-Government design and implementation is to overcome the complications experienced in the mainstreaming of ICTs in the different public service business processes. Given this complexity, there has been a lot of research of late focussing on understanding factors influencing success or failure of e-Government.

E-Government projects fail to meet their expectations owing to the difficulty in bringing all design attributes together given its multidimensionality and the complexity in its configuration.

The configuration of e-Government is more like a puzzle which needs clever leadership in order to put all pieces together. Various reasons can be attributed to the failure of e-Government projects, depending on the context in which they are implemented. Many e-Government projects have failed owing to low user acceptance, as it is the key impediment to accepting or rejecting the eventual use of a technology and therefore the success or failure of an e-Government project (Akkaya et al. 2011; Heeks 2003). With the emergence of e-Government 2.0, many studies have tried to understand the general factors that influence e-Government penetration (Grimmelikhuijsen 2008; Meijer & Zouridis 2006; Meijer et al. 2012). Some of the key factors are leadership (driving the design, implementation and monitoring agenda of the e-Government 2.0 interventions), citizen incentives (involving the citizens at the different stages of the implementation cycle, including the design stage) and trust (providing information in public domain spaces and platforms so that citizens can trust e-Government 2.0). E-Government 2.0 requires an environment where new ideas and innovation can easily be implemented and accepted. The type of leadership needed in such an environment is entrepreneurial leadership which encourages 'out-of-the-box thinking' for innovative ideas. Some of the key challenges in e-Government 2.0 implementation include:

1. Putting in place collective leadership in contextually different environments. The leadership is needed to drive the e-Government design and implementation agenda and to monitor the actual integration of ICTs in the public services and ascertain the impact thereof.
2. Obtaining identity information from citizens and business, as well as encouraging trust in e-Government platforms.

Adoption of technologies allows government organisations to re-establish institutional structures and facilitate institutional changes towards adoption of contemporary trends such as e-Government 2.0. Igniting interest in e-Government 2.0 applications involves coming up with friendly communication models to engage with would-be users, while serious official communication is done at the onset of e-Government implementation. The communication involves clearly articulating the privacy and security modules of e-Government 2.0 and the general benefits of e-Government. Another very important step in the design of e-Government 2.0 applications is the articulation of the business case and the overall public administration agenda to the different stakeholders (Savoldelli et al. 2013). The communication and awareness strategies should articulate all the hidden and non-hidden facts about e-Government so that would-be users develop a degree of trust in e-Government applications.

E-Government and Trust

One of the key determinants of e-Government implementation is trust. If citizens or businesses have limited trust in the e-Government application platforms and systems, it is logical to assume that they would not meaningfully adopt and use e-Government applications. Thus, in essence, although technology is considered one of the key enablers of e-Government, trust is equally a very important success determinant in as far as e-Government adoption and usage is concerned. In a successful e-Government environment, the role of leaders and policy is to ensure that the different dimensions of e-Government are communicated to the users so that they have a degree of trust in the e-Government solutions. As e-Government is implemented using faceless configurations, trust is one of the important factors that impact on transactions effected using technology platforms. Furthermore, trust in e-Government entails that citizens are convinced that obtaining public information and services online can be achieved satisfactorily (Bwalya & Healy 2010; Dharma 2015).

Trust has been recognised as the main aspect influencing customer loyalty in different setups, including e-Services. Recognising trust as one of the key factors in influencing citizen intention to engage in e-Government, Carter and Bélanger (2005) conceptualised trust as having two components: trust of government and trust of Internet. For an individual to engage in e-Government, it is important that they trust both the government (owing to their past behaviour) and the Internet (owing to the technology upon which e-Government is implemented). Thus, for any e-Government implementation, it is clear that there is the need for a strategy that guides the implementation focussing on the different trust dimensions. One way to promote trust is to assure the would-be users of e-Government that their records would be managed based on appropriate sound legal and regulatory environment according to the context in which e-Government is implemented.

The design of e-Government needs to consider carefully designed electronic records handling platforms. Most governments in Africa, such as Botswana and South Africa, are implementing electronic records management systems (ERMSs). Appropriate and context-aware information policies need to underpin the implementation of ERMS in the context of e-Government. Examples of policies that could be considered include data protection policies, FOI, *Electronic Communications Act* and so on. International Code of Ethics (BSI DISC PD0008: 1999, Legal admissibility and evidential weight of information stored electronically; also included in BSI DISC PD5000: 1999, International code of practice for electronic documents and e-commerce transactions as legally admissible evidence) can also be considered. E-Government environments that consider progressive management of records based on the above principles can give a lot of confidence to the would-be users with regard to the safety of their information online in e-Government systems.

Al-Sobhi et al. (2011) investigated the role of intermediary organisations in improving e-Government adoption in Saudi Arabia. The intermediaries enhanced trust between the government departments and citizens, thereby increasing the adoption of e-Government services by the latter. Intermediaries have proved effective in instilling trust in e-Government environments and can be considered in any environment where e-Government is designed. In another environment, Brunei Darussalam, there were deliberate strategies aimed at strengthening security and trust in e-Government implementation. This was achieved by the implementation of public key infrastructure (PKI) under the *Electronic Transactions Act* (Cap 196) and was based on international best practice. Also, there was implementation of IT and Protective Security Services (ITPSS) which further ensured privacy and trust in the e-Government environment (Mus 2010). In the North American context, using e-Government as an engagement and service delivery platform has increased the trust and external political efficacy (or perceived government responsiveness, accountability and transparency) in voters which had in general dwindled to abysmal levels (Parent et al. 2014). In general, the low uptake of e-Government is attributed to overall low trust in technology, government and the perceived risk in engaging in e-Government (Akkaya et al. 2011). In another study, Myeong et al. (2014) measured e-Government 3.0 using metrics hinged on trust.

As shown by the cases above, the use of e-Government is defined by the general political trust in the governance value chains in any given area. This trust, like any other trust, is earned through a consistent and sustained radical decision-making by the political rank and file. In conclusion, it cannot be denied that trust in e-Government is one of the key ingredients to effective e-Government (Kanaan et al. 2016). Trust in government exists as specific and diffuse: Specific trust is linked to the level of individual satisfaction in the government outputs and overall performance of the political establishment, whereas diffuse trust is not linked to any appreciable level of performance but regime-level politics (Parent et al. 2014).

As the behaviour of politicians and the trust in the government largely influence the direction in which e-Government will go, politicians should paradoxically not only concentrate on building trust online but also consider leaving the confines of the Internet so as to build personal relationships with the citizens. Lack of trust in government can directly impact on the voting patterns of voters in an election. For example, the voting patterns in Canada were determined by trust in the government, among other things (Belanger & Nadeau 2002). Acknowledging that trust has an impact on the voting patterns, Thomas (1988) discussed the different sources of trust in government systems: Characteristic-based trust emanates from expectations of a democratic dispensation in a given person. Government institutions or politicians earn trust through adoption of a code of ethics or professional standards guiding their actions or indirectly through the observance of administration laws and regulations. Process-based trust emanates from expectations that there will be reciprocity where the giver expects to receive goods and services of 'intrinsic or economic value' (Parent et al. 2014). Online activities increase trust and political efficacy in voters. This is because e-Government applications are perceived to be implemented online using open platforms which can be monitored anytime. This measure allows citizens in general to trust that politicians would make rational decisions as a lot of people are trailing and monitoring their decision-making (Parent et al. 2014).

Many researchers have used theories such as the socio-democratic theory to the different trust dimensions that influence adoption of technologies in different spheres of the socio-economic establishment. However, the colour and contours of trust can not only be understood using socio-democratic theory but also by the different dimensions of social–political capital (Parent et al. 2014). Some users of e-Government applications are found to be already having an appreciable degree of trust in the government machinery owing to its track record. In such a scenario, it can be stated that it is not difficult to convince individuals with *a priori* trust in their government to engage in e-Government assuming they already have higher computer and political self-efficacy.

The Leadership Dimension

As stated above, leadership is an essential requirement in the different aspects of e-Government and is therefore one of the most important elements for a successful e-Government implementation (Khanh et al. 2014). Although there are no global factors influencing successful e-Government implementation owing to varying contextual settings, many studies have consistently found that management and leadership sit at the centre of meaningful e-Government development (Rose et al. 2015). As e-Government has multiple dimensions, such as policy, management, citizen (individual), organisation, technology and so on, it follows that each dimension needs to be designed carefully to dovetail into the local contextual characteristics. This can be done with strong leadership and strategy. E-Government leaders need to drive the different initiatives in the e-Government environment (Elnaghi, Alshawi & Missi 2007). Lack of appropriate leadership and strategic management plans result in the ultimate failure of e-Government. In many studies, it has been found that some of the key factors of failure have been attributed to management's failure to coordinate and control the different aspects of the e-Government project in its multidimensionality, lack of adequate and appropriate planning and lack of goals and scope definition (Sarantis et al. 2010). The role of competent leadership in e-Government cannot therefore be overlooked.

It is not a secret that digital transformation propagated by the NPM agenda requires competent digital and leadership capabilities. Leadership capabilities have a lot to do with the role of the executives in providing strategic direction and support for the different e-Government initiatives and digital capabilities, focussing on the implementation of the identified digital transformation elements such as operation processes, customer experiences, business models and so on. It is worth mentioning that appropriate leadership creates a roadmap for integration of ICTs into the different socio-economic domains, manages absorption of technology at individual and societal level, provides incentives and strategies for partnerships within the private sector, encourages innovations given the context (digital mail and payment systems, developing of novel systems for implementation of government services, databases, retrieval systems, adaptive front-end systems, etc.) and coordinates the integration of government IS to ensure the development of progressive strategies such as the big data strategy.

In dynamic e-Government environments, leadership plays a central role in as far as e-Government development is concerned. Other than the roles articulated above, leadership facilitates accomplishment of the overall objectives of e-Government through appropriate and requisite management of people to optimally participate in the different processes of e-Government (Khanh 2014). Leadership is crucial in ensuring that e-Government is adopted at different levels, that is, at individual, process and organisational levels (Khanh 2014). In any e-Government setting, it is important that there are individuals who are mandated to lead the public administration transformation agenda and ensure that the different e-Government challenges are overcome. The role of leadership in e-Government setups is to ensure that the different technology platforms are integrated into the different government business processes and that citizens and businesses rightly adopt and use e-Government applications. In other words, e-Government leaders ensure that there is equilibrium between the supply and the demand sides of e-Government. E-Government needs robust transformation leadership who have a broader understanding and grasp of e-Government given its multidimensionality. Good leadership promotes faster realisation of e-Government benefits, pushes for integration of processes in different government departments, promotes coordination of e-Government efforts and ensures that the e-Government platforms keep evolving given the changing contextual settings (Elnaghi et al. 2007). There are different characteristics of leadership that are desired in the case of e-Government. Just as in other setups, e-Government leadership involves getting results through people (Khanh et al. 2014).

Requisite and context-aware e-Government services can only be achieved by having in place a robust leadership and governance structure. For example, in Brunei Darussalam, e-Government development is led by the e-Government Leadership Forum (eGLF), which is somehow linked to the Brunei Darussalam National IT Council, which is further linked to the Authority for Info-communication Technology Industry (AITI). The eGLF falls directly above the Prime Minister's office and occasionally obtains input from the e-Government Technical Authority Body. In the Prime Minister's office, there is an overall government Chief Information Officer (CIO) who is further linked to the other line ministers in Darussalam and industry (Mohidin & Mus 2010). Being one of the leaders of e-Government development in Africa, South Africa has done a lot in as far as putting together e-Government leadership at the institution level is concerned. For example, the leadership and strategic direction has been provided by the Presidential International Advisory Council on Information Society and Development (PIAC-ISAD) and the Presidential National Council on Information Society and Development (PNC-ISAD) which were established around 2001. These advisory councils have managed to put in place robust institutional, legal and regulatory frameworks for the advancement of e-Government in South Africa.

In the e-Government dispensation, leadership may both entail traditional leadership and e-Government leadership (e-Leadership). Therefore, it is important to distinguish between the two. The traditional leadership involves politicians who are also mandated to rule the country and preside over public administration. Their focus is therefore not specifically on e-Government, but they are key to e-Government development. In the e-Government environment, traditional leaders need to be convinced that e-Government is important for them to support its implementation. They need to provide the political will for e-Government design and implementation as they are usually the custodians of the requisite resources to ensure that e-Government is implemented across the different government departments.

Further, traditional leaders should ensure the availability of a competent human resource base to drive the e-Government agenda. On the other hand, e-Government leaders are those that are directly involved with the execution of the e-Government mandate as they ensure that e-Government strategies are presented with an expert touch and that the different aspects of e-Government design and implementation are performed as per the expectations. Further, e-Government leaders implement monitoring plans on a daily basis to ensure that e-Government is rightly integrated into the different components of the public service business processes. Strictly, in the context of e-Government, traditional leaders are mostly managers and e-Government leaders are leaders. The difference between management and leadership is that the former is concerned with making routine decisions (can now be replaced with intelligent computing machines), whereas the latter is concerned with making crucial decisions informed by data or information at hand. E-Leadership uses technology platforms to reduce the distance between the leaders and the people being led so as to facilitate one-to-one and one-to-many interactions (DasGupta 2011). Thinking on past experiences in e-Government development (Verdegem & Verleye 2009; Bwalya 2017):

> In the past, the development of e-Government has been guided by the supply side forces without necessarily considering the demand side (consumers). In order to understand the general factors that influence success of e-Government, many researchers have investigated factors that influence usage (attitudinal determinants) of e-Government. It is these factors that [*vibrant leaders need to incorporate into the*] design [*of e-Government applications*]. (p. 4)

Figure 3.1 shows some of the key (identifiable) attributes of e-Government with a leadership aspect to it (CoR Studies 2003).

Therefore, with regard to e-Government leadership, it can be concluded that e-Government requires leaders who are agile and forward-looking and are competent in many aspects of the e-Government agenda. Some of the major competencies for an e-Leader in the e-Government environment include:

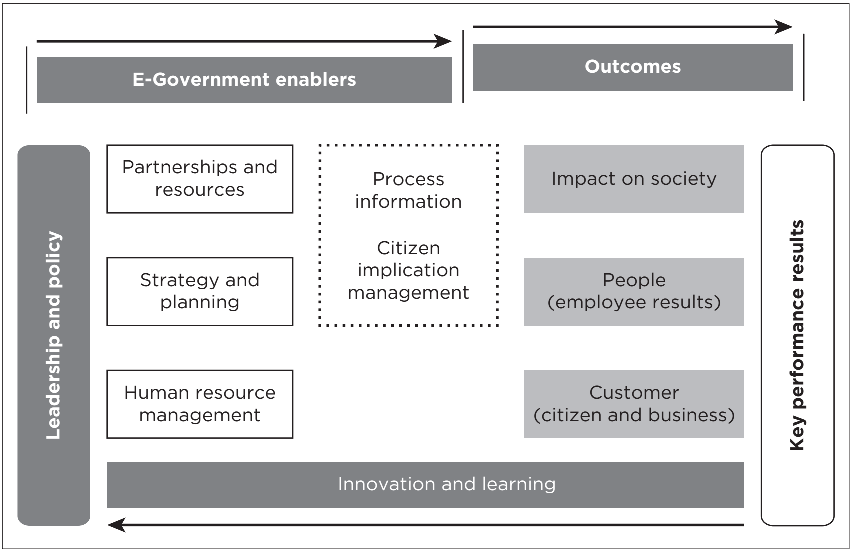

FIGURE 3.1: E-Government attributes.

1. Setting the overall direction which should guide the implementation and development projectile of e-Government. Competent leaders need to explicitly define the roadmap for e-Government implementation so that all the different initiatives are directly tailored to dovetail into the overall strategy.
2. At the very beginning when e-Government is conceptualised, it is important to consider the issue of funding. Therefore, at the conceptualisation and design stage of e-Government, it is important to explicitly put in place provisions for the funding of the different options (Khanh 2014). Other than that, it is equally important to ensure that legal frameworks that guide e-Government design and implementation are defined given the context.
3. Coordination of the budget allocations, system conceptualisation, design and management (e-Government system implementation). Resource management (especially budgeting and allocation) is one of the most difficult tasks in the e-Government environment. Competent leaders need to

carefully check how finances, which are mostly not enough, and other tangible and intangible resources are going to be distributed to the different modules of e-Government. Furthermore, leaders need to ensure that the e-Government designs are done as per the contextual factors and characteristics to stand a chance with regard to eventual adoption and usage by the citizens and businesses.

4. Understanding the whole e-Government strategy and being adept at formulating new strategies and policy and constantly analysing the movements in the cross-disciplinary fields to inform sustainable e-Government implementation.
5. Talent and skills management to ensure that innovation informed by the local context is continuously available. In many of the developing countries, there is a short supply of personnel with the requisite technical expertise who are able to come up with ground-breaking innovations that stand a chance to be sustainably utilised in e-Government environments. Therefore, there are usually difficulties when new technologies come onto the scene and then there are external forces that desire that these technologies be integrated into e-Government designs.
6. Monitoring of the penetration of technology use in the different government business processes (technology visionary). In order to understand the impact of e-Government applications, it is desired that the integration of technologies in the public service business processes is done every day and the results are considered with regard to levels of efficiency or achievement of the desired results.
7. Inculcate confidence and trust in the general populace that e-Government is a public good. E-Government leaders should be able to convince the citizens and businesses that e-Government applications are designed on requisite and appropriate technologies that guarantee advanced levels of privacy and security of users' information or engagement patterns in the e-Government online environments.
8. Apply the concept of systems thinking to solve complex problems that might arise in the implementation cycle of e-Government. E-Government leadership needs to be endowed with characteristics of network thinking so as to

ensure that applications are integrated in a whole network of government and that experts are logically connected to a network which enables designers to exchange ideas or be reached easily to solve complex problems. The integration of the e-Government systems enables seamless flow of information among government departments, thereby facilitating the provision of a competent and comprehensive service to citizens and businesses.

9. Lead in the adaptation and transformation of public service transactions and processes. E-Government leaders need to be visionaries and endowed with strategic capabilities so as to lead the transformation agenda of e-Government.
10. Implementing initiatives to ensure that an enabling environment is created for cross-boundary collaboration of sharing ideas so that best practices are collated together. Innovation needs to be led by the leaders and the ideas are then cross-pollinated to the rest of the team. E-Government leaders need to be at the centre of innovation.
11. Have in-depth knowledge for implementing recommendations and principles espoused in the e-Government Interoperability Framework for integrating cross-boundary e-Government systems. One of the key requirements for today's competent e-Government implementation is the ability to design context-aware interoperability platforms that are going to mostly guide the technical and process integration of e-Government business processes.

E-leaders need to ensure that they remain competent in this area by continuously checking the emerging platform frameworks that are being designed elsewhere and coming up with strategies on how these can be integrated into the current e-Government designs.

E-Government leaders need to possess characteristics of both foxes and hedgehogs – which is a combination of contrarian foxes (people with strong views about something and who consider themselves extremely clever) who are able to adapt to the changing contextual circumstances as e-Government progresses and visionary hedgehogs who are capable of setting strategic, visionary and defined direction of the organisation. Foxes are mostly transformational leaders owing to their unmatched abilities to adapt to change. Transformational leadership is about effecting change from old routines to new ones with careful reference to the pre-existing context (Moynihan, Pandey & Wright 2014; Wright & Pandey 2010). In the context of e-Government, transformational leadership entails encouraging technological innovation which is further constrained by the rules, laws and culture of the organisation in which it is implemented. Another type of leaders not directly linked to e-Government are the entrepreneurial leaders. Entrepreneurial leaders constantly scan their environments and networks or knowledge partners so as to pick new signals from their external environments and pass them on to the people they lead. Such type of a leader is needed in the e-Government environment because in a bid to retain relevance, e-Government leaders need to continuously scan their environment and keep abreast with the emerging trends and incorporate them in the design of new e-Government applications.

In considering the leadership models of the emerging forms of e-Government, it is important to understand that the needs of leadership keep changing. One of the common forms, the e-Government 2.0, calls for effective and transformational leadership which helps to overcome legal, financial and technological constraints, and political instabilities, which negatively impact on e-Government development (Grimmelikhuijsen 2008). In summation, it can be concluded that because e-Government 2.0 is a multidimensional phenomenon, leadership in this context can be defined as collective leadership where different individuals work on one aspect of e-Government. Therefore, leadership is a collective effort (Boin & Hart 2011).

Effective e-Government leadership involves the provision of strategic leadership as e-Government traverses through different models given emerging technologies. In conclusion, Figure 3.2 shows the summative key roles of leadership in the contemporary e-Government domain.

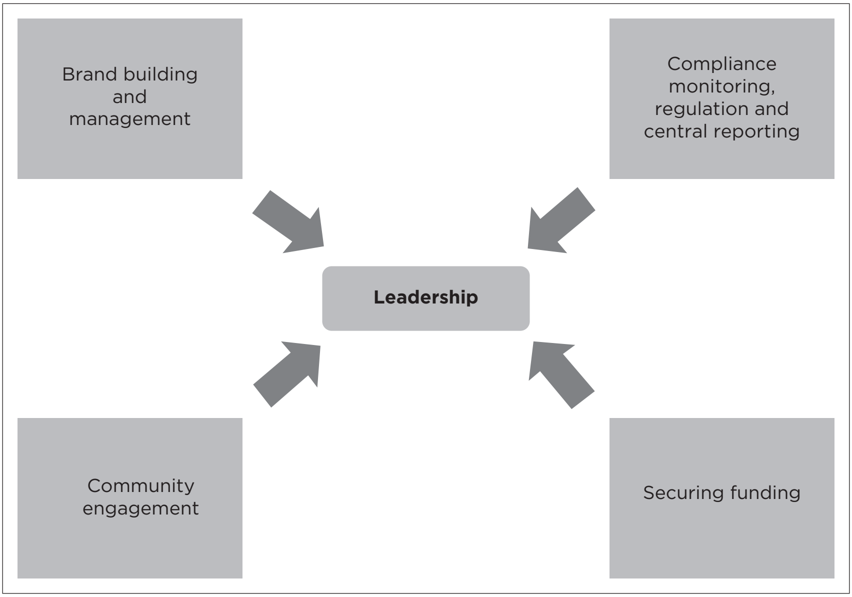

FIGURE 3.2: Leadership dimensions.

Leaders are at the centre of the provision of an efficient and effective public service delivery. The four key basic entities for leadership that can possibly leave a good impact are:

1. Compliance regulation and central reporting. It coordinates all the different efforts of innovation and rapid prototyping that happens continuously given the nature of e-Government. As e-Government is hinged on a lot of standards for the managerial or technical attributes, it is important that there is compliance to these standards by the different players in the e-Government development cycle. It is worth noting that as the rapid prototypes for the different modules of e-Government are developed, there are chances that some designers may disregard the design specifications and standards in any given environment. Therefore, it is important that there is requisite monitoring and coordination of all that is happening in the e-Government environment.

2. Brand building, including needs assessment, collaboration commissioning, market deployment and supplier management. As e-Government has a lot of entities that need to be coordinated, it is vitally important that there should be strategic efforts to ensure that everything is being done within the defined perimeters with regard to brand building and management. Thus, anything that goes against the brand being promoted needs to be disregarded.
3. Community and democratic engagement enabling sound and adequate participation of the citizens and the business community. As e-Government uses a citizen-centric design, it is important that individual citizens and the community are engaged as much as possible to bring them closer to the design processes. Further, community engagement is important because it creates opportunities for e-Government designers and implementers to get the feel of the overall contextual characteristics of the community. Through engagement, it is possible to discuss with the community the benefits of using technologies to access public services so that there is generally increased e-Participation from the citizens and businesses. Appropriate engagement will result in increased interest among the citizens on the democratic dispensations of the area in which e-Government is implemented.
4. Securing smart and sustainable funding that can go a long way in ensuring infrastructure development and talent management. One of the crucial factors in e-Government implementation is adequate funding to finance the different dimensions of e-Government in the procurement of appropriate technology platforms, design, implementation, monitoring, hiring of the competent human resource base and so on. For each context in which e-Government is implemented, there are different models of e-Government funding that can be explored (see Ch. 10). The choice of the mix of funding models to be employed depends on the context in which e-Government is implemented.

Given the different dimensions of e-Government, it can be concluded that e-Government is not only a technical and non-ideological issue, but that it is multidimensional and encompasses all aspects of the political and governance discourse. It can further be stated that leadership at the different implementation cycles of e-Government is at the core of its ultimate success.

Policy and e-Government

In conjunction with the need to have appropriate ICT infrastructure, requisite and dynamic policy environment is one of the key determinants for setting ground for the effective absorption of technology into the different public service domains. Policies are very important in the implementation of e-Government in that they set the behavioural agenda of all the key players in the e-Government environment and provide a roadmap on the e-Government development projectile. Successful e-Government design needs to include spot on policy interventions to facilitate the growth of the ICT sector and appropriate integration of technology into the different public service business processes, adequate resource investments, requisite funding models (including the PPP model) and an enabling environment (Kundishora 2010).

There are many policy initiatives that have been put in place at different levels, for example, global, continental, regional, country and provincial or district level. For example, e-Government falls within the ambit of the Geneva Action Plan signed by the African Heads of State at the World Summit on the Information Society forum in 2003. The Action Plan generally articulated the leadership's commitment to increase ICT connections in different entities (villages, schools, hospitals, etc.) of the society and increase wider uptake of ICTs (Kundishora 2010). Another example is the ICT policy at the Southern African Development Community level. This policy sets out the agenda of how ICTs in general can be integrated into the different socio-economic platforms, public sector inclusive. Another effort to guide in the measurement of the impact of e-Government has been proposed at the EU level using the analytical hierarchical process (AHP). Broken down into several levels of mutually dependent relationships, the AHP presents the policy dimensions that articulate a process for measuring impact. Thus, AHP can be used for modelling policy-making processes. In many instances, even in the case of eGEP 2.0, AHP is used for project modelling or evaluation purposes.

Many countries in the world have come up with national e-Government strategies to guide the design and implementation of e-Government solutions. One example is Estonia which is implementing digital identification through the e-Government framework. In this case, the key to implementing digital ID cards has been the sound legal, institution and regulatory frameworks (e.g. the *Public Information Act* 2000, *Personal Data Protection Act* 1996, *Digital Signatures Act* 2000 and the *Electronic Communications Act* 2000) promoting data protection, privacy and security of information generated by individuals' digital ID cards (Vassil 2016). In Libya, although the implementation of e-Government is relatively new, there is commitment to put in place appropriate interventions to encourage effective e-Government implementation at various levels of the governance business processes (Yousef & Martin 2017). In Vietnam, the e-Government agenda is geared towards satisfying citizens with regard to e-Government implementation (Khanh 2014). It is worth noting that Vietnam has a well-articulated, inclusive and dedicated e-Government vision that is aimed at spearheading e-Government development in the ever-changing environment. Further, there is committed support from top leadership in as far as e-Government implementation is concerned (Khanh 2014).

In another example, from 2001, Brunei Darussalam has been strategising on e-Government action plans using Wave 1 and 2. These were anchored on the national strategic orientation such as the National IT Strategic Plan (IT 2000 & Beyond) and through Wave 3 (E-Government Strategic Plan 2009–2014). The overall guiding principle of all these initiatives was to establish citizen-centric e-Government solutions which can be made possible by integrated and accessible e-Services, strengthened security and trust, integrated government modules, developed requisite capabilities and capacity and so on (Mohidin & Mus 2010). Brunei Darussalam has a dedicated national vision for aggressive development known as Wawasan Brunei 2035, which is the anchor of the different national development interventions and initiatives. Through the National Development Plan 2007–2012, this policy framework, among other things, recognises e-Government as a critical component with the development of the ICT sector in Darussalam Haji (Mohidin & Mus 2010). In this country, there is also requisite leadership with good will and purpose from the traditional leadership to promote e-Government. This can be demonstrated by the hosting of the chief government CIO in the Prime Minister's office as a key link for e-Government which demonstrates the overall good leadership will and is a gesture of unwavering support and political will for e-Government implementation in Darussalam (Mohidin & Mus 2010). This leadership configuration demonstrates the fact that everyone, regardless of status, is involved in the design and implementation of e-Government in Darussalam. Ordinary citizens can give inputs to e-Government design and implementation through line ministers with whom they have direct contact (Mohidin & Mus 2010).

African countries have been implementing SAPs in order to bring governance and decision-making closer to the citizens. It is believed that decentralisation would have led to e-Government strategies at the local level, for example, district level. This is not the case in a majority of the developing countries. It is thus not surprising that countries intending to implement e-Government start with national e-Government strategies and policies.

Strategic thinking in e-Government is most desired as this provides a test bed on which e-Government applications can be hinged given the ever-changing contextual settings in environments where e-Government is to be implemented. The Gartner 2020 Government Scenario Planning Tool can go a long way in planning contemporary e-Government implementations.

This tool gives a prognosis of how governments will be shaped by technologies in 2020. This tool is hinged on two driving forces: the first aims to understand the extent to which government intervenes in the economy and the second 'relates to [citizens'] attitude [towards] privacy and surveillance and [considers governments'] freedom to access citizens' personal information [and] situations in which laws protect citizens' private information' (Al-Khouri 2013:n.p.).

To demonstrate the role of policy and strategic planning for e-Government, the following cases look at different policy and strategy interventions from both the leading and emerging e-Government countries in the world. One of the more prominent countries in setting up enabling environment for proliferation of e-Government is Singapore. Box 3.1 shows the Singapore e-Government Master Plan iN2015 and iGov2010, which gives a strategic development of e-Government in Singapore from 2015 onwards (Leong et al. 2015).

The Singapore case shows the different strategic orientations that were pursued in e-Government implementation. There is uncompromised commitment in terms of putting in place

BOX 3.1: IDA Singapore e-Government Master Plan iN2015 and iGov2010.

- Intelligent Nation 2015 (iN2015) launched in 2006
- E-Government initiatives and policies hinged on strong customer orientation
- Developed a robust 'wired and wireless' broadband network as a supabport structure for e-Government applications towards achieving 1Gbps symmetric speeds in all households, businesses and so on
- iN2015 was enshrined on a dedicated e-Government plan, iGov2020, budgeted for 2billion USD

Source: Adapted from Leong et al. 2015.

requisite infrastructure to accelerate the development of e-Government. The investment of US$2 billion in the iGov2020 strategic initiative accentuates the unwavering commitment to provide excellent e-Government development in Singapore.

Box 3.2 shows a real-life utilisation case from South Korea. Realising that there was massive and unprecedented corruption coupled with high levels of inefficiency in the public sector, South Korea implemented the OPEN e-Government initiative in Seoul, resulting in the mitigation of corruption to a great extent.

Boxes 3.1 and 3.2 have shown that in countries where e-Government thrives, strategic policies and action plans are available to guide e-Government development. Further, it has been shown that there is clear leadership (e-Leadership) driving the countries' position as global leaders in e-Government development. Therefore, effervescent leadership and relevant policy is at the centre of competitive e-Government development.

BOX 3.2: OPEN e-Government drive in Seoul, South Korea.

- Driven by the general leadership, numerous regulations were done away with by the Seoul Metropolitan Government.
- Established leadership, especially driven by the Mayor's office, to stamp out corruption in the government's business processes through the launching of the Online Procedures ENhancement for Civil Applications (OPEN) initiative.
- OPEN allows individual citizens to be issued a case ID and password which allows the tracking or monitoring of their application as it is processed within the public service business value chains. Further, the mayor's office can independently track the business transactions launched through OPEN.
- OPEN is officially recognised as a very good anti-corruption system, which increases transparency in government business processes.

It is recommended that when designing e-Government solutions, each of the 10 security principles of the ISO 17799 needs to be considered while keeping in mind the contextual nuances. The following are the 10 ISO 17799 security principles:

- business continuity planning
- system access control
- system development and maintenance
- physical and environmental security
- compliance
- personnel security
- security organisation
- computer and network management
- asset classification and control
- security policy.

Conclusion

Appropriate leadership is an indispensable need for competitive and sustainable e-Government implementation. Many of the e-Government initiatives in the developing country contexts are implemented with reference to national e-Government strategies. This presents a big mismatch with governance policies and strategies such as the SAP being implemented in most African countries. Therefore, there is an urgent need for countries in Africa to consider drafting e-Government strategies at the local government level in order to take e-Government to the doorsteps of the communities and subsequently increase the levels of e-Inclusion (Nabafu & Maiga 2012).

E-Government requires different types of leaders who are capable of driving the strategic and actual integration of ICTs into the public service delivery platforms, and these e-leaders have been discussed throughout this chapter. It is stated that a blended governance structure implemented using traditional governance system and e-Government is needed to accommodate one and all. No matter how developed the e-Government system is, it is important to still maintain the traditional government model so that other citizens and businesses experiencing e-Exclusion (as a result of the digital divide) can still access public services (Williams et al. 2014). Furthermore, a vibrant policy environment is needed to provide guidelines and a cushion upon which e-Government is designed and implemented. The policies and leadership of contemporary e-Government should ensure that the multidimensional nature of e-Government is taken into consideration at all stages, right from design to implementation. It is worth noting that the existence of appropriate policies and standards is one thing, and their implementation is another.

It can thus, for sure, be stated that the bottom line of e-Government implementation is leadership. Appropriate leadership enables to embed contextual nuances of e-Government at different levels of the socio-economic infrastructure.

PART B

Measuring e-Government Development

Chapter 4

Effectiveness of Technology Adoption Models in Measuring e-Government Adoption

Overview

Like assessment models and frameworks (see Ch. 5), many technology adoption models have been used to measure the level of adoption and usage, especially at the individual level. There are also technology adoption frameworks that guide the design of different context-aware adoption models. However, most of the adoption models and frameworks have limitations that need to be highlighted and discussed to guide researchers and practitioners with regard to the models to be used in a given context to generally advance the body of knowledge in this field. This chapter discusses the famous models for measuring

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technology adoption, such as the theory of reasoned action (TRA); TAM (Park 2009; Yucel & Gulbar 2013; Silva & Dias 2015); rural technology acceptance model (RUTAM); unified theory of acceptance and use of technology (UTAUT), UTAUT2; technology, organisation and environment (TOE); and so on (Williams et al. 2011; Venkatesh, Moris & Davis 2003; Thomas, Singh & Gaffar 2013; Silva & Dias 2015), and further proposes an integrated model of various adoption models that can be used, especially in developing country contexts.

Technology Adoption

Since the conceptualisation of e-Government in the USA around 1993, many researchers and practitioners have grappled with the question of e-Government adoption (Zafiropoulos, Karavasilis & Vrana 2012). Many researchers have stated that e-Government adoption is synonymous to technology adoption without clearly understanding that e-Government in its entirety involves many different attributes and that technology adoption merely means that the interaction and access platform of e-Government domains have been adopted and are being used by individual citizens and businesses. The phrases 'technology adoption' and 'e-Government adoption' are different and so are their meanings. This chapter articulates the differences between the two terms and reviews the different models for measuring technology adoption highlighting their conceptual and technical limitations in accurately measuring actual adoption.

In order to discuss the different contours of technology adoption, there is a need for a clear understanding of what adoption entails with regard to e-Government. Although many research attempts have been devoted to understanding what influences individuals to use technologies, few have delved into the understanding of what adoption entails. Majority of the studies have concentrated on investigating the actual status of adoption. As a matter of fact, studies investigating the level of adoption do not serve much purpose other than indicating the level of penetration of e-Government at the individual level. Some studies have shown that adoption entails accessing and using technologies, while others have described the concept of adoption as the mere acceptance that the use of a technology has many benefits and yet others have looked at technology adoption as the usage of technology (Kahenya, Sakwa & Iravo 2014; Leal & Albertin 2015; Vakilzavareh, Lashgarara & Mirdamad. 2014; Venkatesh et al. 2003). In this chapter, technology adoption entails acceptance and usage of technology. Technology acceptance is the psychological state of an individual with regard to his or her conviction that a given technology may be useful in a given context to reap benefits. In this case, an example of e-Government adoption can be a self-recognition that applying for a national registration card online will result in many tangible benefits such as fast and efficient service, convenience and so on, which in turn prompts one to access the online platforms, download and then upload filled-in forms and eventually getting the said card by post. Partial adoption of e-Government is when an individual has acknowledged the perceived benefits of e-Government but only plans to use it in the near future.

Of the many limitations in the adoption research, there is also a conviction that addressing the question of adoption takes a dichotomous viewpoint where technology is either adopted or not adopted. This view of technology adoption fails to take into account intermediate or the different degrees of circumstances, articulating partial adoption of technology, and therefore excludes the reality on the ground. For example, if one were to state that there is low adoption or high adoption of technology – what does that mean? What constitutes low adoption? What is the threshold for low, medium or high adoption? Research or practice is mute on this aspect. There is a need for a research to ascertain the minimum attributes that are needed to ascertain the degree of adoption along the whole continuum of adoption.

Many models have been used in technology adoption in different studies across the world. The following are some of the most common models:

- TRA (Ajzen & Fishbein 1980).
- Theory of planned behaviour (TPB) (Ajzen 1991).
- TAM (Davis 1989).
- Model of PC utilisation (Thompson, Srivastava & Jiang 2003).
- Motivational model (MM) (Davis, Bagozzi & Warshaw 1992).
- Social cognitive theory (SCT) (Bandura 1999).
- Extension of the technology acceptance model (TAM2) (Venkatesh & Davis 2000).
- DOI model (Rogers 1995).
- UTAUT (Venkatesh et al. 2003).

Of these, the TAM enjoyed wider usage, especially in developing country contexts. Some of these models have been modified so as to dovetail into the local contextual settings. Furthermore, because of perceived and actual limitations, some of the models have been modified to come up with extended versions (e.g. TAM to TAM2/3, and UTAUT to UTAUT2).

Regardless of context or cultural fibre, studies around the world have shown that an individual's intention to use technology is mostly influenced by the factors articulated below (Al-Awadhi & Morris 2009; Compeau & Higgins 1995; Davis, Bagozzi & Warshaw 1989, 1992; Marchewka, Liu & Kostitwa 2007; Rogers 1995; Thompson et al. 2003; Venkatesh et al. 2003). These factors are perceived as crucial in adopting e-Government platforms:

1. Performance expectance – it is the degree to which an individual believes that using a technology will result in the improvement of his or her job performance. Performance expectance is measured using five variables: extrinsic motivation, outcome expectations, performance expectancy (PE), job fit and relative advantage.
2. Social influence – it is the degree to which an individual perceives importance of what others think with regard to whether he or she should use a given system.

3. Effort expectancy – it is made up of complexity and actual ease of use.
4. Perceived ease of use – it is the degree of ease associated with the use of a system.
5. Facilitating conditions – it is the degree to which an individual believes organisational and technical infrastructure exists to support a system (Venkatesh et al. 2003:453).

Technology adoption contains a vast array of complex and logically connected processes surrounding user attitude and personality, social influence, trust and other facilitating conditions (FC) (Fishbein & Ajzen 1975; Gefen et al. 2005; Sharma & Mishra 2014; Venkatesh, Thong & Xu 2012). Of the many factors that have been used to explain technology adoption, personal attitude and perceived usefulness (PU) have been found to be the key determinants for technology adoption (Magsamen-Conrad 2015). Given the foregoing, it is evident that individuals generally have to be assured of the anticipated ease of use and perceived benefits of the technology before actually using it. The understanding of such factors, which are at the core of individuals' motivation to use technology, is important because it can guide the design of e-Government applications. The willingness of citizens to adopt the e-Government services is crucial to achieving value in the implementation of e-Government as a whole. Therefore, e-Government design should be based on citizens' requirements (Alrashidi 2012).

Although technology studies have centrally focussed on assessing factors influencing individuals' adoption of technology, it is equally important to understand technology adoption at the organisational level. The right technology appropriately aligned to the business processes of an organisation ultimately results in increased business efficiency, reduces time spent in providing affluent services, improves communication and promotes seamless flow of information within the organisation. A balanced understanding of factors influencing technology adoption has to be there from the perspective of both individuals (demand side) and organisations (supply side).

Many e-Government practitioners and researchers assume that models for measuring technology adoption measure the penetration of e-Government in any given area. This assumption is wrong as technology is taken as the main determinant of e-Government and not as an enabler. The correct position should be that technology is one of the enablers of e-Government and accepting to use a given technology in accessing public services does not automatically result in adoption of e-Government but shows the likelihood of adoption of e-Government as the 'use' component is not yet fulfilled.

This chapter assumes that technology is a precursor to accepting and using e-Government and is therefore regarded as the key enabler for integrating ICTs in the public business processes. It further explores some of the key models and frameworks used to assess technology adoption and critiques them by highlighting their weaknesses and strengths.

Usage of Adoption Models

The different models for measuring technology adoption have been used in different contexts in a bid to understand the factors at the centre of adoption. In many instances, e-Government adoption studies have mentioned having utilised a certain model but on careful scrutiny of the study, it was evident that the model had not been applied in the study altogether or had been inappropriately utilised. For example, most studies cite having utilised the UTAUT, but there is only limited evidence emanating from the study for having actually utilised the model in the study. Furthermore, most studies that have claimed to have used the UTAUT have not actually used the constructs specified therein. Furthermore, most studies have relatively very small sample sizes bringing into question the validity of the research results (Dwivedi Weerakkody & Janssen 2011). Michael, Rana and Dwivedi (2011) analysed 450 articles citing the UTAUT and found that only 43 of those actually utilised the UTAUT, while the others merely claimed having utilised it. It is worth mentioning that the use of a theory or model involves testing of all the given constructs of the model in the study. If a part of the constructs in the original model is not measured, it results in the use of an adapted version of the model utilised.

Many models and frameworks such as Rogers' DOIs theory (DOT), TRA and TPB have been used for long to understand factors that influence technology adoption. After many years of using the aforementioned models, researchers from a variety of disciplines started investigating technology adoption using the parsimonious TAM anchored on the measuring of the PU and perceived ease of use of a technology. The TAM was perceived as an adaptation of the TPB, TRA and decomposed TPB (Nel 2013).

This section discusses some of the most utilised adoption models exploring the key characteristics of those models in relation to the focus of this chapter. More specifics including formulaic definitions of each of these models are abundant in literature (Ajzen 1985; Ajzen & Fishbein 1980; Alomari 2014; Al-Shafi & Weerakkody 2010; Brown 1999; Davis 1989; Davis, Bagozzi & Warshaw 1992; Rogers 1995; Thompson et al. 2003; Teo, Srivastava & Jiang 2008; Venkatesh & Davis 2000; Venkatesh et al. 2003). The following sections present the scenarios and contexts of where each of the common models has been utilised to understand the factors influencing technology adoption at individual or organisational levels.

The Diffusion of Innovation Theory

The DOT is one of the earliest models that has shaped the debate and measurement of factors influencing technology adoption. Some of the key uses of DOT include the following:

- Use of DOT in measuring the use of ICTs for agricultural extension in Southern Africa (Tata & McNamara 2016).
- Use of DOT, the structuration theory and two-step flow theory of information to understand diffusion of agricultural

innovation in Kenya. The use of a comprehensive model containing the synthesis of many models addresses the limitations found in the DOT when used in certain contexts.

The Theory of Reasoned Action

The TRA was one of the first theories that attempted to explain usage behaviour (UB) and acceptance of computer technology using the behavioural intention (BI), attitude and subjective norm (SN) as key constructs (Chatzoglou, Chatzoudes & Symeonidis 2015).

The Theory of Planned Behaviour

The TPB is an extension of the TRA by including additional determinants of intention, specifically the perceived behavioural control and self-efficacy (Chatzoglou et al. 2015).

Technology Acceptance Model

The TAM is one of the most popular models explaining technology adoption in use today. Its genesis was penned in the seminal paper 'PU, Perceived Ease of Use, and User Acceptance of IT', published in 1989 and authored by Davis. This paper, which is heavily cited on Google, has laid solid background for technology adoption investigation using the TAM. PU is the degree to which an individual perceives the extent to which a technology will be of benefit to him or her. PU is, therefore, crucial to understand the BI of an individual to use a given technology. The PU is directly determinable by the PEOU. Perceived ease of use articulates the belief that a technology will demand a minimal effort in order to benefit from its full capabilities. The TAM presents itself as an established theoretical model underpinned by tested usage in analysing technology adoption in different contextual settings. Its focus is on the understanding of perceptions or beliefs of the adoption of technology which will eventually determine the attitudes which sit at the centre of technology or innovation adoption and eventual usage (Lim & Ting 2012). The TAM makes an assumption that the BI and eventual use of a technology is a result of conscious decision-making processes executed at the individual level (Shroff, Deneen & Ng 2011). There are many uses of the TAM and some of them are presented below:

- The TAM has found its usage in different types of industries where technology was introduced for the first time as an enabler to achieve a desired goal – cellular telephone industry, investigating online consumer behaviour, electronic commerce, World Wide Web adoption and usage, e-Government implementation and so on (Koufaris 2002; Kwon 2000; Pavlou 2003; Legris et al. 2003). The predictive capacity of the TAM is between 40% and 50%. Although the TAM has been considerably used to measure intention to adopt technology, it has structural inefficiencies as espoused by Bagozzi (2007).
- Using the TAM, Shroff, Deneen and Eugenia (2011) investigated the predictors for adoption of e-Portfolio systems and found that individual characteristics and technology factors are the key factors.
- Yucel and Gulbar (2013) utilised meta-analysis to critically analyse the effectiveness of the TAM variables such as PEOU to explain the adoption of technology. The conclusion of the study was that, although TAM is riddled with structural and logical inconsistencies, it has been widely used in explaining factors influencing technology adoption at an individual level in different contextual settings.
- The use of the TAM in the South African context is minimal as there are very few studies that have utilised it (Erasmus, Rothmann & Van Eeden 2015). In the South African context, BI had a linear positive correlation with the actual usage confirming the direct relationship that exists between the two variables (Erasmus et al. 2015).
- Further empirical testing and enquiry has revealed that TAM and TAM2 are still handicapped by factual inconsistencies. TAM3 was specifically designed to investigate technology

adoption in the context of e-Commerce and specifically included 'effects of trust' and 'perceived risk' in addition to the attributes espoused in the original models (Venkatesh & Bala 2008).

- From the empirical study conducted in Zambia, PEOU and PU positively contributed to the realisation of CU (+0.137 × 2 +0.046 × 3), thereby confirming the notion that these are the two most important factors that influence individuals' willingness to engage in technology utilisation and further confirms the later studies that attempted to validate the TAM (Dishaw & Strong 1999; Pavlou 2003; Venkatesh et al. 2003).
- Yucel and Gulbar (2013) postulated that, despite the context, the three main factors of PEOU, PU and BI are the key factors which explained a lot of variance in the measuring of technology adoption.

Rural Technology Acceptance Model

The RUTAM was used in an interpretive study in investigating farmers' adoption drive to use mobile phones in Bangladesh (Islam & Grönlund 2011). The RUTAM was found to be much better than the original TAM in rural contextual settings because it has the capability to integrate local contextual characteristics into the measurement attributes.

Unified Theory of Adoption and Use of Technology

The UTAUT proposed by Venkatesh et al. (2003) aimed to extend the conceptualisation of adoption assessment and include the actual usage of the technologies. The UTAUT combines eight different technology and innovation models to increase the relative predictive capacity compared to each of them (Kohnke, Cole & Bush 2014). The UTAUT has the following independent variables which directly measure the UB: effort expectancy (EE), PE, FC and SI. The PU and PE are obtained from the TAM and SI is synonymous with the SN found in TAM2 which is an extension of TAM; FC which has the same meaning as 'compatibility' is from the DOT and is used as the main construct in the UTAUT (Ali & Arshad 2016). The UTAUT is a comprehensive model explaining technology adoption which has been used in many different fields of enquiry (Ali & Arshad 2016). Other than the factors espoused in the UTAUT model, motivation which is divided into extrinsic and intrinsic motivation is one of the key predictors for individual's usage of technology. Extrinsic motivation emanates from an individual's belief that using a technology will enhance his or her job performance. The extrinsic motivation is synonymous to the PE found in the UTAUT. Intrinsic motivation emanates from the perceived enjoyment that can be obtained or felt from using a particular technology platform or system (Ali & Arshad 2016).

The validation of the UTAUT has been done in different contextual settings. For example, Kassim (2015) validated the UTAUT by demonstrating that all the independent variables had a positive influence on knowledge sharing in this particular context. Despite this being the case, some moderating factors such as 'age and experience' showed invalid relationships pertaining to the dependent variable 'knowledge sharing behaviour'. Moon (2016) analysed the extended UTAUT and found that SI directly affects the intention to use.

The UTAUT has found itself being used in different contextual settings throughout the world. For example, it was used in the measuring of adoption of m-Learning in Egypt. Some of the uses of the UTAUT include the following:

- Alshehri et al. (2012) used the UTAUT to understand e-Government penetration in Saudi Arabia and found it inadequate as it could not measure other factors such as culture which has a direct influence on individuals' adoption and usage of technology in this particular context.
- Chhachhar et al. (2012) used the UTAUT to understand the BI of farmers in Pakistan to use mobile phones for communication on agricultural issues. The model was found to correctly measure a majority of the factors.

- Kohnke et al. (2014) used the UTAUT to measure the adoption and use of e-Health mobile applications by clinicians and patients.
- Daniel (2015) used a modified UTAUT to measure the adoption of e-Government in Papua New Guinea and stated that all the factors espoused in the original UTAUT hold good for explaining e-Government adoption at the individual level.
- A second variant of the UTAUT, the UTAUT2, formulated on the realisation of the limitations of UTAUT was specifically designed to analyse the adoption of consumer-based technologies with the introduction of additional constructs (e.g. hedonic motivation habit, value) introducing new relationships and deleting one construct from the original model. The direct outcome of the UTAUT2 was an improvement in the amount of variance explained by the UTAUT model (Maditinos, Chatzoudes & Sarigiannidis 2015).
- Leal and Albertin (2015) utilised the UTAUT2 in investigating the adoption of IoT in India (Leal & Albertin 2015). Hedonic motivation from the UTAUT was replaced by eudemonic well-being and the security constructs in UTAUT2.
- Using a meta-analysis of 43 research papers, Dwivedi et al. (2011) analysed the performance of the UTAUT in measuring what it is to be measured.
- In trying to understand students' ICT adoption in Ghana, the UTAUT explained 70% of the variance in the predictor factors (Attuquayefio & Addo 2014).
- In their study which used the UTAUT as a theoretical lens, Alshehri et al. (2012) singled out web quality (WQ) as a significant factor in influencing acceptance of G2C e-Government services in the Kingdom of Saudi Arabia.
- Ahmad et al. (2014) found that the UTAUT was one of the key adoption models in investigation technology adoption in Malaysia.

Technology, Organisation and Environment

The TOE framework articulates constructs that need to be measured in each of the given pillars of the framework. The TOE has seen usage in situations where the interest is in understanding the level of penetration of technology at the organisational level. In order for the assessment to be done and the degree of adoption ascertained, there is a need to check the technology profile of the organisation; the leadership, legal setting; and the general fit of the environment in the organisation.

The constructs of the TOE are: Technology (relative advantage – compared with the previous technology, the degree to which the perception of technology innovation surpasses the technology before it; compatibility – the degree to which the perception of technology innovation supposes existing values, past experiences and adopter needs; complexity – the degree of difficulty to understand a technology); Organisation (top management support – logistical and technical support rendered by the CEO and other leaders at the top of the organisation; organisational readiness – financial, technical and requisite human resources to drive technology innovation and implementation and so on); Environment (information intensity and product characteristics – degree to which information is embedded into the product or service provided by the business; government pressure/support – strategies or initiatives put in place by the government or other technical partners; consumer readiness – the state of readiness of the consumers may influence the adoption process and so on) (Hoti 2015).

At the organisation level, the TOE framework proposed by Tornatzky and Fleischer (1990) has been used extensively in different contextual settings. An example of TOE usage was done by Padilla-Vega, Sénquiz-Díaz and Ojeda (2017) who utilised it to analyse the readiness of an organisation to adopt and utilise technology in its business processes. Although the TOE is continuously seeing improvements in the scale of usage throughout the world, it also has remarkable limitations as discussed below. In another study, Chen and Chang (2014) utilised the TOE and the perceived readiness model (PERM) to examine technology adoption, thereby achieving a higher predictive capacity. TOE has also been used in measuring adoption of technology innovations at the organisation level (Harfoushi et al. 2016).

Other than utilising the known adoption models and frameworks, some studies have taken a more statistical approach which emanates from exploring all the possible factors that can influence technology and then drilling down to the use of factor analysis to decide on which ones have the highest variance to explain adoption. Suki and Ramayah (2010) used confirmatory factor analysis (CFA) to analyse the factors influencing e-Government adoption at the individual level. Using PCA, including the social–technical and stakeholder theory, the multidimensional nature of an e-Government system in China was investigated. PCA is a known method of multivariate analysis which has been used to investigate complicated phenomena. It is also largely used to reduce factors that are closely related in understanding which factors have higher variance in influencing the phenomenon (Shan et al. 2011).

■ Key Technology Adoption Factors

A careful look into the many technology adoption studies presented above reveals that there are common key factors that influence technology adoption regardless of the area in which it is implemented. The variance of each of these factors on the actual level of technology adoption varies with respect to the context in which e-Government is implemented. Table 4.1 shows the description of each of these common technology adoption factors.

Other than the factors included in Table 4.1, there are other factors such as the level of participation, policies and institutions, human and financial capital, suitability and user awareness, demographic factors, et cetera, that influence technology acceptance. In order to adequately benefit from what e-Government has to offer, it is important to increase usage of

TABLE 4.1: Key technology adoption factors.

No.	Factor	Description	Synonymous or similar factors	Source
1	PE (*Source*: TAM)	Degree to which the usage of an activity results in obtaining improved benefits in performance of certain activities	PU (TAM), extrinsic motivation (motivation model), job fit (model for PC utilisation), relative advantage (innovation diffusion theory), outcome expectations (SCT)	Venkatesh et al. (2012, 2003)
2	PU (*Source*: TAM)	Individual's psychological belief that using a given technology will translate into enhancement of job performance. Refers to users' perception of usefulness of technology in unlocking innovative properties, and internal relational and external collaboration potential of e-Government applications	Job fit (model for PC utilisation), Outcome expectations (SCT)	Davis et al (1989); Kahenya et al. (2014); Leal & Albertin (2015)
3	Effort expectancy (EE) (*Source*: UTAUT)	Individual's perceived amount of effort and degree of ease attributed to using a given technology	Complexity (from model of personal computer utilisation), perceived ease of use (TAM, IDT)	Venkatesh et al (2012)
4	Self-efficacy (*Source*: TAM2)	Degree to which an individual believes he or she has the necessary capability to engage in and execute courses of action in relation to desired goals	-	Bandura (1999)
5	Social influence (*Source*: Kelman's Social Theory)	Individual's belief that others expect him or her to use a new system	Subjective use (TRA, TAM2, C-TAM-TPB)	Venkatesh et al. (2003)
6	FC (*Source*: TAM)	Perceived belief of an individual that the organisation has the necessary technical and organisational infrastructure to support the use of a system	-	Venkatesh et al. (2003); Vakilzavareh, Lashgarara & Mirdamad (2014)

table continues next page

TABLE 4.1: (Continued)

No.	Factor	Description	Synonymous or similar factors	Source
7	Hedonic motivation (*Source*: UTAUT)	Perceived fun or pressure derived from using a technology	-	Venkatesh et al. (2012); Hauner 2005
8	Price value (*Source*: UTAUT 2)	Trade-off between the costs of using the technology and the benefits realised from using the said technology	-	Dodds, Monroe and Grewal (1991)
9	Habit (*Source*: RUTAM)	Consumer behaviour as a result of automatically performing tasks because of having previously performed them	-	-

TAM, technology acceptance model; SCT, social cognitive theory; PC, personal computer; IDT, innovation diffusion theory; TRA, theory of reasoned action; TPB, theory of planned behaviour.

technology in accessing different types of public services. As articulated in Chapter 3, policies, leadership and the arrangement of government institutions determine the level of integration of technology in the public business processes and overall adoption of e-Government at individual levels. A requisite leadership resume would pick up the weakness of e-Government implementation obtained by analysing the factors from empirical studies and then try to fix it.

Analysis of Models Explaining Technology Adoption

The use of the original models that were at the centre of explaining technology adoption has proved that almost all of them lack the necessary rigour and depth in measuring technology adoption when subjected to explaining adoption in different contextual settings. The following highlights some of the limitations that are known so far for some of the most common models and frameworks. More focus is attributed to the TAM because it is the model which has received unmatched attention in the technology adoption research and practise.

Suggested Modifications to the Unified Theory of Adoption and Use of Technology

The UTAUT has been used in many different fields to measure the adoption of technology. Although this is the case, as mentioned, many studies that have implemented the UTAUT tend to not utilise all of its constructs and so it becomes extremely difficult to understand its compressive predictive power for technology adoption and usage (Akbar 2013). The utilisation of other models explaining technology adoption has shown many weaknesses, especially when applied to measuring adoption in environments where there is a strong culture or language component. When used in multiple countries with different cultures and language, UTAUT showed that it is robust enough to not to lose meaning brought about by translation of the constructs (Oshlyansky, Cairns & Thimbleby 2007). Even though the UTAUT displays this important power characteristic, it has also proved to have weaknesses when implemented in varying contextual settings. Such occurrences show that it is very difficult to come up with a global model for technology adoption based on the UTAUT alone. Some of the studies which suggested modification of the UTAUT are the following:

- Use of CFA in a study investigating adoption behaviours of mobile commerce in Hong Kong (Lai, Lai & Jordan 2009) extended the UTAUT model by adding disturbance concerns (DC) as one of the factors influencing adoption. The inclusion of further constructs was done to ensure that the model is comprehensive and is able to measure the different factors given the unique context. This shows that the original UTAUT has limitations when applied in certain complex environments. Therefore, it can be posited that the UTAUT needs to be subjected to more cross-cultural analysis in order for it to be a more comprehensive model (Thomas, Singh & Gaffar 2013).
- In a study conducted by Schepers and Wetzels (2007), it was observed that the SN has a great impact on PU and BI to use. This showed that there was a need for the original UTAUT to

be subjected to further validation so as to check the factor linkages and relationships espoused in the UTAUT.

- Although able to explain considerable amount of variance, the original UTAUT theorised construct relationships that may not hold in all contexts, omitted constructs that may go a long in explaining behaviour and altogether disregarded important relationships. Therefore, there is a need to look towards alternative models building on to what the UTAUT has theorised (Dwivedi, Papazafeiropoulou & Gharavi 2006).

Limitations in the Technology, Organisation and Environment Framework

The TOE is a very important theory despite having structural and logical limitations. The constructs are not clearly defined within each of the major themes or pillars of TOE. Because of a lack of clear definition of constructs, what defines each of the pillars or constructs of the framework depends on the contextual characteristics. Although the TOE has the aforementioned structural and definitional deficiency, its advantage lies in the fact that it is a highly flexible framework which can easily be used in any given environment. Owing to the ever-evolving technology means and platforms, the TOE is a candidate framework that can be used to ascertain the factors influencing technology adoption. For example, the most appropriate framework for guiding the understanding of cloud computing is the TOE (Nedev 2014).

Gangwar et al. (2014) have suggested the following limitations with regard to TOE:

- The inability of TOE to present itself as neither an integrated conceptual framework nor a well-articulated and developed theory. Because the interpretation and understanding of some of the constructs used in the TOE are left to the mercy of the practitioner, it is considered as a highly abstract model and work-in-progress. Therefore, the research community and practitioners still have reservations on its reliability and validity. In this regard, it can be stated that there is more work needed in as far as validation of the TOE is concerned.

- As mentioned, TOE has no globally defined constructs or measurable attributes (and these depend on the interpretation by each researcher utilising it).
- TOE has not gained crucial mass of validation owing to its low usage, especially in the developing country contexts.
- TOE has limited explanatory power. Studies that have utilised TOE as a mono-theory have reported mixed results with very low explanatory power as compared with other models explaining technology acceptance or adoption.

Limitations of the Technology Acceptance Model

The TAM originates directly from the TRA which has enjoyed wider usage in the field of IS. Furthermore, the TAM has been extensively utilised in measuring adoption of e-Government, especially across the developed countries. Owing to its solid establishment, many researchers have had a lot of confidence in the TAM, thereby increasing its usage statistics. Koufaris (2002) reports that many studies have confirmed and validated the between-constructs relationships shown in the TAM. Although there is a plethora of empirical studies employing the TAM, there are no authoritative results that can take us to the generalisation of the TAM constructs (Ma & Liu 2004).

In the earlier studies, TAM was found to be a useful tool in understanding BI to use e-Learning and has been extensively utilised in different studies throughout the world, although it only accounts for 40% to 50% of variance of the predictor factors (Park 2009). As mentioned, a lot of studies have validated the TAM. In his study, Park (2009) found that the endogenous constructs of the TAM, that is, PU and PEOU, did not have direct impact on the BI to use e-Learning. This was because of context. In their study, Pardamean and Susanto (2013) showed that both social influence and PE have a significant relationship with BI and that BI did not necessarily translate into actual usage of the technology. Because context plays a very important role, a TAM variation that has been used to take into consideration the rural contextual setting is the RUTAM.

In analysing the effectiveness of the TAM among experienced users with regard to adoption of online banking, PU had significant positive influence on 'intention to use', whereas 'perceived ease of use' did not have a significant effect on intention directly. This result shows a departure from traditional results on the application of the TAM constructs in measuring technology adoption, accentuating the need for the consideration of the context and study's characteristics when utilising the TAM (Maditinos et al. 2015). Despite being widely validated by other studies, the TAM has shown some inefficiencies leading to the development of other related TAMs such as the UTAUT and the TAM2/M3 (Bagozzi 2007). Realising the conceptual limitations of the TAM, many studies have attempted to extend it so that it becomes a comprehensive model for measuring technology adoption; however, the extensions have mostly been a 'patch work' of many largely unintegrated and uncoordinated abridgements (Bagozzi 2007:252). The following are some of the limitations of the TAM:

- One of the key limitations of the TAM is that it does not have a clear theory behind the conceptualisation of both the PU and the PEOU. It also neglects the group, social and cultural aspects of decision-making and assumes decisions are only an individual's preserve and does not depend on the environment in which an individual operates (Bagozzi 2007).
- TAM lacks adequate rigour and relevance to establish itself as a key theory for investigating technology adoption at the individual level in IS (Chuttur 2009).
- TAM excludes some of the most important sources of variance and does not take into inconsideration dominant constraints such as money or time that would normally prevent an individual from using IS.
- Further, TAM fails to explain the user acceptance of a given technology owing to its generality (Al-Shafi & Weerakkody 2010).

- TAM's inability to measure actual behaviour towards technology adoption rather than future 'perceived' adoption stems from restricted constructs that are rigid with regard to measuring and adopting new or emerging technology solutions, limited predictive capacity (only able to explain 50% – 60% of variance) and lack of constructs that can measure human and social change processes (Gangwar et al. 2014).
- Further, it is posited that the Achilles Heel of the TAM is its robustness and parsimony, being a very simple model yet expected to measure complex adoption phenomena.
- The issue of generalisability lies in the need to determine the extent to which the TAM can be used in different contexts (Yousafzai, Pallister & Foxall 2010).
- How causality can be inferred in cross-sectional studies to show causation depends on additional longitudinal research, possibly even a quasi-experimental design, is necessary (Yousafzai et al. 2010).

Bagozzi et al. (2007) posited that the characteristic of parsimony in TAM is its weakness. This is because it seems unreasonable to expect that such a simple model would explain the different attributes that influence and define decisions and behaviour towards adoption of technology. The only time the TAM would go a long way in offering explanations of the factors influencing individual adoption of technology is by extending it given the context in which it is implemented.

As mentioned, because of the limitations brought about by the context in which the TAM is implemented, it has seen many extensions: TAM2 (Venkatesh & Davis 2000) and TAM3 (Venkatesh & Bala 2008); combined TAM and theory of planned behaviour (C-TAM-TPB) (Kang & Ng 2015); UTAUT2 (Kahenya et al. 2014; Ramkhelawan & Basit 2014); and so on. Many of the extensions have been brought about owing to the context in which the technology is implemented. For example, in the context of Turkey, it was important that culture be considered when designing education technology solutions

(Göğüş et al. 2012). The TAM2 dropped attitude elements from the original TAM model and included 'social influences' in the new model. In essence, this meant that technology adoption could not be carried given a variety of contexts, including individual context and organisational setting (Maditinos et al. 2015). The combination of the TAM with other models or frameworks to make a unified model will make it possible for many factors defining adoption to cohere and explain meaningful variance in the adoption (Bagozzi 2007). Using both the DOI and the TAM in investigating citizens' perception towards e-Government in Jordan, it was recommended that social and cultural dynamics need to be seriously considered when designing e-Government (Alomari 2014).

Towards Global Models Explaining Technology Adoption

Currently, there is no global model that can explain technology adoption in any given situation or environment. Due to the limitations in the original models, many of them have been modified or adapted to suit the contextual characteristics of the area in which they are implemented. In other instances, two or more models have been put together to come up with a comprehensive model that will be commensurate to the area in which it is implemented. The choice of the framework or model to be added to one model such as the TAM or TOE depends on the constructs lacking in either of these but are pertinent to the study area (Ali & Arshad 2016). The use of synthesised models to form robust conceptual frameworks commensurate for use in a given contextual setting is gaining ground in technology adoption research. For example, Gangwar et al. (2014) used a combination of the TAM and TOE in the investigation of technology adoption at both individual and organisational levels in a bid to increase the explanatory power. Alghamdi and Beloff (2016) proposed a research model, the e-Government adoption and utilisation model (EGAUM), which was commensurate to the Saudi Arabian context.

Coming up with global models explaining e-Government has been impossible owing, in part, to the different national cultural setups (Nguyen 2016). Therefore, researchers have been coming up with models conceptualised with reference to the existing models and their contextual settings. For example, Lai and Pires (2010) proposed a model to explain e-Government adoption in Macao. This model has specific attributes commensurate to the local contextual characteristics of Macao, China.

With reference to the previous studies, it has been established that the general factors influencing e-Government adoption at the individual level include the following: perceived risk (expected subjective injury after engaging in the use of technology platforms in accessing public services), trust in e-Government (trust that the government and technology will deliver on their promise to revitalise public service delivery), PU (degree of belief that using a particular system or technology will enhance a person's performance), perceived ease of use (degree to which the use of a system would be free from effort), perceived quality (perception of overall quality in relation to alternatives), quality of Internet connection and the experience obtained from the use of the Internet, computer self-efficacy (belief of an individual in his or her abilities to use a computer to execute a task), self-image (degree to which the use of an innovation enhances the social status of an individual), peer influence (effect of surrounding environment on the behaviour of an individual), intention to use (measuring the intent or plan to use technology in accessing public services and information), et cetera (Chatzoglou et al. 2015). Considering each of these factors is crucial in designing a contextual model that can be used to assess which factors are valid in a given context.

As IS innovations that depend on different types of technologies are significantly differentiated, there can ever be a single adoption model that can be used in different contextual settings. A better approach is to consider the existing models and therefore come up with a single conceptual model that incorporates contextual attributes that can be used in that particular context and in other similar contextual settings as well (Ramdani & Kawalek 2007). Given that it has been stated that there is no one model that can be used globally regardless of a context, the model proposed below simply articulates the constructs that need to be considered when designing a model to suit a given context.

The model shown in Figure 4.1 is mostly a very abstract model because it does not reveal the different constructs that underpin it. However, the constructs are conceptualised from the three common models and frameworks explored in this chapter: the TAM, TOE and UTAUT. The model is conceptualised based on the following two principles:

1. Adoption entails acceptance and usage of e-Government applications. The acceptance involves the conviction that utilisation of a technology to access public service will result in more benefits to both the individual and the government department. Usage involves using a given technology platform to access a public service. This thinking wipes away the temptation to only consider technology adoption as e-Government adoption.

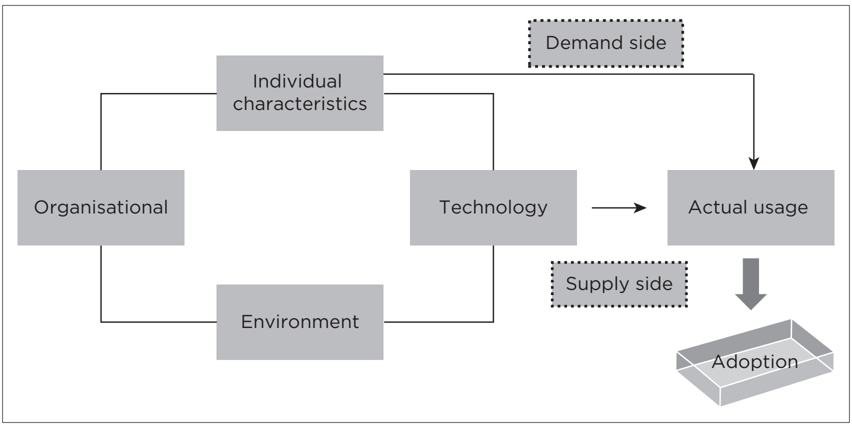

FIGURE 4.1: Attributes of a comprehensive adoption model.

2. Effective adoption of technology should occur at both the supply and the demand sides. The supply side is measured using the TOE and other technology adoption models that measure acceptance and usage of technology platforms in different organisational structures. The demand side focusses on the individual. Adoption at the individual's side is measured using individual adoption models.

The main thesis of the proposed model, therefore, is to emphasise that there is a need for a comprehensive adoption model that will facilitate measuring adoption at both the supply and the demand sides. When this is achieved, it means that there will be equilibrium in adoption where government departments have all the necessary requirements to migrate all their public services onto technology platforms and that individual citizens and businesses have fully accepted technology platforms as enablers for their accessing of government information and services.

Environmental factors have a significant influence or impact on the rate of adoption of e-Government services. Some of these factors include ICT infrastructure, availability of online payment mechanisms, legislative and regulatory framework, logistics infrastructure, et cetera (AlGhamdi & Nguyen 2013).

Utilisation of such a comprehensive proposed model where the actual constructs are informed by the local contextual characteristics may not only indicate the factors influencing overall adoption at different levels but also highlight the weak points of e-Government, which in turn may prompt authorities to explore the interventions to be put in place in order to achieve meaningful e-Government development.

■ Conclusion

It is assumed that adoption of technology as a key platform for e-Government will likely result in the actual adoption of e-Government. This chapter posits that technology adoption is a partial adoption of e-Government and that full adoption of e-Government should include both the acceptance of a given e-Government technology and its continued usage. Appropriate adoption of e-Government applications articulates the actual uptake of e-Government services which involves acceptance and actual usage. Understanding the key attributes of e-Government adoption is important because it gives pointers as to what aspects of e-Government the government and co-operating partners need to concentrate on in order to achieve global usage. This saves the government a lot of money with regard to designing tailor-made e-Government solutions for a given population (Kumar et al. 2007).

Many IS researchers have found that the TAM is one of the reliable models in investigation technology adoption and has proved to be a useful theoretical framework for explaining BI to adopt a variety of technology solutions. Although this is the case, it is important to extend it further and include the different contextual nuances and overcome its many limitations (Chen, Li & Li 2011). The numerous studies that have extensively utilised the TAM have generally not incorporated context when using the TAM. Furthermore, most of the studies have largely used a positivist approach in explaining the effectiveness of the TAM without considering qualitative and interpretive approaches to explain the associations among the different factors (Korpelainen 2011).

Effective technology adoption measurement emanates from understanding the process of technology adoption. Understanding the technology adoption process is very important in IS research (Silva & Dias 2015). As technology acceptance and usage occurs at both the supply and demand sides of e-Government, there is a need to understand the adoption process models on both sides. At the organisation level (supply side), there is a need to understand what processes and stages technology goes through before it is officially accepted in the confines of the organisation structures. To firmly understand the processes, one needs to understand the organisational politics influencing the processes. At the individual level (demand side), the researcher needs to understand the psychological and mental models influencing the individual to take a certain route as a process for technology adoption. Once the process that the technology goes through before it is finally adopted is understood, a researcher can have the desired technical competence to innovate adoption measurement guidelines that accurately measure the level of adoption. Technology adoption in e-Government research presents a lot of grey areas which need to be explored starting from terminologies utilised for definitions and operation of concepts. Lessons from various researches done so far in e-Government point to the fact that the more strictly the e-Government researchers delve into different aspects of e-Government design and implementation from their contextual comforts, the more they will be able to contribute to the body of knowledge. This is because this field is constantly changing, and the methods used in measuring levels or processes of adoption will continuously change. For example, in the future, special forms of e-Government may consider smart wearable devices to encourage citizens' convenient engagement in e-Government applications. Researchers need to ask themselves whether such evolving technologies will need to be investigated with the same methodologies as today. Further, the effectiveness of technology models has proved that most of them do not completely explain technology adoption. Therefore, there is a need for more adapted models to be validated in different contextual settings.

It is worth mentioning that any innovation in the development of assessment methodologies is welcome to contribute to the advancement of the body of knowledge of e-Government. For example, focussing on individual levels and using an adapted UTAUT2 model, Munyoka and Maharaj (2017) investigated moderating factors influencing e-Government adoption in the SADC region. The study found that some of the key factors at the centre of individual adoption of e-Government include age, level of education, the location of residence and presence or absence of vernacular language.

One of the key findings from this study was that there was a need to include language options in the design of e-Government platforms (Munyoka & Maharaj 2017).

Chapter 5

E-Government Maturity Models

Overview

Assessing the status of e-Government development is important as it gives a picture on the level of penetration of e-Government 'in the public service delivery value chains' (Bwalya 2012). Many researchers and practitioners have used different models and frameworks in evaluating e-Government development. However, most of these assessment tools have been found wanting as they give synoptic measurements of e-Government without giving sustained patterns of development. This chapter discusses different widely used frameworks articulating strengths and limitations for each of the models discussed. The chapter provides insight into guiding researchers and practitioners to motivate them to come up with global assessment models and frameworks that can go a long way in measuring e-Government development.

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E-Government Development

The goal of any e-Government implementation is to ensure that technologies appropriately integrate into the different public service delivery platforms and that they are adopted by citizens and businesses at the different levels of the socio-economic hierarchy. Like the many other innovations in e-Government which take the local context as a key determinant, the development of e-Government, which does not have any global maturity assessment model, needs to be carefully thought out. A global e-Government maturity assessment model needs to go through rigorous processes in order to be valid. The best-fit method for use in evaluating e-Government maturity is determined by the contextual outlay of the environment in which e-Government is implemented as any environment comes with unique contextual characteristics (Fitsilis, Anthopoulos & Gerogiannis 2009). This chapter intends to highlight the need for a global e-Government maturity assessment model given the limitations in many of the current models and frameworks. By carefully observing the limitations in the different models, one can conceptually come up with ideas on how a comprehensive and global assessment model can be conceived.

A great deal of effort has gone into evaluating the level of penetration of technologies in the public service business processes and at individual levels. The evaluation of e-Government maturity has been spearheaded by different maturity models, frameworks and continuum models. These models and frameworks focus on measuring different things such as use of different terminologies and stages of maturity. The first stage of e-Government maturity happens at the organisational and individual levels (see Ch. 4). The second is the actual realisation of the promises of e-Government (see Ch. 1) which are dependent on the level of development or maturity of e-Government applications. Apart from the models and frameworks, stage models such as Hiller and Belanger (2011) have been utilised to assess e-Government development.

In order to completely understand the assessment of e-Government, it is important to distinguish between measurement and evaluation. Both consider input, output, outcomes and impacts. However, evaluation goes further to consider the covariates affecting or influencing the measurement. Evaluation may include issues of causal impact as the measurement of any phenomenon is done (Savoldelli & Codagnone 2013). Most of the models use evaluation in the assessment of e-Government maturity.

Maturity models judge the extent to which an intervention or design achieves the purpose for which it was made and takes care of the evolving expectations of its core stakeholders and customers. Continuous assessment of government departments on their capacity to implement technology innovation and move away from traditional government is important at all times. The digital government capability is assessed in order to understand whether government agencies are ready to implement some digital innovation on the one hand and to understand the impact of these technological innovations on the overall agenda of efficient public service delivery and highly responsive leadership on the other hand (Cresswell, Canestraro & Pardo 2008).

Motivation for Assessment

There are many reasons that have prompted researchers and practitioners to design assessment models/frameworks and engage in the processes of assessment. Among others, evaluation of e-Government facilitates the understanding of what level of intended purpose is being realised in as far as investing in e-Government is concerned, understanding of the actual usage of e-Government solutions as a monitoring tool for the intended purpose and so on. As e-Government in general is still in its infancy, many of its dimensions are not developed to any appreciable extent. E-Government as a field is still a jungle of unstructured theories cemented by a majority of researchers and innovators who are not endowed with comprehensive and contemporary methodologies with regard to e-Government maturity. In addition, many e-Government theories lack cohesion and structure (Dehkordi et al. 2012). Given such a premature field, it is important to encourage debate among researchers and practitioners on the different aspects of e-Government.

Different e-Government maturity models (eGMMs) aim to serve as a guide to measuring the level of maturity of e-Government implementation (Karokola & Yngström 2009; Bwalya & Mutula 2014). Maturity is considered the development projectile of an innovation over evolving expectations and time (Raja & Ramana 2012). There are different stages of maturity depending on the level of innovation accomplished. The level of maturity of e-Government represents the level of maturity which is measured using the different eGMMs and frameworks.

The presence of an effective e-Government assessment framework is a prerequisite for the advancement of e-Government. Assessment enables the understanding of what stage in the implementation projectile development agenda any e-Government is (Jansen 2005). Measuring the e-Service constructs is important, especially when looked at with the conviction that there is a need to monitor and evaluate the maturity of e-Government (Kaisara & Pather 2011). The assessment and measurement of e-Government development and maturity are difficult given the scope and variety of e-Government projects targeting different aspects of public service administration (Fitsilis et al. 2009). Sigwejo (2015) stated that there are basically no appropriate and suitable evaluation strategies that can be deployed to measure the effectiveness of e-Government services and therefore ascertaining their level of maturity. Many maturity assessment models have focussed on global penetration of e-Government at the national level with no focus on understanding e-Government penetration at the local level. There has been continued push towards the need for e-Government to be conceptualised and designed from the local-level characteristics.

Although there is abundant literature describing the different stage models that exist, studies focussing on the model and framework limitations are few. Even as of today, there is no consensus on how e-Government maturity is to be measured or evaluated – no wonder there are a multiplicity of measurement frameworks that are fighting hard to occupy the turf for e-Government evaluation. Given that there is no globally agreed-upon definition of e-Government, it makes it even harder to think of a global measurement framework. Realising that most of the conventional models and frameworks have many structural problems and limitations, many researchers and practitioners have opted for alternative methods of assessment. For example, in the assessment of the impact of e-Government at the Kenya Revenue Authority, Akinyi and Moturi (2015) used the Balanced Scorecard (BSC) to understand the balance between anticipated benefits of e-Government implementation against investment costs in setting up e-Government. In presenting a business case as to why e-Government needs to be implemented in a given area, a BSC may not be enough to accentuate the case. In New Zealand, researchers included in their business case the different e-Government projects scoring different successes in as far as public service provision is concerned. As a motivation, the researchers also underscored the fact that, once fully implemented, government units will have the opportunity to follow internationally agreed standards and protocols for service excellence (Tucker & Miller 2005). This was after the realisation that using the existing models and frameworks may not yield good results in as far as assessing e-Government efforts is concerned.

Stage Models and their Limitations

The first generation of e-Government maturity assessment models were the stage models that explained e-Government maturity rigidly from one phase to the other. Many studies have evaluated the earlier stage models and brought out key issues justifying their limitations. For example, the DeLone and McLean model is one of the stage models that attracted a lot of attention from researchers all around the world. From its deployment in many projects assessing e-Government around the world, it can be posited that this model lacks the emphasis of the socio-economic implications for e-Government projects despite the model considering project and product dimensions.

Other than the DeLone and McLean model, many e-Government development projectiles have been modelled upon the Layne and Lee model of 2001. The model specifically aimed to showcase the level of integration between the back-end and front-end applications of e-Government. It was assumed in this model that the level of integration is directly proportional to the level of development or maturity of e-Government applications. Many eGMMs have been premised on the degree of horizontal or 'vertical integration of back-office and front-office [e-Government] systems' (Iribarren et al. 2008:n.p.).

Another prominent stage model for e-Government was the Stage Maturity Model of m-Government (SMM m-Gov). As a scientific framework, the SMM m-Gov was proposed to act as a guiding framework for e-Government implementation. It specifically measures the current level of maturity of e-Government which could be used as a guideline for the desired level of e-Government maturity later (Maranny 2011). The downside of this model was that it relied on current evaluations of e-Government maturity and then utilised it to guide objectives for e-Government implementation later. If the evaluation of the e-Government programmes being implemented showed that they have reached the end-point of development, then there would be no aspiration for further transformation or maturity of e-Government. Given that contemporary e-Government is implemented in highly dynamic environments where technology and expectations change every day, it is important that e-Government maturity assessment models continue changing.

Most of the stage models for e-Adoption are not necessarily correct because they assume that the penetration of technology in any given context follows a linear prescribed ladder. The stage models are also conceptually problematic because they assume that all organisational units need to use some sort of technology in order to be competitive. This is logically incorrect as some business processes do not necessarily have to use technology to efficiently execute their mandate (especially in the developing country contexts) (Ramdani & Kawalek 2007). In realising the limitations of most of the stage models, many organisations such as the Bretten Woods Institutions have spearheaded the formation of benchmarking models which provided close-to-reality maturity levels and milestones defining each of the levels.

Benchmarking Models

As mentioned, because of varying contexts, some institutions have come up with benchmarking models that are meant to act as reference points when assessing e-Government maturity. Fitsilis et al. (2009) have explored some of the e-Government benchmarking and maturity models used throughout the world. Given below are some of these models.

World Bank Four-Stage Model

The effectiveness of e-Government can be analysed using a four-stage model encompassing the following dimensions: quality of services delivered to citizens using ICT platforms, the level of improvement in the services delivered to businesses, empowerment of the e-Government consumers with information provided through e-Government platforms, transparency and anti-corruption brought about by the openness of e-Government platforms and efficiency in government purchasing practices. The World Bank's focus is on the assessment of the viability of the e-Government portals in ensuring that governance information is accessible online. Furthermore, the World Bank is interested in assessing the investments done in ICT infrastructure development to ascertain the extent of government systems that are connected to provide a more coordinated, open, transparent and connected government. The understanding is that such a connected governance infrastructure will enable the provision of a less duplicated governance and cheaper but quality public service which will ultimately result in an efficient public service. The four stages of the World Bank model are shown in Figure 5.1.

In the publishing phase, e-Government is in the preliminary stage where its online presence has just been established. In this stage, a few public services are migrated online, and the government departments experiment and carefully monitor to check if they are yielding the desired results. In other words, this stage pertains to when e-Government has just gone live.

The second phase is the interactivity phase. Principally, in this phase there is only one-directional interaction 'between the government [departments] and citizens and/or businesses' (Bwalya 2012:n.p.). During this phase, the citizens can download forms and upload them back to the e-Government system. They can also fill online forms for onward transmission to the government departments.

On completing the transactions phase, e-Government will have graduated to more interactive ways. This stage allows bidirectional interaction between government departments and citizens. This makes it easy for the exchange of services and public information.

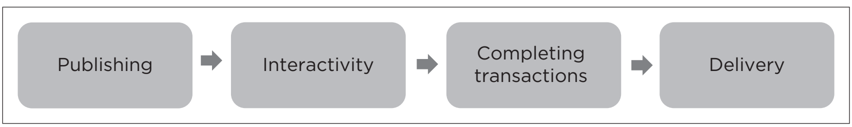


FIGURE 5.1: The World Bank model.

The delivery phase depicts a more fully developed e-Government capability which allows various transactions for executing all the public services as in the traditional model of government without any limitations. This is basically the transaction stage where e-Government users are able to engage with government departments efficiently and effectively, strictly online, but obtaining the service quality levels as if they were employing the traditional governance model.

United Nations e-Government Readiness Index

This is a four-staged process model that measures the overall e-Government readiness (the degree to which an entity has all the necessary conditions to offer a meaningful e-Government service – assessing both the front-end and back-end readiness levels, policies, funding models, etc.). By considering e-Service levels (levels and stages of services provision) and e-Participation (targeting universal participation of citizens regardless of their status in the governance hierarchy), the United Nations e-Government Readiness Index (EGRI) is able to indicate the level of overall development of e-Government. Collectively, the UN e-Government readiness model is a composite of the following indices measuring different aspects of e-Government: the Web Measure Index (measures whether websites have defined dynamic structure to handle majority of contemporary e-Government applications), Infrastructure Index (measures ICT infrastructure development and level of integration of the different e-Government systems including service integration and automation) and Human Capital Index (availability of adequate human resource base to foster e-Government innovation and design of contextually influenced applications). The EGRI is one of the most cited e-Government measurement methodologies demonstrating its reliability in measuring the level of e-Government development.

Greek Information Society Observatory

It is a national model assessing information society diffusion in Greece with close reference to the e-Europe benchmarking framework. The observatory uses the following to measure the e-Government maturity: the level of availability and sophistication of public services online and their level of compliance to the e-Europe framework, number of e-Government transactions by individuals and businesses using government online platforms, the number of digital public services conforming to the requirements of back-end (back office) readiness, the degree of government procurement done online using e-Government spaces (e-Procurement) and the number of government offices using 'open source software in designing [their] e-Government solutions' (Bwalya 2013:n.p.).

American Customer Satisfaction Index

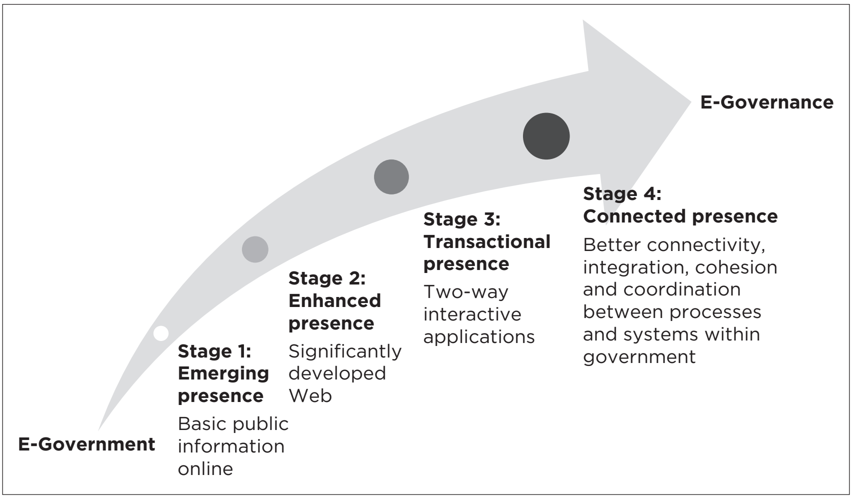
The American Customer Satisfaction Index (ACSI) indirectly measures e-Government by measuring consumer satisfaction in the use of e-Government applications. The assumption is that understanding consumer behaviour towards e-Government is crucial in understanding the drivers for penetration and eventual development of e-Government. The sentiments and behaviour of consumers can give pointers as to the actual level of penetration and development of e-Government in an area.

Other researchers such as Braclay (2007) used a framework based on BSC methodology endowed with project management perspectives. Still others have designed frameworks based on Control Objectives for Information and Related Technologies (COBIT) and Capability Maturity Model (CMM) process maturity frameworks. COBIT is a good practice framework that was created by the Information Systems Audit and Control Association (ISACA), an international professional association, targeting information technology management and information technology (IT) governance.

United Nations Maturity Stages of Government

The UN maturity model presents the different stages of maturity of government (by examining the provision and access models of public service) and thereby ascertains what has been achieved and what needs to be achieved in the near future to have a fully competitive public service delivery. The maturity curve shown in Figure 5.2 articulates the four key stages that need to be attained in light of e-Government maturity.

The first stage is the ‘Emerging Presence’ stage which basically shows the initial efforts of a government in establishing its presence online. In most cases, in this stage, information offered is static and is only presented on Web platforms for citizens to access or simply read the government regulations and statutes. Although there can be some interaction between the citizens/ businesses and government agents, no appreciable amount of interaction is expected at this stage.



Source: Adapted from Iribarren et al. 2008.

FIGURE 5.2: The UN e-Government maturity curve.

The second stage is the 'Enhanced Presence' stage. In this stage, there is significantly developed Web presence of the government departments where the majority of government information and services are accessible online. There are several information management tools such as Web portals, mobile portals and SMS functionalities to enable the citizens/businesses adequately access government information. In this stage, some of the interaction is supported.

The third stage is the 'Transactional Presence' stage where e-Government platforms support interactions such as two-way applications. At this stage, the e-Government project has developed to such an extent so as to have coordinated access and interaction channels such as public kiosks, a mobile app, mobile portal, and a Web portal that allow both financial and non-financial transactions.

The fourth stage is the 'Connected Presence' stage wherein the 'government as whole' is involved – the different modules of government are aptly coordinated to allow better coherence, integration and coordination of public business processes and system. This is done within and across government agencies. All the government modules are now connected as one entity.

In the EU, e-Government has now developed to between stages 3 and 4, where their technocrats are busy working to have cross-border business process integration.

Assessment Models and Frameworks

Apart from the known stage models and international benchmarking models, there are newer frameworks that have been proposed by different research consortia and international organisations. The models are geared towards presenting the key milestones that are needed to reach a certain level, especially in the contemporary IT world and public service environments. This section explores some of these models.

The Accenture e-Government Maturity Model

The eGMM proposed by Accenture is a four-level categorisation which articulates the maturity of e-Government rather than a mere presence on the Web. According to Shan et al. (2011), these categories are as follows:

1. Innovative leaderships – these are the leading countries in e-Government at the global level which provide advanced Web-based solutions targeting citizens and businesses. Countries in this category include South Korea, Canada, Singapore, the US and so on.
2. Visionary followers – these countries aim to improve government sophistication while at the same time maintaining administrative simplicity propelled by advanced implementation of technology in its public business processes. Countries in this category are Australia, Finland and so on.
3. Steady achievers – these countries show dedicated and steady improvements in e-Government although with less ambitious projects. Countries in this category are Hong Kong, France and so on.
4. Platform builders – these countries concentrate on the new government initiatives. Countries in this category are Brazil, Malaysia, Mauritius, South Africa and so on.

The eGMM has three pillars depicting the level of the business processes, namely, information criteria, IT resources and leverage domain. The eGMM posits that e-Government maturity passes through the following three phases:

1. Information presence – where governments merely have an established Web presence.
2. Interaction – there is exchange of information in a bidirectional model between the government and its stakeholders.
3. Political participation – this is the advanced level where citizens and businesses are significantly engaged in the governance value chains such as in political participation and

e-Governance including voting and activism. In this level, there is advanced interaction between the politicians or governance agents and the individual citizens.

The key principles upon which the eGMM was designed include standard structure of the CMM such as the Capability Maturity Model Integrated (CMMI) of the US, ISO/IEC 15504 of Europe, governments' digital strategies and the globally accepted principles of IT Governance or Enterprise Architecture (Iribarren et al. 2008). A careful look at the eGMM has proved that a robust eGMM needs to integrate security, availability and reliability issues into the design and implementation of e-Government.

Forrester e-Government Maturity Continuum

The Forrester research group has been doing a lot of research on applied aspects of IT to guide private companies and government departments on how to appropriately integrate technologies in their business processes. The group has proposed the Forrester e-Government Maturity Continuum which shows a more contemporary e-Government evolution cycle going through the phases of access, interaction and integration. The three phases of the continuum are discussed below:

1. Era of access – this was generally the era around 1993 where citizen-centric e-Government initiatives were geared towards the accessing of government information online within the information dissemination and sharing phase. Real-time information was provided so as to increase the trust levels of citizens in government service provision value chains.
2. Era of interaction – this allows bidirectional transactions between the government departments and the citizens. Access and Identity Management (IAM) systems have been adopted by many governments around the world to facilitate and manage the transactions between government departments and citizens/businesses.

3. Era of engagement – this is perceived as the final stage of citizen-centric e-Government maturity which aims to facilitate and enhance active participation of citizens in government decision-making. The understanding is that a few individuals should not decide the fate of all other citizens but that the citizens and businesses need to be involved in the decision-making processes, especially in things that affect them either directly or indirectly. The engagement era facilitates increased e-Participation of citizens in the different business processes of government.

The next set of models are those based on simplicity in measuring e-Government adoption. There are so many models that have been designed with a goal of providing the simplest models and frameworks. One of these models is the AHP, which is considered as one of the simplest methods in measuring impact (Saaty 2008). In e-Government assessment, the AHP assumes that the higher the impact of the e-Government solutions, the higher the level of maturity of e-Government. Other evaluation frameworks and models have concentrated on ex-ante or ex-post evaluations of e-Government policies, particularly focussing on the impact of policy on overall e-Government maturity. Level of e-Government is equated to the advancement and level of application of the policies. Some of these frameworks and models include MAREVA, eGEP, WiBe 4.0 and AGIMO (Stanimirovic et al. 2013).

MAREVA

The French framework, MAREVA, focusses on accrued benefits of e-Government to external users and civil servants, profitability, project necessity and risks. Another model, Wibe 4.0, also measures similar aspects (Stanimirovic et al. 2013).

E-Government Assessment Framework

The e-Government Assessment Framework (EAFv2) is one of the most complete ‘assessment frameworks that can be used to measure [e-Government maturity]' (Bwalya & Mutula 2014:n.p.). Rao et al. (2015) have posited the following as the pillars in as far as presenting EAFv2 as a robust assessment framework:

1. Service orientation – grouped under three themes: efficiency, citizen-centricity and user convenience.
2. Technology – technological base measured with reference to general architecture, interoperability, compliance to standards, reliability, security and scalability.

In the e-Government environment, compliance to each of these attributes can be achieved by understanding their meaning given the context in which they are applied:

- It is mostly encouraged to reduce setup costs and eventually maintenance costs; technology configuration for e-Government needs to be designed upon open standards such as those recommended by standards such as DCOM, CORBA, ODBC (0–5), TCP/IP, HTTP and XML metadata standards.
- Compliance involves assessing the appropriateness and comprehensiveness of the architecture to be fit for purpose, conformance to the national or international architectures, degree of interoperability with other existing systems and the extent to which a given architecture utilises open source software.
- Security attributes involve conformance to established security standards such as the DA AII, BS 7799 and so on, or is there a dedicated security policy guiding the security endeavours in the organisation? Understanding the level of security applicability involves assessing whether there are mechanisms in place for enforcing the existing security policy and the extent to which there is follow-up to ensure that users engage in secure electronic transactions in the e-Government environment (Rao et al. 2015).
- Scalability entails assessing the extent to which e-Government systems can be extended by increasing their hardware or software without impacting on system availability. E-Government scalability may mean increasing the number of users and/or transactions or integration of new devices into the system without sacrificing the functional state of the system.

- System reliability assesses the extent to which a system is up and running (functional state) in a given period of time. Reliability is determined by the level of availability of the system in a given period of time, which is measured as the probability that the system will be up and running during a specified period of time. Reliability is mainly a function of 'system availability', 'degree of producing highly accurate results' and 'existence of alternative service delivery channels'.
- Contribution of the e-Government system works towards cost reduction in public service delivery. Measurement of the impact is done by assessing the percentage of the reduction in the direct costs such as travel cost, cost of repeated visits, communication costs and staff costs (Rao et al. 2015).

In an attempt to come up with more comprehensive assessment models, some researchers have proposed models hinged on known international quality standards and a synthesis of many factors obtained from the other known models. The results are models that may stand a good chance towards self-establishment as global models. Examples of some of these models include the following: Ziemba, Papaj and Descours (2014) proposed a framework for e-Government quality evaluation based on the International Organisation for Standardisation (ISO) encompassing eight dimensions, namely, usability, maintainability, reliability, portability, performance efficiency, security, functional stability and compatibility. As mentioned, the shift towards models based on the ISO and other standards is gaining ground in e-Government research. Another e-Government model, the eGMM was proposed by Valdés et al. (2011) for use by different government agencies in assessing their readiness to implement e-Government. This multidimensional model was considered to be one of the key models in measuring the different elements and facets of e-Government and their complexity. Other adaptive models have utilised constructs from the adoption models to understand the level of penetration of e-Government in a given area. For example, in the context of Jordan, compatibility (degree an innovation is seen to dovetail with the values and experience in a technology) and trust (both in the institution [government] and Internet) are key factors that influence adoption of e-Government services (Mofleh & Wanous 2008).

Issues with e-Government Maturity Models

There are many issues or challenges that need to be solved in many of the e-Government maturity assessment models. For example, most of the models and frameworks measure penetration of e-Government at a global and not a local level, thereby missing out on the minute details outlining actual e-Government maturity in many of the contextual settings. Therefore, because global models and frameworks do not measure e-Government maturity at the local level, most of them are not very useful. However, of late, there are innovative models which can measure e-Government at the local level. For example, for assessing the penetration of e-Government at a local or municipal level, the Municipal e-Government Assessment Project (MeGAP) was proposed and promoted by the Public Sphere Information Group (PSI Group). The PSI Group proposed the MeGAP to effectively implement e-Government at the municipal level.

A critical look at most of the assessments reviewed reveals that most of them do not clear evaluation items (units of analysis) and the measurable constructs mentioned are left to the interpretation of anyone using the model or framework. In agreement with this suggestion, Jansen (2005) argued that most of the e-Government assessment frameworks and evaluations have no clearly defined purpose and scope. There is a need to encourage clearly defined measurement and evaluation metrics for the proposed models in any given context.

In some instances, e-Government assessments have used the more general e-Readiness assessment models such as the European Foundation for Quality Management model (EFQM), Center for International Development at Harvard University, Information Age Partnership (IAP), Computer Systems Policy Project (CSPP) and the Network Readiness Index (NRI). These models generally measure the general and basic tenets of e-Readiness such as the level of the digital divide, ICT skills in the general population, availability of requisite ICT infrastructure and ICT access modules (Dehkordi et al. 2012). The assumptions of such models are that positive scores on any aspect of these models suggest better e-Government maturity.

Given the limitations articulated above, it is evident that there is a need to work more towards the design of a holistic e-Government model that combines the strengths of all or most of the available e-Government assessment models. A lot of work needs to be done in order to come up with a comprehensive model for assessing the level of e-Government maturity. Khanh (2014) has stated that it is unlikely that there will be a time when a global conceptual model for e-Government is ever going to be designed given the varying contextual settings and cultural variations. However, it is worth mentioning that such a comprehensive model can be developed if there is more research and practice in this area.

New Thinking

In order to overcome the many limitations in the assessment models for e-Government maturity, there is a need for new proactive thinking. One of the ways to advance the effectiveness of assessment could be by a switch in the execution of research in this area. Instead of focussing on models that measure the state of e-Government at a given time (instantaneously) using cross-sectional studies, there needs to be a move towards assessment models that can measure e-Government over a period of time using longitudinal studies.

Another advancement in assessment could be utilising multiple criteria. Many of the e-Government assessment models and frameworks have adopted Multiple Criteria Decision Making (MCDM). This is because e-Government has many attributes which demand different methods in measuring each of the attributes. It is more likely that this method may increase the accuracy in the measurement of the actual advancement of e-Government. For example, in the Chilean context, four leverage domains were defined in the measurement of e-Government maturity: e-Strategy, IT Governance, Process Management, people and organisational capabilities. The eGMM was designed to be a strategic reference model to guide development and implementation of e-Government services in the Chilean, and by extension, the South American context (Iribarren et al. 2008). The way ahead in e-Government development assessment includes utilising a known model and integrating it with the factors from the local context which are crucial in the definition of e-Government maturity in that given context.

There is only limited research with regard to innovation and diffusion research in small and medium enterprises (SMEs), and therefore, there is limited understanding with regard to factors affecting adoption of technologies in the SMEs. Diffusion of e-Government in local contextual economic settings such as SMEs shows actual meaningful development of e-Government. The level of e-Government development in such a context demands thorough understanding of the factors influencing penetration of technologies in different parts of the socio-economic establishment, including SMEs, individual level, organisational level and so on. Empowering SMEs with technologies will result in their increased capacity to directly or indirectly participate in e-Government. Empowering SMEs means building human and institutional capacity with regard to the design of technology solutions given the context in which the SMEs operate and facilitating an enabling institutional environment for the penetration of technology into the different business processes (Ramdani & Kawalek 2007). Modelling of e-Government processes can also help in understanding e-Government maturity. The Wimmer's holistic reference framework aims to support integrated modelling of e-Government activities in a bid to understand their level of development (Iribarren et al. 2008).

E-Government should be assessed with reference to the already-existing development plan put in place by the e-Government designers. For example, analysing e-Government maturity in the case of Gauteng should start with a careful analysis of the strategy in the province. The Gauteng Province in South Africa has a robust e-Government strategy that aims to equip the province with one of the most developed e-Government programmes. The strategy, Gauteng Cities Region (GCR) e-Government Strategy 2015–2020, is built upon the following five pillars:

1. Building enabling ICT infrastructure that is going to stand the test of time. This entails that all the GCRs need to be connected to the Gauteng Broadband Network (GBN) by 2030 and that there will be a basic GCR portal in place so as to create a one-stop e-Government space.
2. Creation of common platforms rightly enabled to offer a single e-Government system with integrated common government models to produce an efficient service. The GCR elements will be highly coordinated so as to ensure that all the government business processes observe the necessary service expectations.
3. By ensuring that there are appropriate e-Government standards and legislation, establish a GCR model which will rate Stage 3 of the UN e-Government maturity.
4. Carry out adequate awareness campaigns so that there is increased usage of basic online government services. Out of these campaigns, it is hoped that there will be increased number of transactions between the citizens/businesses and the government departments.
5. By appropriately implementing e-Government, the GCR aims to stimulate the ICT economy. This will be done by having public–private partnership arrangements so that the developed ICT industry will contribute towards placing the GCR as a Southern African Development Community hub.

Assessment of e-Government maturity in the GCR scenario will involve checking the level of achievement of each of these pillars using a contextually aware measurement tool.

Conclusion

In summary, it can be stated that in e-Government research, there is a serious conceptual and logical mismatch in that all the researchers who have investigated adoption, usage and penetration of e-Government have made considerable progress in taking technology as the key indicator of e-Government maturity. The assumptions in prior research and practice have been that 'a mere adoption of technology is an indication of positive e-Government acceptance and adoption'. This is not correct because technology is merely an enabler for e-Government access. An individual may adopt technology and be very comfortable in using different platforms built on technology but may decide not to use available technology platforms to access public services and information. The factors affecting e-Government adoption are multifaceted, and therefore, a complete analysis of factors influencing e-Government adoption should be multidimensional looking at different factors such as social, technical, cultural, individual (networks, ICT skills, trust in government, competencies, etc.) and contextual attributes.

Therefore, it is important to investigate e-Government using multidimensional frameworks hinged on solid theoretical or conceptual underpinnings and practice. This is a grey area that PhD students, researchers in e-Government and practitioners need to explore. A model investigating the factors influencing e-Government maturity from multiple vantage points, especially with a focus on the developing countries, can be novel and stand the test of time. In trying to contribute to this cause, Kirui, Baguma and Kiprono (2016) have developed usability framework for developing countries. Understanding the usability constructs can help understand the actual level of e-Government penetration and therefore ascertain the level of e-Government maturity.

Such innovative and/or indirect ways of measuring e-Government need to be encouraged. As e-Government delves towards more ubiquity by adoption of pervasive technology platforms, the place of cloud and fog computing in e-Government is crucial to future e-Government implementation (Harfoushi et al. 2016). Therefore, in measuring the maturity of e-Government, there is a need to understand the level of usage of the pervasive e-Government platforms.

In conclusion, although a lot of ground has been covered with regard to the assessment of e-Government maturity, it is clear that a lot more needs to be covered. As articulated in this chapter, there are so many grey areas that need to be explored, especially giving cognisance to the local contextual characteristics. New maturity models of e-Government are emerging, thereby accentuating the need for e-Government researchers, enthusiasts and practitioners to continue pursuing development of models informed by their context. For example, Yousef and Martin proposed a maturity model for e-Government maturity in Libya based on technology, organisation and process (TOP). TOP defines the many dimensions that influence e-Government in many different contexts (Yousef & Martin 2017).

Chapter 6

Measuring Individual Adoption and Usage of e-Government Solutions using Principal Component Analysis

Overview

Although there are known models and frameworks used for technology adoption (as discussed in Ch. 4), other methods have been used either in conjunction with existing models or in isolation to measure the level of adoption of e-Government services. One of the methods that have recently gained increased attention of researchers is the PCA approach. This chapter explains how PCA is used to identify the factors at the centre of technology adoption as a platform for accessing public services

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and information in Zambia. These factors are most likely linked to both physical state and psychological well-being of an individual. The PCA is a factor reduction process that has been used in many fields of enquiry. The PCA is explored as a statistical approach in determining which factors have higher variance in influencing actual adoption of e-Government services at the individual level in Zambia. The methodological nuances shown in this chapter may be used to showcase an alternative approach to measuring the penetration of e-Government in any given area.

Zambia's Push for e-Government

Effective e-Government development translates into e-Government applications and solutions being accessed by a majority of citizens and businesses. This in turn gives these citizens and businesses access to a lot of government information or services and results in them participating in the different governance value chains. Zambia presents a case where e-Government development is in its nascent stages and where a majority of the population and businesses do not engage in e-Government, let alone being aware that e-Government is being implemented in Zambia. Because of a large number of e-Government projects failing to meet their expectations, especially in resource-constrained environments, the need to carefully understand contextual factors influencing e-Government development cannot be ignored.

The conceptualisation and implementation of e-Government in Zambia started some 20 years ago when the government realised that there was a need to combat the increasing trends of corruption. Further, it was evident in the Zambian polity that there was unprecedented levels of administrative barriers and 'red tape and inefficient/ineffective business processes, and [lack of] a neutral [platforms] where all citizens can participate in shaping the discourse [of] national matters' (Bwalya 2012:n.p.; Henriot 2007; Nyirenda & Cropf 2010). Furthermore, the international community had put much pressure on the government to find ways of inculcating efficiency in their public service delivery frameworks, especially following the SAP which was being implemented then. The SAP recommended the use of technologies in the public sector delivery programmes so that there could be audit trails of the level of services offered by the government departments. The unprecedented levels of inefficiency in the public sector necessitated the rapid radical transformation of the public service business processes (Habeenzu 2010). In tandem with the Public Service Reform Programme (PSRP) aimed at encouraging service innovation for improved public service, e-Government was conceived to be implemented in line with the aspirations of the SAP. Within the PSRP, public service business process re-engineering was being conceptualised and implemented within the Public Service Capacity Building Project (PSCAP).

As ably articulated in Chapter 2, the impact of e-Government on improving the overall efficiency of the public service, mitigating corruption, reducing the cost of service delivery and so on cannot be ignored. There are several cases that have shown the impact of e-Government on different aspects of the public service delivery. The restructuring of Pakistan's tax department, South Korea's 'online procedures enhancement for civil applications (OPEN) project and GePS' (Bwalya 2012), India's e-Government project assessment, the Philippine's e-Procurement system have all demonstrated massive reductions in the instances of corruption (Bhatnagar et al. 2007; Iqbal & Jin 2008; Pathak & Prasad 2006). Although e-Government is never a panacea for entrenched problems in the public service delivery platforms, it is a lever aiming to continuously improve public services.

There is a dearth of studies investigating e-Government adoption and usage at any level focussing on Zambia. Using the ITU e-Government implementation toolkit, Munyoka and Maharaj (2017) analysed the status of e-Government development in Zambia using four key dimensions: ICT infrastructure, policy, governance and outreach. The results of the study show that although e-Government has significantly developed during the last decade, a lot more needs to be done to achieve universal access to e-Government solutions.

The concept of PCA is based on mathematical and statistical principles. Mathematical modelling has been used in different contexts to measure or demonstrate different phenomena. Numerous studies conducted all over the world indicate that e-Government is a complex multidimensional phenomenon which depends on many factors and is difficult to measure given the multiplicity of factors. A rigorous factor reduction process was used to extract factors with higher communalities which show the highest likelihood of explaining variance in the predictor variables. The understanding of these factors is important because it gives guidelines on what interventions need to be put in place for effective e-Government development in Zambia and in similar contextual settings. This chapter articulates the general outlook of e-Government in Zambia, presents the rigorous process of factor reduction using PCA, explores the general outlook of e-Government adoption focussing on the individual and has a cursory look of the institutional factors of e-Government development. The end result of PCA shows the critical factors at the centre of e-Government development in Zambia.

The empirical research generated a large data set with many uncorrelated predictors which made it very difficult to analyse without a carefully informed statistical approach. Using these data in the analysis at this stage was not possible of many unrelated variables. Most of these data have very little to do with explaining the level of e-Government development in Zambia and had correspondingly low eigenvalues. In order to reduce the number of variables to a small set with correlated variables that could possibly be involved in the analysis, factor analysis using PCA was apparent. PCA is a factor reduction procedure that reduces a large data set with uncorrelated variables to a small set with largely correlated variables where statistical inferences can easily be drawn. At the end of the rigorous statistical procedure, a total of seven variables accounting for maximum variance in the predictor variables were extracted from the data set.

Individual Adoption of e-Government

Individual adoption of e-Government is one of the indicators that e-Government is slowly achieving one of its crucial roles – bringing governance to the doorsteps of the people by allowing them to participate in decision-making processes and obtain public information using appropriate technologies. However, it is worth mentioning that adoption of e-Government does not automatically result in efficient e-Government services and timely access to information resources. This is in conformance to the assertion by Kanaan et al. (2016) that acceptance and usage of e-Government services do not occur automatically but occur owing to citizens' satisfaction of the services provided on e-Government platforms. This suggests that there is a whole complicated array of factors that influence individuals' motivation to adopt e-Government services.

In a view to understand the inherent factors influencing e-Government adoption at different levels – individual, organisation, society and so on – many researchers have carried out empirical studies to understand the different factors at the centre of e-Government adoption. These studies were carried out in different contextual settings. Although many studies have been conducted to investigate the different dimensions of adoption, very few have been conducted in Africa and other developing country contexts. Some of the studies performed include the following:

1. Mahadeo (2009) investigated the adoption of e-Government in Mauritius and found that individual factors are key for adoption and usage of e-Government services.
2. In the context of Jordan, a host of factors influence e-Government adoption and development like managerial, individual and technical issues such as limitations in ICT skills,

social influence (SI), inadequate funding and data privacy. In realising the impact of these multidimensional challenges on the development of e-Government, Jordan came up with a dedicated e-Government strategy to counter the aforementioned challenges (Al-Shboul et al. 2014).

3. In Germany, the low adoption of e-Government services was attributed to the high risk-averseness of the Germany culture (Akkaya et al. 2012). The national culture in Germany sits at the centre of the willingness and perceptions on a technology of the citizens and therefore facilitates or impedes the adoption of new technologies.
4. In the case of Qatar, these are PE, effort expectancy and SI. The non-significant factors are those that may have some impact on the adoption of e-Government but are not necessarily crucial in predicting the BI of individuals to adopt and use e-Government services. In the case of Qatar, gender, age and Internet experience are also considered (Al-Shafi & Weerakkody 2010). Therefore, Al-Shafi and Weerakkody (2010) classified the factors influencing adoption of e-Government as being significant and non-significant. The significant factors are those that matter a lot in as far as e-Government adoption is concerned. Discussing the key issues that impact on individuals' adoption of e-Government, Nel (2013) stated that usability issues and other contextual factors need to be clearly understood before technology deployment platforms are designed.

With a goal of understanding adoption at the organisational level, Harfoushi et al. (2016) investigated factors influencing the adoption of cloud computing services in Jordan at the organisational level. The understanding was that adoption of e-Government at the organisational level may have an impact on the potential of individuals to adopt e-Government. Not many researchers have focussed on investigating e-Government adoption at the organisational or institutional level. Only the United Nations Department of Economic and Social Affairs (UNDESA) and very few organisations have focussed on measuring e-Government at the organisational or societal level.

The focus of the UN in measuring e-Government development keeps changing. For example, in 2008, measuring e-Government was based on the degree of the country's capability in terms of e-Readiness and e-Participation. In 2012, the focus was on e-Participation (Sigwejo 2015).

The mere implementation of technologies in the public business processes does not guarantee sustainable impact as technologies change rapidly, and if e-Government does not move with the times, the technology upon which it is designed may become obsolete. Harfoushi et al. (2016) have stated that, compared to traditional IT services, cloud computing offers promise with regard to reduced service processing costs, enhanced reliability and flexibility, increased throughput and so on. It should be mentioned that technology adoption to access public services and information is not the beginning or the end to itself. Because technology advancement does not necessarily translate into guaranteed adoption of technology, there is need to understand the factors and drivers for technology adoption before the 'design and implementation of e-Government [is] done' (Bwalya, Zulu & Sebina 2015:n.p.). This allows technology designers to understand the key attributes and design modules to include in the technology before it is actually designed (Nel 2013).

There is no single method of measuring e-Government adoption. This is because multiple researchers and international bodies have measured the development of e-Government using different indexes, methods, maturity models and so on (Fitsilis et al. 2013). Further still, many researchers have concentrated on measuring e-Government development by measuring individual adoption levels. As mentioned, the key assumption in this case is that individual e-Government adoption is directly proportional to e-Government development. Assessing the level of e-Government development at the individual level is one of the most important attributes indicating the level of overall e-Government development. As posited in Chapter 5, evaluating e-Government development or impact on public service delivery is a complicated and multifaceted undertaking which requires careful consideration of all the possible dimensions.

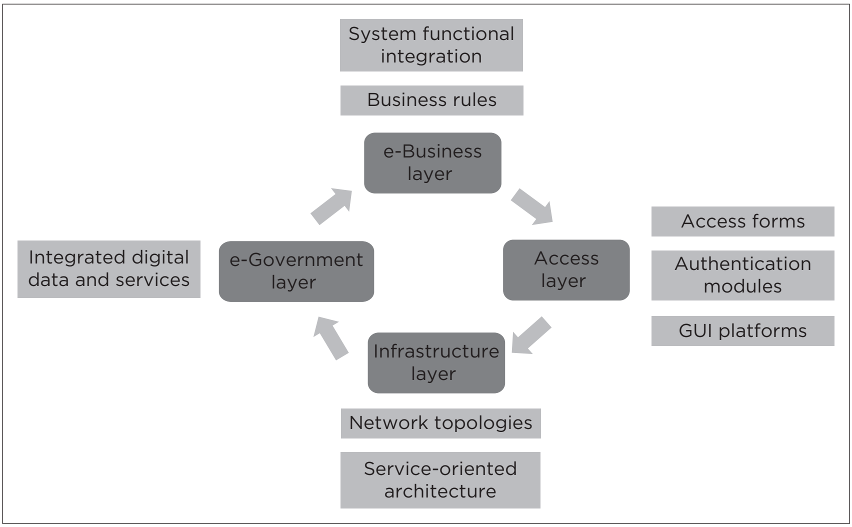
Understanding the many forms of e-Government and appreciating the benefits that come with e-Government implementation can be one of the key drivers for sustainable e-Government design. Given that technologies change rapidly and so do e-Government applications, citizens and businesses need to be always appraised of the current mode of e-Government services and their anticipated benefits. It cannot be denied that e-Government, in its many forms such as Government 3.0, mobile government (m-Government) and semantic government, is now at the centre of public service efficiency and innovation. Competitive and responsive public service delivery is now a must for inclusive governance and transparency. Many countries in the world are implementing different forms of e-Government in their public service delivery chains. In the case of Zambia, although e-Government implementation is in its nascent stage, many public services can now be accessed using ICTs. Some of the e-Government services that can be accessed online include applying for drivers' licences, renewing passports, paying for utilities, accessing policy and government information and so on. Benefitting from accessing public services such as the ones above using technology platforms means a great deal of public service delivery transformation for a majority of citizens across many of the developing countries. When properly implemented, e-Government results in a vast array of benefits – some of these benefits include the enabling of 'participatory democracy and social inclusion, [reduction in] the cost of public service delivery'(Bwalya 2012:n.p.), improved transparency in individual's interaction with government, mitigating corruption, enshrining of an efficient and effective public service delivery and so on (Alomari, Sandhu & Woods 2014; Alomari, Woods & Sandhu 2012; Kumar & Best 2006; Navarra & Cornford 2007). These benefits can be harnessed if citizens understand the benefits of e-Government services and ultimately adopt them.

Another factor that can influence the level of individual adoption of e-Government is the way e-Government solutions have been designed. As technology evolves rapidly, not paying adequate attention to the individual citizens' characteristics may result in a design that can make it harder for citizens to access e-Government platforms. E-Government information needs to be more dynamic and support transactional capabilities. This is expected as e-Government has transformed into different forms such as mobile government whose concern is pervasiveness (Gil-Garcia & Ignacio 2005; Rokhman 2011). In order to accommodate e-Government within the broader public service infrastructure, there is a need for massive decentralisation efforts of the e-Government agenda. The current trend all over the world is that e-Government is evolving from the national to the local levels so that more citizens and businesses are able to interact with government organs and that local government organs operate at acceptable service quality levels and effectiveness (Gil-Garcia & Ignacio 2005; Gomez-Reynoso & Sandoval-Almazan 2013). A likely design that would increase the chances of e-Government success is where business processes in the public sector are aligned with an integrated IT architecture framework. The integrated architecture contains the access layer (simplest form with access parameters), e-Government layer (integrated digital data from different government departments), e-Business layer (integration of front-end activities such as online transaction interfaces with back-end database consoles) and the infrastructure layer – IT configurations and topology providing technology infrastructure reaching all organs of the government (Abu-Shanab & Khasawneh 2014; Ebrahim & Irani 2015). When designing e-Government, all the layers of the integration framework need to be considered so as to ensure that the user gets the best experience from interacting with e-Government platforms.

The integrated infrastructure shown in Figure 6.1 allows the different essential hardware and software modules that are needed to lay a basic network abstraction for integrated e-Government IS. Such a system would be able to seamlessly share information for optimum service delivery.

In general, practice has shown that in order for e-Government to succeed, there are a lot of interventions that need to be put in place and various issues considered. E-Government strategies should consider all the different factors that influence e-Government not only at the individual level but also at the different levels such as society, organisation and so on. Although they do not suffice in all possible contextual settings, some of these issues and e-Government aspects are articulated below:

1. Government departments need to consider inter-organisational information sharing arrangement allowing them to share information and integrate business processes (Praditya, Janssen & Sulastri 2017).
2. In the development of e-Government, there is utmost need to ensure that the legal aspects are considered and/or embedded into the e-Government development processes (Olbrich & Simon 2008).



GUI, graphical user interface.

FIGURE 6.1: E-Government integrated infrastructure.

3. To increase the level of security in e-Government, it is important that a tailor-made security layer encompassing technical and non-technical aspects of security is included in the design (Karokola & Yngström 2009).
4. Many e-Readiness models are based on the private sector as not many studies in the public sector have been done globally. Designing responsive and/or dynamic e-Government solutions depends on the understanding of the factors that influence e-Government adoption in a given context. Furthermore, some of the constructs of e-Government design are based on the understanding of the e-Government readiness and e-Government strategy (Alghamdi, Goodwin & Rampersad 2012).
5. Because of varying contextual settings, e-Government design in each area needs to consider its unique characteristics so that they are embedded into the design (Elsheikh & Azzeh 2014).

Given the aforementioned, this study aimed to understand what factors influence the acceptance and usage (hence development) of e-Government applications. Although the focus is at the individual level, other broader factors that may have direct or indirect impact on e-Government were considered in light of the focus of the study.

Theoretical Grounding

The PCA, closely related to the Karhunen–Loeve transform (KLT), is used in the analysis of multidimensional data sets so as to extract factors contributing maximum variance to the adoption and usage of e-Government. The use of PCA is commensurate to the analysis of the multidimensional aspects of e-Government. As early as 1904, Pearson had started investigating PCA as a data reduction technique in contexts where a large data set needed to be analysed with a large number of uncorrelated variables. The PCA uses dimension reduction or 'data reduction' techniques which are methods used to reduce the number of variables explaining variance in a given scenario. Further, PCA uses linear transformations of data to retain fewer factors that maximally explain the variance in a phenomenon. PCA may further be looked at as a noise-reduction procession where data that contribute to the attenuation of the value of data are removed. In information science, this would be white noise being removed from a signal sample to reduce signal attenuation.

PCA can be used to present data in one-dimensional space which can then easily be analysed. In contemporary data and computational sciences, PCA can be used in creating algorithms and tools for use in big data analytics, data clustering, pattern recognition, data or classification applications and so on and can therefore be seen as a backbone to contemporary data analysis domains. Specifically, PCA allows the generation of new sets of data from a huge data set with linear combinations of variables uncorrelated with each other and ordered according to the degree of explanation of variance in the original variables (Everitt & Hothorn 2011). Although PCA has many advantages, it also comes with a higher computational cost compared to other potential methods that can be used in data reduction such as the Fourier Transform.

PCA is founded upon applied linear algebra and non-parametric methods forming a mathematical conceptualisation used for extracting relevant data from complex data sets. The mathematical procedure for the PCA starts from the data dimensionality reduction procedure where only variables showing promise are extracted. Principal components are a linear combination of optimally weighted variables. PCA is then done by shifting data set in a coordinate system using the data vectors with greatest modes of variance. The data used in this research have a large number of variables, and therefore, it was important that PCA be used to reduce redundancy so that it can be prepared for further analysis. Redundancy in the variables can occur because some of the variables are correlated as they are measuring the same construct. The key assumption in the use of PCA is that the reduced number of variables will account for most of the variance in the predictor variables. The independent variables are referred to as predictors and the dependent variables are the criterion variables. Each of the variables is analysed independently using one-way analysis of variance (ANOVA) bivariate analysis to gain statistical inferences, and at the end of the analysis, a combined multivariate procedure is utilised to analyse the combined effect on the overall adoption and use of e-Government of the individual variables. The use of multivariate descriptive statistics enabled the researcher to investigate the data set as the entire population of interest and finally obtaining multivariate descriptives such as R^2 as a final measure of variance.

The PCA procedure follows distinct sets of steps to ensure that only the factors with higher communalities are included in the final set of factors accounting for the highest variance in the predictor variables. After the empirical study with N observations, a data set was obtained with X variables (dimensions) which represents the multidimensionality in the data set represented by Equation 6.1 as a set of data column vectors that are artificial variables (principal components):

$$Y_1 = \mu_{11}X_1 + \mu_{12}X_2 + \mu_{13}X_3 + \ldots + \mu_{1p}X_p \qquad \text{[Eqn 6.1]}$$

The coefficients μ_{iN} will be different for each of the different data sets. Equation 6.2 can further be represented in a matrix form of size [M by N] using the Euclidean product as:

$$Y_1 = \mu_1^T X \qquad \text{[Eqn 6.2]}$$

The aim is to reduce the dimensionality of the data set by rotating it around the *XYZ* coordinate plane. PCA is applied to the normalised data by firstly obtaining the empirical mean as:

$$\zeta = \frac{1}{N}\sum_{n=1}^{N} R(m,n) \qquad \text{[Eqn 6.3]}$$

where $m = 1 \ldots M$.

The empirical mean is then subtracted from each column of R. Given that ε is a unit vector of size N, we can thus posit $X = R - \upsilon\varepsilon$. Approximating X in a lower dimensional plane M of the given matrix Y_i (of dimension Z), the mean square error can be approximated as follows:

$$\varepsilon^2 = \frac{1}{N}\sum_{n=1}^{N} |X_n|^2 - \sum_{i=1}^{Z} b_i^T \left(\frac{1}{N} X_n X_n^T\right) b_i \qquad \text{[Eqn 6.4]}$$

where b_i, i = 1, ..., Z, is the basic vector in the linear plane of size Z.

We can minimise ε^2 using a symmetric, positive semi-definitive covariance matrix as follows:

$$\varepsilon^2 = \sum_{i=1}^{Z} b_i^T cov(x) b_i, \text{ where } cov(x) = \sum_{n=1}^{N} X_n X_n^T \qquad \text{[Eqn 6.5]}$$

Each of the principal components is obtained by maximising $\upsilon^T \sum \upsilon$ so that the end result obtains $\upsilon^T \upsilon$ = 1. Using the Lagrange multipliers with $\Lambda(\upsilon)$ = $\upsilon^T \sum \upsilon$ + $\Lambda(1\text{-}\upsilon^T \upsilon)$ and taking a derivative with respect to *v* and equating the equation to zero as espoused in the Lagrange energy conservation equation:

$$\frac{\partial \Lambda(\upsilon)}{\partial \upsilon} = 2\sum \upsilon - 2\lambda\upsilon = 0 \text{ (Lagrange optimisation problem)} \qquad \text{[Eqn 6.6]}$$

We can therefore posit that the following equation holds:

$$\sum \upsilon = \lambda \upsilon \qquad \text{[Eqn 6.7]}$$

where *v* is the eigenvector of the covariance matrix which corresponds to the maximum variance from the covariance matrix ($\sum$) corresponding to the eigenvalue λ. The eigenvalue problem can be conceptualised as follows: Given the eigenvalue problem with $A.v = \lambda.v$ where A is a m by p matrix, v is a m by 1 non-zero vector and λ is a scalar. Therefore, any value of *l* which ensures that the equation above has a solution is known as the eigenvalue of A and the vector corresponding to this value is called the eigenvector of A. By shifting the directions of the rotations on the Euclidean plane, we were able to obtain successive principal components with projected maximum variance. In this study, the obtained factors explaining e-Government adoption in Zambia represent the principal components as *K* eigenvalues with largest eigenvalues from the data covariance matrix representing the likelihood of factors that can explain much of the variance in the predictor variable. The value of the eigenvectors determines the component factors to be included in the final analysis from the data set.

Principal Component Analysis of e-Government Adoption

The application of PCA in e-Government adoption research follows a careful thought process to ensure that all the factors influencing adoption are included in the analysis. As has been conceptualised from the articulation of PCA, a reduction process is undertaken to weed out factors that do not significantly contribute on individuals' resolve to adopt e-Government applications. The research process is as follows:

1. Preliminary analysis involves subjecting the raw data from the empirical study using a normal analysis procedure to remove outliers.
2. Data that follow a normal Gaussian distribution are analysed to understand the degree of variance contributed by each of the factors extracted using PCA with Kaiser normalisation.
3. The finalised factors are subjected to selected statistical processes to understand the degree of variance of each of the factors.

The research instrument used for data collection was conceptualised upon the TAM2 and UTAUT (Venkatesh et al. 2012). The questionnaire had both open and closed-ended questioners probing individuals on various aspects of e-Government adoption. The research followed the ethical principle espoused in the ethics statement of the American Anthropological Society, University of Johannesburg set of ethical principles and the University of Zambia biomedical ethical principles. Snowball and purposive sampling techniques were used to execute the inclusion criteria of this study.

Preliminary Analysis: Tests for Normality

In order for the data set to pass desired reliability and validity and to conform to established statistical assumptions for inferential statistics in the multivariate analysis, it was apparent that it be subjected to preliminary tests. The first statistical assumption is that the data set needs to follow the Gaussian normal distribution. A further assumption is that multivariate normality is achieved if all of the bivariate data in the data set follow a normal distribution curve as tested using the Kolmogorov–Smirnov and the Shapiro–Wilk test. Therefore, each of the bivariate data was subjected to normality testing. The preliminary tests showed that the data were negatively skewed confirming the presence of outliers which could distort the regression coefficients. The data in Figure 6.2 show negative skewness with a clear case of an outlier. Therefore, the data do not follow normality. The same data were plotted using a boxplot also presenting the same case where the outlier and the negative skewness are clearly identifiable.

In order to conform to the Gaussian distribution function (GDF), the negatively skewed data were subjected to data transformation.

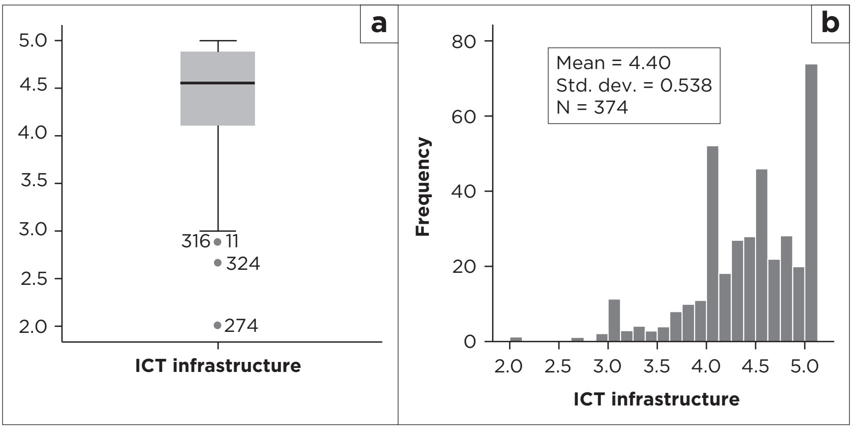


FIGURE 6.2: (a) Boxplot and (b) histogram on 'ICT infrastructure' data set (demonstrating negatively skewed data).

After clearly observing the visible outliers and skewness, the data were transformed using a logarithmic function $\log_{10}(6-x)$ to remove the negative skewness. After transformation, the data followed normality as they clearly showed the bell-shaped curve.

The Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy (MSA) tests whether the sample utilised in the empirical study was adequate or not. The KMO test in this study shows χ^2 (66) = 2701.097, $p < 0.001$ (level of significance at 0.005) with a value of 0.919 showing that more than an adequate sample was used in the study as shown in Table 6.1.

As the data now follow the GDF (normality) and it has now been statistically proved that a sample is good enough for statistical inferences, it can now be firmly stated that the data are ready for PCA.

Principal Component Analysis

After the preliminary tests, the observed data are first coded and presented in a matrix format with dimensions ($m \times p$). From this matrix, correlation matrix (Σ) and also the corresponding covariance matrix were calculated. Given the two matrices obtained, it is now possible to calculate the eigenvalues and eigenvectors. From there, we generated the proportion of total variation explained by the jth principal component. Finally, you choose the number of principal components and generate plots to explain the results of the analysis. Because this study uses data with many measurement items and is therefore difficult to easily discern the many inherent associations among the data,

TABLE 6.1: Kaiser–Meyer–Olkin and Bartlett's Test.

Test		*N*
Kaiser–Meyer–Olkin MSA	-	0.919
Bartlett's test of sphericity	Approx. chi-square	2701.097
	df	66
	Sig.	0.000

it was difficult to understand which factors account for the adoption of e-Government in Zambia without a careful statistical analysis. Therefore, factor or dimensional reduction to consider only factors with large variance was apparent. The value of the *eigenvectors* determines the component factors to be included in the final analysis from the data set.

'[The study uses] restricted EFA at 0.005 level of significance' (Bwalya & Mutula 2014:n.p.). The EFA is conducted in conjunction with PCA employing principal axis factoring as the factor extracting methodology. The oblique rotation methodology used in PCA factor optimisation is Promax with Kaiser normalisation. After the initial factor solution was obtained, it was important to manipulate the factor axes in the factor matrix to achieve a more acceptable factor solution. Instead of orthogonal (90 degree) solution, the factors were rotated in such a way that the factors extracted were more correlated. We then computed the factor/component loadings obtaining PCA coefficients between variables (shown in the rows) and factors (shown in the columns) as shown in the factor matrix in Table 6.2 in the initial factor solution. The PCA procedure done in conjunction with restricted EFA was performed on the data set using varying degrees of iterations as follows:

1. After the first round of analysis, a total of 15 factors were extracted after 13 iterations of principal axis factoring as the extraction method.
2. In the second round, the two cases with low communalities (<0.3) were excluded from further scrutiny, with rotations converging after 19 iterations using both Promax and Kaiser normalisation resulting nine factors being extracted. The use of both Promax and Kaiser was to ensure that only relevant results are included in the analysis.
3. The last round saw seven factors being extracted. Extraction communalities depict the estimates of variance in each variable accounted for by a given factor. The variance referred from the communalities is not final as an alternative statistical procedure was performed to obtain the R^2 values which better estimate the factor variance.

TABLE 6.2: Total variance explained.

Dimension Factors	Initial eigenvalues			Extraction sums of squared loadings			Rotation sums of squared loadings[a]
	Total	Variance (%)	Cumulative (%)	Total	Variance (%)	Cumulative (%)	Total
1	13.642	20.061	20.061	13.195	19.404	19.404	10.197
2	7.268	10.688	30.749	6.819	10.028	29.432	8.475
3	5.339	7.851	38.600	4.878	7.173	36.605	5.841
4	3.301	4.855	43.455	2.848	4.188	40.793	7.252
5	2.881	4.237	47.691	2.473	3.637	44.430	7.945
6	2.731	4.017	51.708	2.321	3.413	47.843	4.938
7	1.836	2.700	54.408	1.373	2.019	49.862	3.972
8	1.781	2.619	57.027	1.357	1.996	51.858	2.858
9	1.743	2.563	59.590	1.290	1.897	53.754	2.302
10	1.357	1.996	61.586	-	-	-	-
11	1.303	1.916	63.502	-	-	-	-
12	1.277	1.878	65.380	-	-	-	-
13	1.038	1.526	66.906	-	-	-	-
14	1.004	1.477	68.383	-	-	-	-

[a], When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.
Extraction method: Principal axis factoring.

The statistical procedures show the total variance explained by the factors extracted after rotation as shown in Table 6.2. Although all the 14 factors extracted are able to explain 100% variance, only seven factors (explaining 54% variance) are included in the analysis owing to differences that may arise from individual orientations.

Only factors with higher communalities after rotation were included in the analysis. Each of the factors extracted was further subjected to normality testing using the Kolmogorov–Smirnov and Shapiro–Wilk tests as shown in Table 6.3.

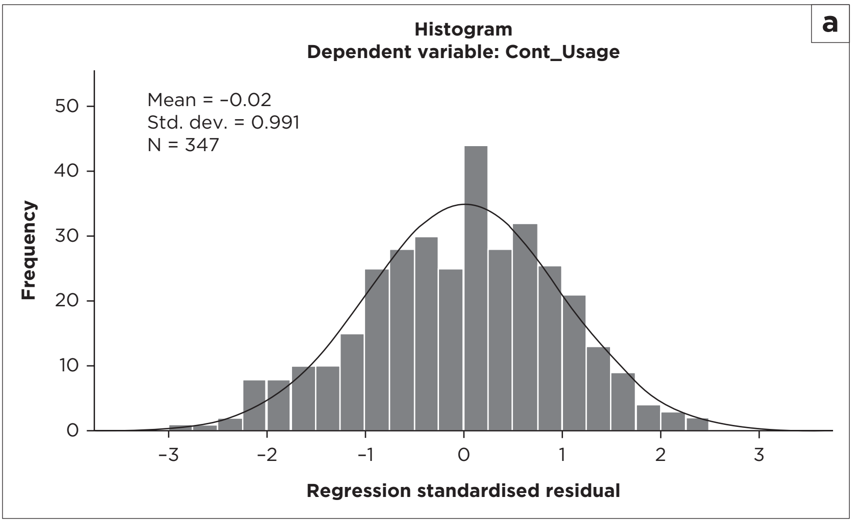
The results of normality testing and linearity are shown in Figure 6.3. The residual statistics shown in Figure 6.3 confirmed that the Mahalanobis distance has an acceptable value and the P–P plot for standardised residue shows linearity in the data set.

The seven factors can now be used to obtain statistical inferences with regard to the development of e-Government in Zambia.

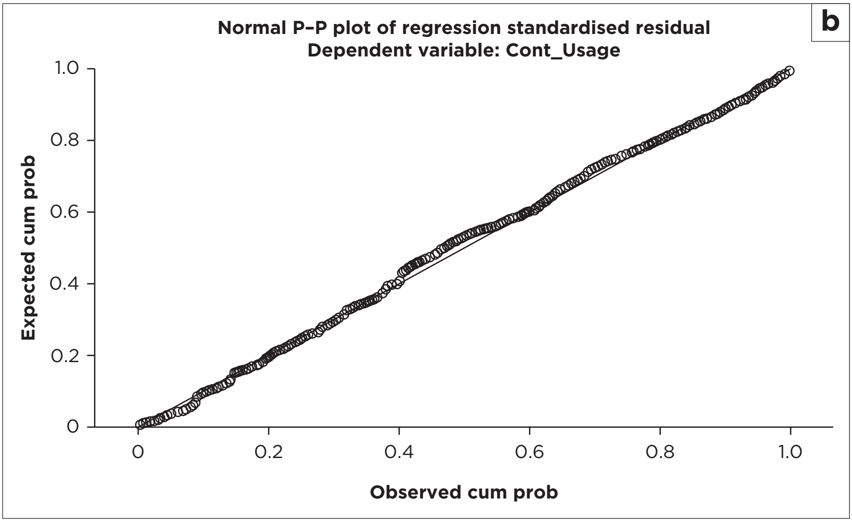
TABLE 6.3: Tests for normality on all measured items.

Measured Items	Kolmogorov–Smirnov[a]			Shapiro–Wilk		
	Statistic	*df*	Sig.	Statistic	*df*	Sig.
ICT_infra	0.132	374	0.000	0.901	374	0.000
PEOU	0.142	377	0.000	0.972	377	0.000
PU	0.117	401	0.000	0.930	401	0.000
Comp_SE	0.178	405	0.000	0.880	405	0.000
FC	0.129	405	0.000	0.899	405	0.000
Trust	0.149	377	0.000	0.951	377	0.000
SI	0.147	374	0.000	0.924	374	0.000

Source: Adapted from Bwalya et al. 2012.
a. Lilliefors Significance Correction.
ICT, information and communication technology; PEOU, perceived ease of use; PU, perceived usefulness; FC, facilitating conditions.



Source: Bwalya et al. 2012.
FIGURE 6.3: (a) Gaussian normal data fit of CU on all other variables, (b) P–P plot for standardised residue of CU on all other variables.



Source: Bwalya et al. 2012.

FIGURE 6.3 (Continues...): (a) Gaussian normal data fit of CU on all other variables, (b) P–P plot for standardised residue of CU on all other variables.

Findings

Some of the issues impacting on e-Government penetration have been the high cost of technology acquisition owing to the partially liberalised and privatised ICT sector and underdeveloped national backbone infrastructure, poor Internet infrastructure, comparatively high cost of Internet access, fragmented government business processes owing to lack of an integrated government ICT infrastructure to coordinate the e-Government implementation, inadequate technology savvy government specialists who can continuously develop central e-Government applications, lack of a central e-Government coordinating agency, lack of capacity to implement the *Computer misuse and crimes Act of 2004* and the *ICT Act of 2009*.

As access to the Internet on mobile gadgets by ordinary individuals continues to grow, as well as continued deployment of optical fibre networks from both sides of the African seaboard coupled with subsequent interconnection with inland fibre networks (such as the ones erected by CEC, ZESCO and Zamtel), there is a veneer of hope that the future of e-Government and public service innovation in Zambia is bright. High unemployment and underemployment rates deny opportunities for a large portion of the citizenry to buy ICTs and potentially engage in e-Government. Out of the 721 questionnaires distributed, only 411 were returned and 408 were finally included in the final analysis of the data. The descriptive statistics obtained from the study revealed that:

1. The majority of the respondents have the requisite ICT skills to effectively engage in e-Government although the actual usage of e-Government applications is low as only 27% of the respondents indicated having ever used e-Government applications, 49% of the people surveyed indicated that they were not aware of e-Government being implemented in Zambia, with 30% being moderately aware of available e-Government services.
2. Sixty-one per cent of the respondents indicated that most e-Government websites or platforms are not reliable and that they cannot generally trust e-Government platforms with 84% citing lack of security policies and a further 84% of the respondents opining that they are not comfortable sharing their personal information with government platforms.
3. Over 50% of the respondents are in agreement with the fact that underdeveloped ICT infrastructure in Zambia is negatively impacting on e-Government development in Zambia. For a poor country such as Zambia, underdeveloped ICT infrastructure is the Achilles Heel for any meaningful e-Government development.

Discussions

Understanding the contribution of variance of each of the factors to e-Government adoption at the individual level is a very complicated undertaking. As of today, the existing models for measuring technology adoption only scratch the surface in as far as understanding the factors influencing an individual to adopt technology platforms. The issue of adoption becomes a complicated affair when one wants to understand the factors influencing adoption not only on the technology component but also regarding other attributes of e-Government. In measuring adoption, we need to ask ourselves, how do we control our adoption experiments so that all other factors influencing a certain individual behaviour can only be attributed to factors in a model? These are crucial research pointers that researchers and practitioners need to explore if e-Government adoption were to be understood clearly or at least to a certain extent. Models based on predetermined factors may mask some of the factors that may contribute a large portion of variance in explaining adoption. In this study, although a comprehensive model was espoused upon the TAM2 and UTAUT was used as a theoretical lens, the questionnaire gave an opportunity for respondents to add more factors which were not included in the closed-ended questions but were included in the open-ended questions. These factors were then subjected to rigorous factor analysis and PCA. Such an approach is more promising for the future.

In order to obtain a general understanding of the status of e-Government development in Zambia, the descriptive statistics obtained from the study revealed that:

1. The majority of the respondents have the requisite ICT skills to effectively engage in e-Government although the actual usage of e-Government applications is low as only 27% of the respondents indicated having ever used e-Government applications.
2. Forty-nine per cent of the people surveyed indicated that they were not aware of e-Government being implemented in Zambia, while 30% indicated that they were moderately aware of available e-Government services. This points to the fact that there are not enough e-Government awareness campaigns being held in Zambia.

The statements above are confirmed by the descriptive statistics. Furthermore, the factors extracted have shown that generally Zambia does not have the requisite ICT infrastructure to support dynamic e-Government applications. The limited ICT infrastructure is concentrated along the line of rail with the cities of Livingstone, Lusaka and Kitwe having the largest share. The international gateway is still managed by Zamtel, a state telecommunication enterprise, making access to the Internet expensive and ultimately reducing any meaningful chances for e-Government development. Many of the people surveyed indicated that they had limited skills – indicating the need for ICT education to up the ICT skills of the citizens and bring about computer self-efficacy. SI and FC were also found to contribute to influencing the actual usage of the system. If an e-Government champion were to be appointed to coordinate and motivate the integration of ICTs at a global level in the public sector, many government employees would be prompted to use technology in delivering public services. Supporting or conducive environment and incentives have to be put in place in order to facilitate the desired e-Government growth.

The pointers presented below articulate what could possibly be done to overcome challenges and issues negatively (directly or indirectly) impacting on individual e-Government adoption and development:

1. Both the public and the private sectors need to invest in appropriate ICT infrastructure for e-Government development. Zambia has a poor backbone infrastructure which could otherwise promote reliable broadband and Internet penetration had they been developed adequately. If individuals do not have access to requisite ICT infrastructure, there is no way they could even think of adopting e-Government applications.
2. Most individual respondents indicated that they were not aware of e-Government applications pointing to the fact that there are no adequate awareness campaigns of the e-Government solutions. This calls for impactful and

sustainable awareness campaigns that can motivate the citizens to engage in e-Government. These campaigns can be tailored such that they emphasise the advantages of adopting e-Government in the today's information age.
3. It is evident that there are low literacy levels and low computer self-efficacy skills among most of the citizens, limiting their capabilities for engaging in e-Government. E-Government stakeholders should implement community-level education programmes aimed at imparting practical ICT skills and knowledge among citizens and businesses.
4. There is a need to increase capacity and competencies among people at the back-end designing and managing e-Government applications on behalf of the government and technical partners/stakeholders. As posited in this chapter, the design of e-Government has a direct impact on individual's decision whether to accept or ignore e-Government. The e-Government leaders at various levels are mandated to ensure that there is information currency on e-Government websites, applications are designed according to the characteristics of the majority of the citizens and businesses, and e-Government solutions adapt according to evolving service level requirements, and business and individual needs. As many different aspects of e-Government change without notice owing to technology's short lifecycle, there is a need to put in place dedicated leadership who keep monitoring the development of e-Government at all times.
5. Commitment of various stakeholders in e-Government is a very expensive undertaking which cannot be implemented by the government alone without the help of the private sector. Earlier on in this book, it was posited that the funding or support model of e-Government needs to be based upon the public–private partnership model. Government or individual commitment can only be obtained when there is a clear understanding and appreciation of the value of e-Government. Therefore, there is a need to understand and appreciate the crucial role that e-Government plays in contemporary adaptive and inclusive governance systems.
6. There is a need to encourage ICT vendors by relaxing the heavy taxes they are expected to pay especially on importing

ICT gadgets and components as this will further reduce prices for ICT gadgets making them more affordable to a majority of the citizens and businesses. As stated in the previous chapters, government needs to regulate the passage of ICT products, gadgets and expertise across the borders so as not to run short of expertise and ICTs when needed.

7. The design of e-Government should take into consideration the unique local contextual characteristics such as the diversity of languages spoken in Zambia, less complicated e-Government solutions owing to underdeveloped ICT backbone infrastructure and liberalising the ICT sector to reduce the cost of access to the Internet.

Conclusion

The focus of this chapter is the understanding of the different issues that influence e-Government development with the individual as a unit of analysis. It is posited that individual perceptions of e-Government and their eventual adoption of e-Government applications sit at the centre of e-Government development. For the context of Zambia where e-Government implementation is at an emerging phase, the involvement of individuals at different stages of the development cycle is crucial. Involving would-be consumers of e-Government makes them associate themselves with e-Government. By so doing, the individuals will eventually adopt the e-Government applications.

The chapter has shown that there are different methods of assessing e-Government adoption – some employ direct measurements of adoption at the individual level, whereas others use indirect means. Indirect measurement would mean measuring the impact of sound policy or design platform for e-Government applications and then extrapolating the empirical data to the individual level.

PCA was used to guide the statistical analysis of the data obtained using questionnaires, document reviews and interviews.

The study used a conceptual framework hinged upon TAM2 and UTAUT. The results of the study show that e-Government implementation in Zambia is still at a nascent stage, and therefore, a lot of interventions need to be put in place if technology stands a chance of being used on a global scale in everyday public service business processes. The factors identified can be used as pointers in guiding interventions aimed at accelerating e-Government implementation in Zambia. The major limitations of the study are as follows:

1. Does not measure actual participants' behaviour but measures 'behaviour intention' although perceived to have a direct causative relationship on technology adoption and utilisation (as posited by Venkatesh et al. 2003)
2. The sample is limited and confined to the major cities along the line of rail in Zambia – may not be representative of the whole population of Zambia.

Therefore, the statistical inferences obtained in this chapter need to be used for reference purposes only. Further, purposive and snowball sampling used in the study may have implications for the generalisability of the findings.

Chapter 7

Contextual Readiness of e-Government

Overview

E-Government readiness is a comprehensive summary of all the necessary factors for creating a conducive environment for e-Government development. Understanding the level of e-Government readiness gives pointers that can be used to inform policy and interventions to facilitate effective e-Government development. Furthermore, understanding e-Readiness enhances the likelihood of successful e-Government implementation. This chapter explores the multidimensional concept of institutional readiness and discusses how it influences e-Government development in a given context. It also explores many common e-Government readiness assessment models and outlines their strengths and weaknesses in as far as measuring e-Government readiness is concerned.

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E-Government Readiness

E-Government readiness is a concept that is closely related to e-Readiness. Both measure the state of readiness of entities in assimilating ICTs in their domains although e-Government readiness goes further to explore the multidimensional aspects of e-Government other than technology. The state of development and therefore readiness in supporting e-Government applications of each of the factors or dimensions for successful e-Government implementation is called e-Government readiness. Understanding of e-Government readiness starts from having a clear idea of what e-Readiness entails (Memarzadeh & Jahany 2014). Assessment of e-Government readiness is the crucial point in the motivation and formation of an e-Government strategy (Meyaki 2010).

Before we delve into the actual e-Government readiness models, it is important to have a clear understanding of the different uses of e-Government. E-Government readiness is a multidimensional function which principally has two parts:

1. Understanding what is in place (policy, ICT infrastructure, human resource, etc.) that would make it easier for the integration and assimilation of e-Government into the public service delivery frameworks and different socio-economic establishments.
2. The existence of a conducive environment which can allow technology to be easily embedded into the different possible e-Government applications.

Understanding the different possible e-Government applications will enable researchers and practitioners to ascertain the readiness of the existing e-Government infrastructure and supporting conditions in as far as supporting the anticipated applications is concerned. The following are some of the possible applications for e-Government:

1. Access to public services – assess the availability of the requisite ICT infrastructure that allows citizens and businesses

to easily access public services such as application for national registration cards, renewal of motor vehicle licences and payment of taxes online or returns (eFiling).

2. Networked government – platforms for allowing the government departments and the general public and/or businesses to seamlessly interact; possibilities for integrating government systems and business processes, thereby providing a streamlined service.
3. Access to government information and knowledge – existence of platforms that could facilitate easy access to public information and knowledge, namely, policies, constitution, government records and government activities (government budget, programmes, etc.).
4. Procurement of government services online – platforms for allowing e-Procurement of public goods and services, e-Tendering, et cetera, to reduce corruption and inefficiencies.
5. Supply of resources – availability of platforms for provision of citizen development programmes and tools.
6. Ubiquitous public services – existence of platforms for enhanced and streamlined public service delivery made possible using Internet-enabled technology platforms. Such services may include obtaining ownership of titles, ID cards, e-Taxation, payment of fines and dues, and so on.
7. Connectivity – existence of platforms that allow the government and citizens to engage through highly connected online systems which form virtual communications (‘online town halls’) where citizens can participate in decision-making and the formulating of policies which have a direct effect on them. Such systems can provide platforms for enhanced e-Participation such as e-Voting.

Understanding the potential of e-Government applications throws light on what attributes of e-Government need to be in place before official e-Government design and implementation can commence. If most of the desired attributes of e-Government are missing, then it can be concluded that e-Government readiness has not been achieved as yet and that e-Government efforts cannot go on.

Why e-Government Readiness Assessment?

As mentioned, there are various reasons as to why e-Government readiness measurement has to be done prior to the design and implementation of any e-Government programmes. There are basically two ways in which e-Government can be implemented – the first one is where a comprehensive and sustainable e-Government implementation is sought. This involves carefully forming a vision, strategy and a roadmap, indicating the desired stages of development including the roll-out plans. The second one involves the development of e-Government on an *ad hoc* basis where there is spontaneous unplanned use of ICTs in the public business processes motivated by different resources based on the context. Regardless of the method in which e-Government was born, it is important to first perform e-Government readiness assessment. In the first case where e-Government is carefully planned, it is easy and obvious that e-Government readiness assessment would be informed. In the second case where e-Government develops on an *ad hoc* basis, there is a need to ensure that once technology is seen to be self-penetrating into PSPs, e-Government readiness assessment has to be done to carefully align it to the public business processes so that public service delivery is not compromised.

E-Government readiness assessments aim to raise awareness on the minimum capabilities and motivations which should be in place so as to accentuate the overall capacity of the entities involved in the implementation of e-Government and also judge the likelihood of success thereof. Readiness assessment enables the pinpointing of the limitation(s) in the 'environment in which e-Government will be implemented' (Bwalya & Du Plessis 2015), provides pointers that could be used in monitoring and evaluation of e-Government implementation, informs e-Government strategy so as to overcome the identified weaknesses in the environment in which e-Government will be implemented, identifies the descriptors of the environment in which e-Government is to be implemented and so on. It is worth noting that e-Government readiness assessments are mostly conducted right at the beginning when preparing to design and implement e-Government. In environments where competitive and sustainable e-Government implementation is desired, it is important to do assessments regularly. This is because e-Government is highly dynamic given the ever-changing technologies, application specifications and user needs. In many aspects, effective e-Government implementation entails rigorous public service process re-engineering to reposition old business processes in the realm of recent technologies calling for continuous e-Government readiness assessments.

Components of e-Government Readiness

Understanding e-Readiness is a precursor to understanding e-Government readiness. Just like e-Government, although there is no formulaic definition of what e-Readiness entails, the multiplicity of definitions are now showing the key or common aspects of what e-Readiness entails in different contextual settings (Memarzadeh & Jahany 2014). E-Readiness is used to assess the preparedness of an area to participate in the global information society which in many cases is hinged upon the utilisation of different types of technologies in accordance with the different socio-economic settings of an area. It is perceived that an area ready to participate in the digital economy will have a much-reduced digital divide so that digital opportunities are harnessed and access to information is achieved (Meyaki 2010). The digital divide is one of the key limiting factors for e-Readiness (Mutula 2005). The digital divide is a global phenomenon which is compounded by lack of access to ICT, leading to lack of information and ultimately social and economic exclusion. For the past 20 years, officials from the Bretton Woods Institutions have been striving to address this issue, resulting in numerous interventions being implemented in different parts of the world.

The digital divide is defined as the lack of access to ICTs, which results in a lack of access to information and correspondingly missing out on the digital opportunities.

Another key challenge to e-Government readiness other than the digital divide is the limited broadband penetration globally. The lack of desired broadband penetration has resulted in massive e-Exclusion where the majority of the global population do not have access to digital opportunities such as e-Government. Although there are over 3.5 billion people who have online access as of 2017, there are still more than 3.9 billion people who do not have online access, indicating glaring levels of digital divide. This means that over half of the world's population still do not have access to vital online information (Broadband 2016). The low penetration of broadband has hit the developing countries more owing to their contextual setting. There are many problems in the developing countries preventing accomplishment of set targets for Internet penetration – progress towards gender equity with regard to access to broadband has not been achieved and the global gender online gap is widening (Broadband 2016). This situation is set to change as this problem has been recognised and included for discussion at the higher levels of the United Nations. With the UN member states set to adopt the *2030 Agenda for Sustainable Development*, broadband has been identified as one of the key drivers for underpinning inclusive and sustainable development (Broadband 2016).

E-Government readiness therefore measures the degree of preparedness of the government institutions to provide a majority of the public services using technology systems and platforms, willingness of the government leaders to open up for transparent and accountable leadership, existence of requisite ICT infrastructure and so on, and the willingness of the general populace to accept, adopt and use e-Government applications (Meyaki 2010). In its basic form, e-Government readiness can be measured using the following four dimensions: 'Security and technical infrastructure readiness'; 'policies, strategies and management readiness'; 'human resource readiness'; and 'legal and judicial framework readiness' (Memarzadeh & Jahany 2014). As mentioned, the importance of the measurement of e-Government readiness cannot be ignored. Assessing e-Government readiness enables an appraisal of the capacity of government entities to effectively implement e-Government (Gyaase 2014).

E-Government readiness is subdivided into many different levels, depending on the focus of e-Government implementation. Given below are some of the levels of e-Government readiness assessments.

National e-Government Readiness

National e-Government readiness is the preparedness of a country to implement e-Government definable by the level of development of technological and telecommunications infrastructure, human resource development and willingness of both the government and citizens to adopt technology in the public service delivery platforms (Mundy & Musa 2010). In order for national readiness to be attained, there is a need for all the sectors of a country to have the minimum requirements for the implementation of e-Government – these may include adequate technical and managerial competencies in public service to ensure the presence of a competent human resource base to design and manage the different dimensions of e-Government, appropriate ICT infrastructure, citizens with adequate ICT skills and affordable Internet costs, among others. There should also be robust communication models which ensure that all citizens know that e-Government is being implemented, what kind of government services can be obtained using the available e-Government platforms and so on.

Institutional Readiness

Institutional readiness essentially means that the government departments and public employees have the capacity to integrate technologies in the different platforms of the public service establishment. This can be achieved by having appropriate and adequate ICT infrastructure and other supporting technical and managerial establishments to support e-Government applications. Further, e-Government readiness entails having the necessary legal and regulatory framework that can support the different aspects of e-Government (Mundy & Musa 2010). Institutional readiness also involves organisational readiness which entails that government departments should be always ready to engage in business process re-engineering so as to accommodate changes brought about by the dynamism in e-Government. Furthermore, institutional readiness entails that the public sector has the necessary flexible business processes which may be re-engineered at any point to accommodate emerging changes introduced by e-Government.

Platform Readiness

Platform readiness means that e-Government is being implemented on platforms designed on open standards accessible on any Internet-enabled devices as these platforms can easily adapt to the changing technology needs. For example, with the development of the social media platform as a robust communication and interaction platform, majority of researchers are investigating social media readiness (SMR) as a precursor for e-Government advancement (Albrecht et al. 2008; Bannister & Connolly 2015; Hoffmann, Lutz & Meckel 2013). Already, there are scalable and adaptive e-Government applications that are solely meant to be accessible on mobile devices in the realm of mobile government (m-Government).

Individual Readiness

Individual readiness depicts the conviction or preparedness of the individual to adopt e-Government applications based on his or her conviction that e-Government applications are indispensable to his or her needs. Furthermore, the individual should possess adequate computer knowledge and ICT skills, and also know about platforms upon which e-Government can be accessed. Also, the individual should be willing to engage in e-Government with the conviction that the benefits of e-Government surpass the difficulty or the cost of accessing public services through ICTs and so on.

Leadership Readiness

Leadership readiness is one of the most important aspects of e-Government readiness. During the feasibility assessment of e-Government design, it is important to assess the different leadership attributes that are desired to drive the whole e-Government agenda. A set of minimal factors act as a baseline upon which e-Government leadership readiness is assessed to determine the degree of e-Government readiness. According to Meyaki (2010), some of these factors include the following:

1. Political conditions – awareness of political value to good governance which in turn is a prerequisite to sustainable national development. This involves understanding that political excellence is a crucial tool for effective e-Government.
2. Political leadership – adequate commitment on part of the leadership towards promoting the development of e-Government by bringing together the private sector and the civil society so as to ensure the development of a competitive e-Government. There needs to be strong political will for e-Government to succeed. Leadership needs to ensure that there is ICT literacy and adequate educational facilities and programmes for impacting ICT skills to the general populace.
3. Flexible governance – the government structures need to be well structured for eventual transformation when e-Government is implemented in order to accommodate the new changes and requirements of contemporary government. This may entail process re-engineering to the required extent.
4. Requisite and robust legislative and regulatory frameworks – protecting the users by regulating the behaviour of the

different entities in the e-Government environment. These are important in privacy legislation and to ensure that there is legal validity for e-Government transactions.
5. Policy implementation coordination – putting in place requisite leadership that ensures that there is expected integration of technology in the public services in different departments of the government.
6. Existence of change agents – driving the e-Government agenda at the business process level. The agents work on the people's attitudes and adaptability to change which is crucial in accepting e-Government in any given setup.

Adequate levels of e-Government readiness can be attained if the e-Government solutions are designed with local contextual settings in mind and there are requisite supporting dimensions to support e-Government development. When designing e-Government, there is a need to understand the four dimensions of e-Government that need to be considered during its implementation. These dimensions have been chosen from the many studies done around the world that have attempted to measure e-Government readiness:

1. Government environment – Infrastructure, that is, technical infrastructure to allow flow of information and services, facilitating the necessary interactions between government departments and citizens/businesses. The government environment needs to be assertive enough to provide a conducive environment for the development of e-Government where public business processes are integrated and all government departments operate within the same legal framework. A requisite e-Government environment ensures that the government procures appropriate technologies as an enabler and gateway for e-Government services.
2. Policy – (a set of principles which articulate a plan of action upon which actions and informed decisions are based with a view to achieve rational outcomes). The policies are articulated and expressed in different laws, declarations, contracts, campaigns, trade regulations and so on. Policies articulate the acceptable behaviour patterns of the different

players in the e-Government environment to ensure that they are in accordance with the expectations. Effective policies need to be guided by the context in which they are applied and should be aligned to the expectations laid upon the e-Government solutions. A key characteristic of a competitive policy is that it should be flexible to be realigned if there are significant changes in e-Government configurations as a whole.

3. Governance – (as defined above, the enforcement of global and contextual principles in the different business processes of the government's administrative process aims to achieve the overall public good of public service, providing individuals with desired levels service quality based on the match between expected/desired service and the actual service rendered against the time it took to process the service). Governance entails the act of ensuring that the actual e-Government implementation dovetails the strategic orientation made at the design stage and therefore articulates the anticipated expectations of e-Government implementation in as far as revitalising public service is concerned. Governance ensures that a competent human resource base is set up to facilitate the design of tailor-made e-Government applications.
4. Outreach – (entails the making available of e-Government platforms so that individuals can have access to them). Outreach aims to achieve universal e-Participation and a general appreciation of the e-Government services. Any potential, successful e-Government implementation should have a clearly articulated awareness campaign to ensure that all individuals regardless of their socio-economic status and orientation have the equal right to access and use e-Government solutions.

There is a need to consider the four dimensions articulated above right at the beginning or the conceptualisation stage of e-Government implementation. The dimensions have been used to inform the different e-Government assessment 'frameworks and models focusing on [different aspects] of e-Government' (Cmielarz & Szumski 2018:n.p.).

E-Government Readiness Assessment Models and Tools

Owing to the lack of a global model for assessing e-Government readiness, many researchers and practitioners have attempted designing models based on their focus and contextual setting. Only the e-Government readiness model by UNDESA has come close to positioning itself as a global model for e-Government readiness assessment. Gupta, Shakya and Marasini (2015) have explored different models used in assessing e-Government readiness. Some of the more common models for e-Government assessments developed in different contextual settings include the following:

1. The STOPE model developed by Bakry (2004) included pillars on strategy, environment, technology, people and organisation. This model was used for measuring e-Government readiness, readiness of organisations to implement enterprise resource planning (ERP), application of information services and so on. The model states that the first step towards e-Government readiness is the existence of a strategy based on the contextual characteristics of the environment in which e-Government is going to be implemented. The environment needs to be ready to support the inclusion of technologies in the business processes of public services. Furthermore, the organisation needs to be ready to implement innovative and emerging technology platforms so that e-Government applications maintain relevance to the government departments and the citizens at large. Just like many other e-Government readiness assessment models, the STOPE model focusses on assessing the readiness parameters of the internal environment of e-Government.
2. The Jordan e-Transformation strategy was used to assess the likelihood of the environment to include e-Government and its various impacts on the public business processes. The e-Transformation strategy was conceived after realising that there was a need for a strategy that would guide the metamorphosis of public business processes as technologies evolve. Majdalawi et al. (2015) articulate the

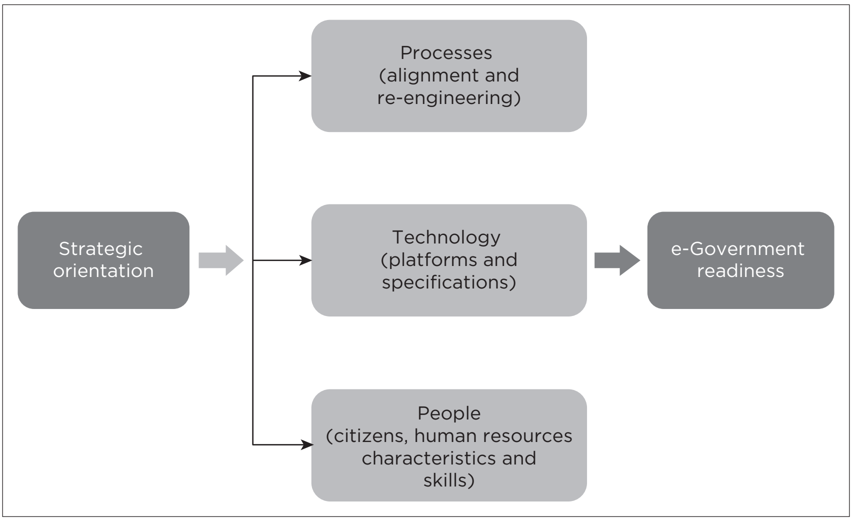
e-Transformation strategy of Jordan as one of the forward-looking interventions that produced policy guidance for effective integration of technologies into the Jordan public service establishment. This strategy was conceptualised after the realisation that there is a need for massive e-Government transformation which should be continuously done in order for e-Government to remain relevant and evolve with the evolving technologies. This strategy was anchored by the following strategic initiatives: 'whole of government', e-Participation, m-Government and open data. The 'whole of government' pillar pushed the agenda of an integrated government where the different e-Government systems were appropriately integrated to achieve seamless flow of information among government departments, reduced time-frame for the provision of government services, increased efficiencies and so on. E-Government assessment in this regard was to check whether the right conditions are set in place for creating the 'whole of government'. The e-Participation pillar is concerned with the implementation of e-Government systems which allows anyone regardless of status to access e-Government solutions.

3. Sabri et al. (2012) proposed an e-Government readiness model based on the Hofstede's cultural dimensions. The model principally intended to concentrate on assessing the cultural and trust factors that may negatively impact on e-Government based on the context in which the study was done.
4. In the case of Tanzania, Dewa and Zlotnikova (2014:44) identified 'ICT infrastructure, ICT usage, human capital, citizens' awareness of e-Government services, and [...] trust and confidence in e-Government services security' as key factors that determine e-Government readiness. In this study, e-Government readiness was determined by the level of development of the ICT infrastructure as a key determinant to support the different e-Government implementations, the ICT usage patterns to ascertain the likelihood of adoption of e-Government applications, availability of requisite technology experts who should be mandated for designing and managing e-Government solutions incorporating the local contextual needs as technology and user needs change.
5. The Three-Ring e-Government readiness model measures the level of Internet integration strategy for e-Government

readiness, focussing on the organisation as a whole, technology and its workers using three levels, namely, strategy, system and data (Koh, Prybutok & Zhang 2008). The readiness is considered at three levels, namely, disparate e-Government function where information, transactional and operational perspectives are standalone; integration state where there is strategic alignment to the systems and data; and integrated e-Government portal where all different parts of e-Government are logically and coherently compacted into one technical and functional state to achieve desired characteristics of 'whole of government'. The Three-Ring e-Government readiness model is a comprehensive model which has a higher degree of flexibility in as far as measuring readiness of e-Government is concerned.

6. Yunis and Sun (2009) e-Government readiness model: Analysing secondary data from United Nations Public Administration Network and the World Bank, Yunis and Sun (2009) proposed an e-Government readiness model based on three components: 'country profile characteristics (Human Capital Index [HCI], Growth Competitive Index, IT development index […])' (Joseph 2014:n.p.); e-Government readiness measurement items (PC and Internet index, Web Measure Index, infrastructure, e-Participation); and the overall measurement of e-Government readiness. This is one of the well-rounded models that measure e-Government readiness at a high level. However, the key limitation is that it does not adequately measure the readiness of the individual before e-Government design is done. The measurement of e-Participation is done at a high level therefore not going down to individual factors that may be at the centre of individual willingness to adopt e-Government.
7. E-Government readiness model with internal factors is a four-phase model that measures the level of readiness of e-Government, focussing only on the internal factors that show the likelihood of successful e-Government development using strategy, process, technology and people. The model was conceptualised from a qualitative and quantitative study which showed that the constructs of the model are the key factors that influence e-Government development in

the study's contextual setting. Technology concerns the IS structure, hardware and available software applications, technical support and development – forming the key enabler and platform upon which e-Government services are accessed. The processes focus on the ability of the public service to achieve business process change which can be facilitated by business process re-engineering. Business process re-engineering involves re-designing of the business process so as to accommodate impending change. Aspects concerning people are user satisfaction, impact on employees, skills, human resource training and development. Strategy which is the anchor upon which e-Government is going to be hinged articulates the motives, goals, strategic alignment to the public services and action plan that shows the roadmap of e-Government implementation, and identifies the current and anticipated challenges. Figure 7.1 shows the schematic representation of the e-Government readiness model focussing on internal factors.



Source: Adapted from Azab et al. 2009.

FIGURE 7.1: Internal factors of e-Government readiness frameworks.

This model assesses the extent of e-Government by assessing the different attributes mainly from the supply side of e-Government. The assumption is that, if e-Government systems are made available to the citizens and businesses competitively, there are higher chances of success. As noted in other models, competent human resources endowed with adequate skills, adaptive technology solutions and flexible business processes which can be easily realigned are the key characteristics of promising e-Government development.

Khalil's National Culture and Values e-Government Model

Khalil (2011) proposed an e-Government readiness model that focusses on national culture, values and practice. The model was conceived after the realisation that culture and general ethos, values and practice sit at the centre of e-Government development in any given area. The model measures the power distance (PD) based on Hofstede's principle; future orientation, the ability of the public service business processes and citizens to accommodate future changes brought about by the dynamic nature of e-Government; gross domestic product (GDP), the socio-economic status of a country to invest in e-Government infrastructure development; institutional collectivism (IC); assertiveness (AS); gender differentiation, assessing the role of women and men in e-Government; performance orientation, metrics focussing on factors that influence effective and efficient public business processes; human orientation (HO); uncertainty avoidance, making information-based decisions possible by the integrated network; and in-group collectivism (IGC). It is posited in this model that GDP is a very important indicator for e-Government readiness as it shows the capacity of a government and its co-operating partners to invest in setting up e-Government applications as e-Government is a very expensive undertaking. The key limitation of this model is that the constructs it uses may be subject to interpretation and may sometimes be incorrectly interpreted.

Bottom-up Approach – e-Government Readiness Model

Developed by Zheng and Jiang (2011), e-Government readiness model is a two-building-blocks model that assesses both the external environment and external readiness indicators of e-Government. The external environment involved social ICT infrastructure readiness, social and human environment readiness, managerial framework readiness and leadership readiness. The assessment of the internal environment focusses on work force capability; internal IT infrastructure; information safety; and investment, legal and regulatory environment.

In order to understand how the different e-Government adoption models have been conceptualised, it is important to know the key e-Government readiness indicators that have guided many models that have been developed. Twum-Darko, Noruwana and Sewchurran (2015) have summarised the many readiness indicators that have been used in various e-Government readiness models and frameworks. Table 7.1 summarises these factors.

TABLE 7.1: E-Government readiness indicators.

E-Government readiness factor	Description
ICT infrastructure	Requisite telecommunications infrastructure that is able to support current and emerging e-Government applications.
Leadership	Leaders endowed with strategic vision to come up with a plan and roadmap for e-Government development; need for senior government officials to act as champions for e-Government implementation.
Institutional infrastructure	To drive awareness campaigns and facilitate e-Government implementation.
Legal infrastructure	Regulations, policies and laws guiding behaviours of different players in the e-Government environment.
Process infrastructure	Information management systems, records, data and metadata standards and business processes that allow the offering of 'whole of government' public services, integrated e-Government systems facilitating seamless flow of information and services.
Human infrastructure	Availability of public sector employees with the right attitude and the necessary knowledge and skills to design e-Government according to the specifications of the local context. The existence of competent human resources with technical expertise is one of the key requirements for a vibrant and sustainable e-Government implementation.

Source: Twum-Darko et al. 2015.

From Table 7.1, it is worth noting that there is a need for the legal and process infrastructure to be integrated to ensure that what the policy articulates is in tandem with what is happening in the daily business processes of e-Government. Any gaps that can appear during the implementation complicate the e-Government's likelihood to achieve desired results.

At the global and national levels, different e-Government readiness models and frameworks have been proposed. The following presents the major e-Government readiness assessment models (Alghamdi, Goodwin & Rampersad 2011):

1. Accenture (2005, 2007) focussed on 22 countries. Measurement items included service maturity (depth, breadth), customer service maturity (citizen-centred interactions, cross-government service interactions, multichannel service delivery, citizen voice, proactive communication and education).
2. Bertelsmann Foundation (2002) did 12 case studies from developed countries by focussing on e-Government portals. Measurement items include efficiency (IT architecture and infrastructure, resource planning, etc.), change management, e-Transparency, e-Participation and benefit (quantity and quality of e-Services).
3. Koh and Prybutok (2003) focused on measuring penetration of e-Government in the City of Denton, Texas. Measurement items were internal and external e-Government functions in informational, operational and transactional categories; e-Government transformation occurred at three levels, namely, strategies, system and data.
4. Focussing on e-Government websites, Brown University measured e-Government development in 198 countries (West 2006). This assessment is no longer performed today.
5. The 2002 report by the Commonwealth Centre for Electronic Governance focuessed on five developed countries. Measurement dimensions were public access and usage of broadband connectivity, citizens' access of e-services and readiness of a PKI.
6. Waseda University (2006) focussed on assessing the e-Government readiness in Japan. Its measurement items

were availability of online systems and applications, IT infrastructure, management optimisation (ICT investment, enterprise architecture, integrated network system, administrative and budgetary systems, public management reform by ICTs), homepage features, promotion of e-Government and so on.

7. Focussing on 197 countries, the United Nations Department of Economic and Social Affairs uses the EGRI to gauge the level of development of e-Government in relation to its peers. This index is a composite measure comprising Web Measure Index and the Telecommunications Infrastructure Index. The UN e-Government ranking is assessed frequently to encourage e-Government development at the world level.

In a bid to measure e-Government readiness, various researchers have proposed different assessment models given their contexts. For example, Ogunleye and Van Belle (2014) proposed a five-stage readiness assessment model that articulates what needs to be done before m-Government is implemented. It is desired that the designed models can assess the readiness of an area with regard to implementation of emerging forms of e-Government. In the design of context-aware e-Government readiness models, the global or national e-Government models and frameworks are used for reference purposes only.

Limitations of e-Government Readiness Models

Most of the models and frameworks are conceptual, although they are diversified given their focus and approaches (Alghamdi, Goodwin & Rampersad 2012). Conceptual models are designed based on theory or real-life phenomena but have not been tasked in the real-world environment. The authenticity of conceptual models is usually under scrutiny until a time when they have been tested or validated in a real-world environment.

Many of the e-Government readiness models focus on presenting themselves as a set of principles that can be used for international benchmarking on the different levels of e-Government readiness and provide pointers for informing interventions, policy and planning on e-Government development.

Although many e-Government readiness models have been conceptualised and used in different organisational and national frameworks, there are still many glaring limitations given the changing concentrations of e-Government that need to be considered by researchers and practitioners. The following are some of the limitations:

- Available e-Government readiness models and frameworks generally fall short with regard to the treatment of heterogeneity caused by unobserved factors or contextual settings (Yunis & Sun 2009). Although this is the case, studies that use dynamic factor measurement methods such as those using SEM and PCA have attempted to come close to measuring the unknown factors that may be at the centre of e-Government readiness.
- The scope and focus of national and global e-Readiness measurement frameworks is different. The national ones are benchmarking models, focussing on the delivery of public services through the Internet based on national indicators of ICT development, whereas the global ones (e.g. UN e-Government readiness model) aim to present a complete picture of the readiness of e-Government which could eventually lead to policy and strategy formation.
- Many models do not consider e-Government readiness from the perspective of government employees – how they perceive e-Government with regard to productivity, usability and security, and to what extent e-Government systems aid them in their day-to-day activities at work and so on. Apart from a few known models (i.e. Azab et al. 2009; Koh et al. 2008) who consider employees as key stakeholders in the success of e-Government, many of the models/frameworks ignore them.
- Many of the models and frameworks focus on measuring the overall indicators of e-Government readiness at the organisational or national level disregarding the municipal

or local level that is arguably considered the smallest measurement unit of e-Government readiness (Yuan, Xi & Xiaoyi 2012).

The different limitations articulated above can act as good pointers to design an e-Government readiness framework that can be used anywhere, regardless of context.

Some contexts would have different e-Government readiness frameworks, for example, one assessing ICT (technology) readiness, human resource readiness, leadership readiness, organisational readiness and so on. Such kind of readiness frameworks can do a better job of assessing readiness than the popular global readiness frameworks and models. Alghamdi et al. (2011) have proposed an e-Government framework for assessing organisational ICT readiness. The modules of the proposed framework cut across many aspects of e-Government strategy and are as follows:

1. Human resource module – IT management and technical staff (technicians, end-user IT skills, continuous human resource training and development, technical support), as well as availability of adequate and highly competent human resources base to help in the design, deployment, implementation and monitoring of e-Government applications.
2. ICT infrastructure module – hardware and software (e.g. operating systems) aspects; connectivity (Local Area Network and Wide Area Network) – Intranet, Extranet, VoIP, Internet; security (policy, identification and accountability); operations (backup, redundancy, etc.).
3. Business readiness IS dimension – business process re-engineering and modelling, knowledge management, content management, ERP (integrated systems which draw data from live databases), Web services, geographic IS (digital tool for storing and mapping of large data sets), data warehouse (ability to collect data from multiple sources and aggregating it into a data store which has different aggregate views), database (a relational database system managed by a robust database management system [DBMS]) and so on.

4. ICT architecture module – layered structure, portal, service-oriented architecture (SOA), electronic data interchange (designed to facilitate exchange of documents between organisations) and core business applications (application specifically utilised by one government department).
5. User access module – websites, fixed line and mobile, kiosks, PCs and laptops, call centre and so on.

The above dimensions can be used in any environment to score organisational e-Government readiness.

Conclusion

This chapter aimed to highlight the different e-Government readiness models. E-Government readiness is hinged on the understanding of the conceptualisation of e-Readiness, the impact of the digital divide, and the integration and mainstreaming of technologies into the different public service delivery value chains. E-Government readiness assessment involves carrying out a probe on the availability of a conducive environment underpinned by different factors that could propel e-Government to success.

It has been shown that there are a host of models that have been designed and utilised to measure the readiness of e-Government implementation in different contextual settings. The national models and frameworks focus on measuring a special readiness or preparedness in the preparation for e-Government implementation. The international models and frameworks are mostly used as benchmarking standards that rank countries to show the maturity of their contextual settings and establishment in as far as implementing e-Government is concerned.

The chapter shows that there is a lot of work that needs to be done in as far as delving towards developing a truly global e-Government assessment model or frameworks is concerned. Furthermore, a desired model has to be one which measures a comprehensive list of factors that can influence e-Government adoption at the business process level, institutional level, public employee level, technical level (standards and applications), citizen level and so on. In sum, an integrated framework combining readiness factors from multiple frameworks is desired.

Chapter 8

Multivariate Analysis of Contextual Factors in e-Government Development

Overview

Given that e-Government is a multidimensional phenomenon dependent on many factors, there is a need to carefully explore, from multiple vantage points, the factors influencing its development. This chapter explores the contextual factors of e-Government growth using multivariate analysis. The exploration of the different stages of multivariate analysis in this chapter leads to the eventual proposal of a contextual model that can be used as a reference point when planning e-Government interventions in Zambia and in similar contextual settings. The chapter presents detailed theoretical and practical multivariate application in an African context. In any given setup where

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e-Government is being implemented, it is important to understand the contextual factors that influence its development. As e-Government is a multidimensional phenomenon, multivariate analysis is a good methodological orientation to understand the key factors at the centre of e-Government development.

E-Government in Zambia

As clearly articulated in Chapter 6, many factors influence the development of e-Government in Zambia given its unique contextual positioning. Despite not having a clearly defined strategy for implementing e-Government, the development of e-Government in Zambia is now showing serious signs of growth. Furthermore, the government and co-operating partners have generally recognised the importance of e-Government implementation in as far as revitalisation of public service delivery is concerned. What is lacking is the awareness of the available public services accessible online. As a result, many citizens have not embraced ICT as a platform for accessing government information and services. Being a multidimensional phenomenon, it is expected that there are a host of other factors that influence acceptance and usage of e-Government at the individual level. Understanding these different factors requires an analysis method that investigates a phenomenon from multiple vantage points. Multivariate analysis presents an opportunity with regard to understanding the different factors that may influence individuals to accept e-Government given their context.

In the Zambian context, it is important that e-Government permeates through the public service establishment, so that its many citizens can benefit from convenient public services. In a nutshell, e-Government should allow government departments to provide public service using technology platforms and further make available government information to citizens and businesses. Furthermore, e-Government should enable citizens and businesses to use online platforms to apply for government services such as business registration, passport application and so on. The end result is that the cost of providing public services is massively reduced, and 'corruption levels in the public service business processes [and mainstreams is mitigated]' (Bwalya & Mutula 2014:n.p.). With the realisation of the aforementioned anticipated benefits of e-Government, it was apparent that the Zambian government would jump onto the bandwagon of governments utilising ICTs for improved public service delivery. Therefore, the goal of e-Government in Zambia is to complement the overburdened public service administration, so that it provides improved and requisite services to the citizens and businesses. Given Zambia's present social, economic and political standing, implementation of e-Government presents a very good opportunity to overcome the many challenges that public administration faces and accords governments a chance to include citizens into the decision-making processes and other democratic dispensations.

Meaningful e-Government development can only be achieved if there is adequate and almost universal adoption by the citizens. After obtaining anecdotal evidence that there are few citizens that have adopted the existing e-Government applications in Zambia, there was a need to understand what influences this unwillingness of citizens to adopt e-Government. Adoption of e-Government is a multifaceted phenomenon which involves institutional and individual acceptance that there exists a summative value of using ICTs in the public service delivery value chains (Abu-Shanab & Khasawneh 2014). Therefore, this value can be different given the context of the individual involved. It cannot be denied that attaining appropriate levels of adoption is one of the key challenges faced by many governments in realising the full potential of e-Government (Abu-Shanab & Khasawneh 2014). Effective e-Government development can be achieved if a majority of the pertinent multidimensional factors defining e-Government development are included into the development and implementation processes (Abu-Shanab & Khasawneh 2014). Understanding e-Government adoption from only endogenous factors and not considering exogenous factors, such as donor assistance, of developing countries in their e-Government implementation is an insular view (Das, Singh & Joseph 2016). Meaningful analysis of the factors influencing e-Government acceptance and usage needs to be conducted with a balanced scale of both exogenous and endogenous factors in any given setting. Therefore, an in-depth understanding of either the endogenous or exogenous factors is desired in designing context-aware e-Government initiatives, interventions and solutions.

Multivariate analysis is used to model the heterogeneity in the data set of this study and to understand the factors that are pertinent in influencing the acceptance and usage of e-Government. Given that the factors that influence e-Government are many and multidimensional, it was important that they be investigated with multidimensional lenses. The study used meta-analysis and multivariate analysis in conjunction with partial least squares (PLS), owing to the fact that data were collected from the empirical study and numerous documents on e-Government penetration in Zambia. The use of advanced statistical approaches in the investigation of e-Government is gaining ground among e-Government researchers. For example, using PLS and SEM, Rabaai, Zogheib, AlShatti & AlJamal (2015) investigated the factors influencing e-Government adoption in Kuwait, and PU was the most important factor influencing e-Government adoption.

E-Government Transformation and Adoption

Sustainable individual acceptance and use of e-Government applications depend on flexibility of e-Government applications as technologies go through certain change cycles given the continuous innovations and the changing needs of users. As transformation and repositioning of public service delivery platforms are being pursued in any given context, it is important to have a thorough understanding of the factors influencing e-Government adoption (Rokhman 2011). Understanding the factors influencing acceptance and usage of e-Government can inform how to design, implement and monitor e-Government with a view to harness its maximum value (Praditya et al. 2017). Although many researchers and practitioners are now active in different aspects of e-Government investigations, there are still no global adoption and usage models that can be used during design, implementation and monitoring of e-Government. There is a need for understanding context-aware (informed by the local context) factors to aid effective development of e-Government. The understanding of factors influencing acceptance and usage of e-Government in any area it is implemented is crucial with regard to informing the design of e-Government strategies. E-Government strategies need to be multistage, encompassing the different levels, namely, municipal, federal and state levels, and clearly articulate how the different levels integrate with one another (Gomez-Reynoso & Sandoval-Almazan 2013; Pederson 2016).

Although there is no global theoretical or conceptual framework that can be used to explain acceptance and usage of e-Government, a lot of ground has been covered as e-Government design, penetration, acceptance, usage and impact have been investigated in many countries representing varying contextual setups. As e-Government is a multidimensional phenomenon, researchers have investigated its different aspects using multiple research approaches. For example, Jukić and Merlak (2017) investigated the use of Facebook as a networking platform with citizens and businesses among different government departments in Slovenia and concluded that Facebook is a ubiquitous platform for facilitating dynamic e-Government. In another longitudinal study, Das, Singh and Joseph (2017) investigated the maturity of e-Government around the world and found that there was a direct correlation between GDP growth, ICT infrastructure and e-Government. Studying Nordic countries' e-Government drive, Joseph and Avdic (2016) discovered the following focus areas that need to be explored in the study of e-Government: public sector reforms, economic reforms and, to a lesser extent, e-Democracy efforts. To stand a good chance of success, there is a need for e-Government to be enshrined into the different national governance frameworks and its implementation guided by the different policies tied to national policy frameworks. In Oman, barriers to e-Government were found to be lack of adequate awareness and knowledge of e-Government, 'lack of trust in the e-Government [services], and lack of [experience in using IT platforms]' (Bwalya 2011:144; Elsheikh & Azzeh 2014). Arab culture was identified as one of the critical factors limiting rapid integration of e-Government into the Jordan polity (Elsheikh & Azzeh 2014). Park (2009) utilised the TAM to test the factors influencing e-Learning adoption in South Korea, with results of the study showing that TAM is a good tool for measuring technology adoption in this particular context. In another study, Alshehri et al. (2012) utilised the UTAUT to understand the factors influencing e-Government development in Saudi Arabia with the results showing that 'social influence' did not have a significant impact on individuals' influence in adopting e-Government (Joseph & Avdic 2016). Joseph and Avdic (2016), using a bibliometric study over a period of 5 years, showed the trends in methodologies and research philosophies in e-Government articulating the maturity of e-Government as a discipline. Even though this is the case, it is evident that most of the studies have been based on a case study approach and not entirely informed by sound theoretical frameworks or local context contours (Yusuf, Adams & Dingley 2016).

Depending on the context, there are a lot of factors that influence acceptance and usage of e-Government (Alomari, Woods & Sandhu 2012). Digital divide is one of the stumbling blocks to effective e-Government adoption and usage. With unchecked levels of digital divide, there are low chances that e-Government can thrive (Abu-Shanab & Khasawneh 2014). Individual levels of computer self-efficacy and ICT skills (digital literacy) play a key role in defining the capacity of an individual to adopt and use e-Government applications. In addition to digital literacy, interpersonal communication has a lot of influence on how citizens get motivated to use e-Government

(Madsen & Kræmmergaard 2015). Urbina and Abe (2017) investigated e-Government adoption in the Philippines by individual citizens and found that the country is faced with many challenges such as unequal access to government information and services, the digital divide and so on. In the Philippines, the potential for e-Government development is high owing to the fact that the majority of citizens indicated their willingness to provide personal information on the government websites because they trust the government (Urbina & Abe 2017). Most of the research participants who did not want to engage in e-Government cited their limitations with regard to the use of the Internet to access e-Government platforms as a key reason as to why they don't use e-Government applications. It is thus clear that apart from the digital divide, one of the key antecedents of e-Government is trust. A study done in the South African banking sector revealed that trust is one of the key factors for the adoption of Internet banking. Furthermore, several other researchers have posited that trust is one of the key determinants of e-Commerce adoption regardless of the contextual setting (Gao, Waechter & Bai 2015; Huang, Ba & Lu 2014; Maduku 2016).

It is not a secret that many of the e-Government initiatives fail (see Ch. 3). Many e-Government interventions have failed because of unclear and unrealistic visions in poorly thought through strategies, lack of coordinated IT acquisitions across different government departments, lack of adequate funding to support e-Government interventions, over-focussing on technology dimensions, a general lack of understanding of the users and the factors that influence their behaviour and lack of explicit fund allocation to non-IT investments (Ebrahim & Irani 2015; Gao et al. 2015; Heeks 2003). Failure is also propelled by a general lack of consideration of contextual factors that inform each of the factors responsible for the failure of e-Government (Pederson 2016). It is worth noting that these factors keep changing over time given what is happening in a given context. Coupled with a generally expensive Internet access and high levels of digital divide, it is expected that e-Government cannot be accessed by everyone in Zambia. The low access of e-Government is exacerbated by high unemployment and underemployment levels denying opportunities for a large portion of the citizenry to buy ICTs and potentially engage in e-Government. Having an in-depth understanding of the factors influencing individuals' acceptance and usage of e-Government in Zambia will inform the strategies or interventions needed to set e-Government on a healthy development projectile.

Theoretical Development and Multivariate Analysis

The conceptual framework in this study was informed by TAM, TAM2 and UTAUT, which were conceived with an idea of increasing the predictive capacity of the conceptual framework. The measurable constructs in this study are: 'PU, Perceived Ease of Use (PEOU), BI] to use, [availability of] ICT infrastructure, language and content, system [usage], computer self-efficacy' (Bwalya 2012:n.p.), access cost, SI, availability of appropriate legal and regulatory frameworks, user support, trust and continuance usage (Park 2009). A total of 721 questionnaires were distributed with 411 of them returned for analysis and three dropping out during data screening. Therefore, 408 questionnaires were included in the final analysis. The study targeted three towns in Zambia: Kitwe, Livingstone and Lusaka. For the interviews, a total of 20 policymakers, government leaders, businessmen and other ordinary citizens were interviewed. The data obtained from the research process were analysed with the help of SPSS version 10. In order to achieve the desired validity and reliability, the data were subjected to preliminary tests to determine whether they follow normality (Gaussian bell-shaped curve) and homoscedasticity.

We assume that the data set is a multidimensional vector or array with X random variables as a new linear X composite of predictors (x_i = [x_{i1} x_{i2} … x_{iN}]), which represents the linear combinations of measured variables, denoted by Equation 8.1.

The composite predictor X represents a multidimensional vector of random variables obtained from the data set from the empirical study and caused the maximum variance in Y_i (a functional representation of acceptance and usage of e-Government in Zambia's public sector delivery value chains):

$$X_1 = l_{11}\lambda_1 + l_{12}\lambda_2 + \ldots\ l_{13}\lambda_3 + \ldots\ldots\ldots l_{k1}\lambda_k + \delta_1$$

$$X_2 = l_{21}\lambda_1 + l_{22}\lambda_2 + \ldots\ l_{23}\lambda_3 + \ldots\ldots\ldots l_{k2}\lambda_k + \delta_2$$

$$X_n = l_{n1}\lambda_1 + l_{n2}\lambda_2 + \ldots\ l_{n3}\lambda_3 + \ldots\ldots\ldots l_{kn}\lambda_k + \delta_n \qquad \text{[Eqn 8.1]}$$

where X_1, X_2 and X_n are known variables, δ_j is the j^{th} factor and λ_{ij} is a constant representing the i^{th} and j^{th} factors.

The variables in this case are the factors espoused to be influencing acceptance and usage of e-Government. If the N random variables collectively conform to multivariate normality assumptions, we can assume that the one-dimensional distribution can take the form shown in Equation 8.2.

$$\varphi_x(t) = e^{it\mu \frac{1}{2}t^2\sigma^2} \qquad \text{[Eqn 8.2]}$$

From Equation 8.2, generalising univariate normal distribution given the multivariate random data set (x_i = [x_{i1} x_{i2} … x_{in}]) in this study, the multidimensional Gaussian normal distribution density function takes the form in Equation 8.3 (Szekely & Rizzo 2005):

$$N\left(x|\mu, \sum\right) = \frac{1}{(2\pi)^{\frac{M}{2}}\ \det\left(\sum\right)^{\frac{1}{2}}} e^{-\frac{1}{2}(X-\mu)^T \Sigma^{-1}(X-\mu)} \qquad \text{Eqn 8.3]}$$

where $\sum$ represents the covariance matrix of the multivariate data and μ represents the multivariate mean vector of the data set represented as a one-dimensional array, as shown in Equation 8.4:

$$\mu = [\mu_{x1} \quad \mu_{x2} \dots \mu_{xN}] \qquad \text{[Eqn 8.4]}$$

Therefore, the covariance matrix, Σ, is represented as shown in Equation 8.5:

$$\sum = \begin{pmatrix} \rho_{x_1}^2 & \rho_{x_1 x_2} & \cdots & \rho_{x_1 x_N} \\ \rho_{x_1 x_2} & \rho_{x_2}^2 & \cdots & \rho_{x_2 x_N} \\ \vdots & \vdots & \ddots & \vdots \\ \rho_{x_1 x_N} & \rho_{x_2 x_N} & \cdots & \rho_{x_N}^2 \end{pmatrix} \qquad \text{[Eqn 8.5]}$$

Equation 8.5 represents a partition of variance into components that are relatively unique. From the matrix, the possibly correlated variables can be presented by a set of correlated and/or random variables. After the extraction, rotation and interpretation of the variables were done. The covariance matrix is now represented in a general form as a factor covariance matrix and an error covariance matrix as in Equation 8.6 (Everitt & Hothorn 2011):

$$\begin{aligned} X &= \Lambda f + \xi \\ \Sigma &= \pi\pi^* + \psi \end{aligned} \qquad \text{[Eqn 8.6]}$$

where ψ = var (Σ) and π^* is the transpose matrix of π; X is a vector of size [$N \times 1$], Λ is a vector of size [$N \times$ (r+1)], f is (r+1) $\times$ 1 and ξ is a covariant matrix of size [N x 1], assuming that $E(\xi_i) = 0$, $Var(\xi_i) = \sigma^2$ and that $Cov(\xi_i, \xi_k) = 0, \forall i \neq i$ from the least squares assumptions. From this follows $Cov(\xi) = \mathrm{E}(\xi \check{\xi}) = \sigma^2 I$ where I is an identity matrix and $\sigma^2 I$ is an N by N variance covariance matrix for random errors and for X. To avoid statistical complexity, the random errors ξ_i are assumed to be normally distributed.

From above, the multivariate multiple regression model can be expressed as in Equation 8.7 (Everitt & Hothorn 2011).

$$Y_{Np} = Z_{N(r+1)} \beta_{(r+1)p} + \xi_{Np} \qquad \text{[Eqn 8.7]}$$

Unique factors to X_i have a mean of zero and is uncorrelated to the common factors, whereas the common factors f_1, f_2, ….,f_n

are common variables and have mean equals zero and variance equals one. In the data set of this study, the covariance matrix was decomposed as shown in Equation 8.8:

$$X_1 = \lambda_{11}f_1 + \lambda_{12}f_2 + \lambda_{13}f_3 + \ldots\ldots\ldots\lambda_{k1}f_k + \varepsilon_1$$
$$X_2 = \lambda_{21}f_1 + \lambda_{22}f_2 + \lambda_{23}f_3 + \ldots\ldots\ldots\lambda_{k2}f_k + \varepsilon_2$$
$$X_n = \lambda_{n1}f_1 + \lambda_{n2}f_2 + \lambda_{n3}f_3 + \ldots\ldots\ldots\lambda_{kn}f_k + \varepsilon_n \qquad \text{[Eqn 8.8]}$$

where f is a common factor and λ_{ik} is a Eugene function where the index indicates the strength of the component and the amount of variance it accounts for.

We further assume that the mean equals zero ($\mu = 0$), and therefore, multivariate normal distribution is defined by the linear combinations of univariate normal distributions. In other words, if the data set in this study were to be analysed using univariate regression analysis, it is important to ensure that each of the univariate distributions follow normality. Many multivariate normality tests are based on Mardia's testing approach for Kurtosis and skewness given a data set with multiple variables. In a given multivariate distribution:

$$\beta_{1,p} = \phi\{\Sigma^{-1}(x-\mu)(y-\mu)^{-1}\}^3 \qquad \text{[Eqn 8.9]}$$

Given a scenario where x and y are independent of each other, it follows that:

$$\beta_{2,p} = \phi\{\Sigma^{-1}(x-\mu)(y-\mu)^{-1}\}^2 \qquad \text{[Eqn 8.10]}$$

In a multivariate normal distribution, it is assumed that $\beta_{1,p} = 0$ and $\beta_{2,p} = \rho(\rho + 2)$. Given a sample size of n observations (in this case, $N = 411$), using Mardia's multivariate test, we can thus rewrite the above equations as:

$$\check{\beta}_{1,p} = \frac{1}{m^2}\sum_{i=1}^{m}\sum_{j=1}^{m} g_{ij}^3$$

$$\check{\beta}_{2,p} = \frac{1}{m}\sum\nolimits_{i=1}^{m} g_{ii}^2 = \frac{1}{m}\sum\nolimits_{i=1}^{m} d_i^4 \qquad \text{[Eqn 8.11]}$$

The equations above form the basis for understanding Kurtosis and skewness in line with the Mahalanobis distance method, where $g_{ii} = d_i^2$ and $g_{ij} = (y - \check{y})' S_n^{-1}\left(y_j - \check{y}\right)$ are the scalars giving the squared Mahalanobis distance between y_i and μ (which is equal to $\check{y}$) which literally translates to the vector dispersion (how far) of the observed data from the centre of joint distribution *m* representing the centroid in the multivariate data space. Skewness is thus approximated as χ^2 with $p(p+1)(p+2)/6$ degrees of freedom, and Kurtosis is approximated with vector mean $p(p+2)$ and variance $8p(p+2)/n$ for sample $n > 20$ (Szekely & Rizzo 2005). Once the Mahalanobis distance of each observed data case is known, it is now possible to construct the P–P plot using the estimated mean vector $\check{y}$ and the covariance matrix Σ to make a visual representation of the data.

From the multivariate analysis, the identified variables are taken as factors influencing the acceptance and usage of e-Government in Zambia as presented in Equation 8.11. From Equation 8.11, the least squares estimator (LSE) *wrt* $b,\ldots,b_n$ the sum of squared residuals is represented by Equation 8.12 (McAssey 2013):

$$\sum_{i=1}^{n}\left(y_i - \check{y}_i\right)^{\wedge}2 = \sum_{i=1}^{n}\left(y_i - b_i - b_i x_i - \ldots - b_k x_k\right)^{\wedge}2 \quad \text{[Eqn 8.12]}$$

where *x* is the independent variable, explanatory or covariate variable, and b_i represents the estimated intercept and the estimated slope coefficient. The LSE is the basis for the understanding of the contribution of the variance which is represented by the totality of the *R*-squared variables (R^2) measured in this study (McAssey 2013). β_1 and β_2 represent multiple regression. The final linear equation estimating the residue (the difference between the fitted dependent variable and the dependent variable – modelling the outliers in multivariate sample) takes the general form with systemic and random variables (Everitt & Hothorn 2011): The conceptualisation of the multivariate analysis and the PLS culminates in the linear regression from the data set and is represented in Equation 8.13 as:

$$Y_i = \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \ldots + \beta_N x_{N1} + \xi_i \qquad \text{[Eqn 8.13]}$$

where ξ_i represents independent normally distributed random variables with mean $\mu = 0$ and variance δ^2, and β_i, $i = 0, 1, \ldots, N$, represents regression coefficients of the N independent variables with β_0 as the intercept. β_i and β_0 represent unstandardised beta coefficients obtained from the regression analysis. The systemic variables are defined from the data set, and the random variables may take unknown values not explained by the predictor variables – covariables (Szekely & Rizzo 2005).

Parametric tests such as the Kaiser–Meyer–Olkin measure (KMO test), the Shapiro–Wilk test and Bartlett's test of sphericity were performed on the data set to check for normality and to check whether the data can be subjected to rigorous statistical inferential analysis. With acceptable values of 0.7 and above, the KMO test measures the adequacy of the sample to justify readiness of the data for statistical analysis. The data were further checked for multicollinearity and singularity and the presence of outliers using histograms, the P–P plots and the scree plot. The data that did not conform to the normality by showing negative skewness were subjected to data transformation using an optimally chosen logarithmic function, Log_{10} (6–X), so as to remove the negative skewness. After transformation, the data observed normality and were therefore ready for further statistical analysis.

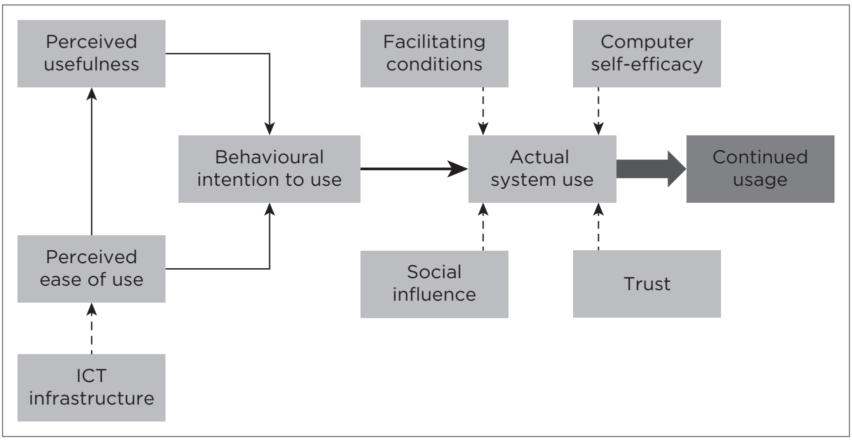
Principal Least Squares

Because e-Government depends on many factors to survive, it is important to use multivariate analysis when analysing factors impacting on its growth. Multivariate analysis digs deeper into the different contours of e-Government to unearth the factors impacting on its growth. This research explores multivariate analysis of factors modelled as multivariate random variables. Because the modelling is done in tandem with multivariate analysis, this study employs principle least squares.

In PLS, a structural model can be measured using path coefficient (β) direction, magnitude and significance, and algebraic sum. Chin (1998) states that a thorough structural model analysis includes the estimates of the path coefficients (β), determination of coefficient which is the R^2 value and the estimation of the total effects (Rabaa 2015). For the results of the empirical study to be acceptable, the path coefficients (β) should take a value higher than 0.100 to account for appreciable impact within the structural model and should be statistically significant at least at the 0.050 level (Henseler, Ringle & Sinkovics 2009; Urbach & Ahlemann 2010). In this research, all the beta coefficients are positive (depicting the expected direction) and statistically significant ($p < 0.05$) as will be shown in the empirical study below.

Research Approach

The conceptual framework of the research was hinged on the TAM, TAM2 and UTAUT only including constructs that are logically relevant to the contextual setting in which the study



Source: Adapted from Yucel and Gulbar 2013, Silva and Dias 2015.

FIGURE 8.1: Conceptual model for e-Government adoption assessment in Zambia (espoused upon the TAM and UTAUT without moderating variables).

was conducted. The conceptual framework is shown in Figure 8.1. Each of the constructs in the conceptual framework had a set of questions which were included into the data collection instruments (questionnaire with closed- and open-ended questions, and interviews). Of the 721 questionnaires distributed, only 411 were returned and 408 were finally included in the analysis of the data. The participants were included in the study based on purposive and snowball sampling.

The research uses methodological triangulation at all stages of the research cycle so as to interrogate the same phenomenon from different vantage points. Multiple regression was used to explore the relationship between one continuous dependent variable and a number of independent variables or predictors.

Multivariate Analysis Procedure

Multiple regression was used to explore the relationship between one continuous dependent variable and a number of independent variables or predictors. Multiple methods are utilised when investigating one research focus from multiple vantage points to obtain highly validated results.

Preliminary Analysis and Normality Testing

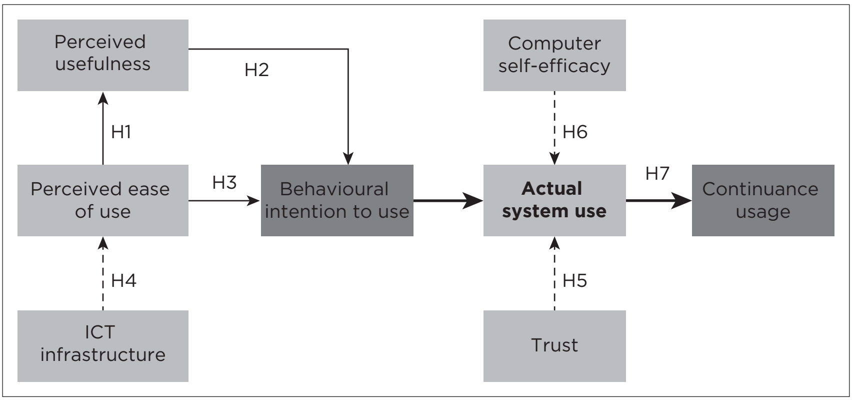
To measure the different factors that impact on e-Government, it is important to analyse the synthesis of e-Government from multiple vantage standpoints. Multivariate analysis is a complicated procedure that involves the analysis of many interlinked procedures and processes. In order to test prior knowledge on the factors influencing e-Government, the hypotheses shown in Table 8.1 were formulated and tested.

These eight hypotheses were conceived from the TAM, TAM2 and UTAUT models for measuring technology adoption and usage. With reference to the concept utilised, the hypothesis can be shown in Figure 8.2.

TABLE 8.1: Study hypotheses.

Hypothesis	Hypothesis statement
H1	PEOU of e-Government websites will positively influence the perception of usefulness of e-Government websites and applications.
H2	PU of e-Government websites will positively influence citizens' adoption (actual usage) of e-Government websites and applications.
H3	PEOU (usability) of e-Government websites will positively influence citizen's adoption of e-Government websites and applications.
H4	Appropriate ICT infrastructure and lower costs to access the basic ICTs impact positively on usability and correspondingly on PEOU.
H5	Trust directly influences engagement or non-engagement in e-Government applications.
H6	The level of computer self-efficacy will impact on the actual use of an e-Government system by an individual.
H7	Positive ICT developments will facilitate actual usage and correspondingly continued usage of e-Government applications.
H8	Appropriate ICT infrastructure coupled with higher PEOU will culminate in improved overall PU.

PEOU, perceived ease of use; PU, perceived usefulness; ICT.



Source: Based on Yucel and Gulbar 2013, Silva and Dias 2015.

FIGURE 8.2: Research hypotheses.

This study employed the mixed methods research (MMR) paradigm, and methodological triangulation was used at all stages of the research process from philosophical conceptualisation, formulation of research objectives and questions, and data collection to analysis. The use of qualitative research allowed more spontaneity in soliciting for information from research participants, whereas the use of quantitative methods allowed the statistical evidence in variance among the factors. The use of MMR was apparent to measure phenomena from multiple vantage points and to counter systemic errors which could be experienced from method limitations. For example, data were collected using interviews and questionnaires (with open- and closed-ended questions). The data collection stage of the research took 3 months – starting with a pretest and a pilot study after which the data collection instruments were further refined to ensure that there is adequate validity and reliability. A meta-analysis of e-Government studies conducted in developing country contexts was used as baseline data in understanding which factors are likely to influence e-Government acceptance and usage in resource-constrained environments such as Zambia. The main sources of information in the meta-analysis included papers discussing e-Government growth in Zambia (Weerakkody et al. 2007). The data collected were analysed at the descriptive level using multivariate analysis given the heterogeneous variables that were investigated.

Given the nature of the study, non-probabilistic sampling is used to enable the researcher include participants in the study using subjective reasoning. The study involved individuals and businesses from the towns of Livingstone, Kitwe and Lusaka. All standard ethical principles and guidelines such as voluntary participation in the research (informed consent), voluntary withdrawal at any time of the research process, questions not embarrassing or insulting, anonymity of responses, non-involvement of minors and so on were observed.

The measurable constructs in this study are: 'PU, PEOU, BI to use, [availability of] ICT infrastructure, language and content, system [usage], computer self-efficacy' (Bwalya 2012), access cost, availability of appropriate legal and regulatory frameworks, user support, trust and continuance usage. The constructs are obtained from TAM, TAM2 and UTAUT. A total of 721 questionnaires were distributed with 411 of them returned for analysis and three dropping out during data screening. Therefore, 408 questionnaires were included in the final analysis. The study targeted the towns of Kitwe, Livingstone and Lusaka. For the interviews, a total of 20 policymakers, government leaders, businessmen and other ordinary citizens were interviewed. The data obtained from the research process were analysed with the help of SPSS version 10.

In order for the data set to pass reliability and validity and to conform to established statistical assumptions for inferential statistics in the multivariate analysis, it was apparent that the data set be subjected to preliminary tests such as normality and homoscedasticity. The first assumption is that the data set needs to follow the Gaussian normal distribution. A second assumption is that multivariate normality is achieved if all of the bivariate data in the data set follow a normal distribution curve as tested using the Kolmogorov–Smirnov and the Shapiro–Wilk test. Therefore, each of the bivariate data was subjected to normality testing. Parametric tests such as the Kaiser–Meyer–Olkin measure (KMO test), the Shapiro–Wilk test and Bartlett's test of sphericity were performed on the data set to check for normality in the data set and to check whether the data can be subjected to rigorous statistical inferential analysis. The data were further checked for multicollinearity and singularity and the presence of outliers using histograms, the Q–Q plots and the scree plot. With acceptable values of 0.7 and above, the KMO test measures the adequacy of the sample to justify readiness of the data for statistical analysis. The study uses restricted EFA at 0.005 level of significance. The EFA is done in conjunction with PCA employing principal axis factoring as the factor extracting methodology. The oblique rotation methodology used in PCA factor optimisation is Promax with Kaiser normalisation.

The data were further checked for homoscedasticity (variance of residuals of the predicted dependent variables should be the same for predicted scores) and linearity by plotting the residual scatterplots. The data in Figure 8.3 show negative skewness with a clear case of an outlier, therefore not conforming to normality. The same data were plotted using a boxplot also presenting the same case where the outlier and the negative skewness are clearly identifiable as shown in Figure 8.3.

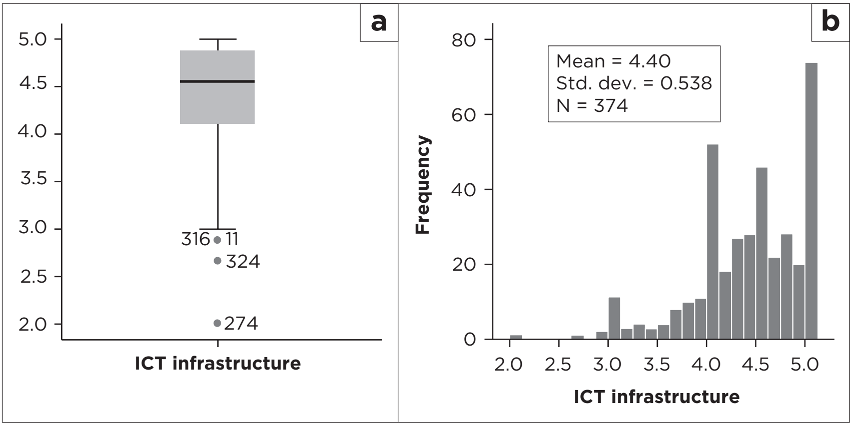


FIGURE 8.3: (a) Boxplot and (b) histogram on 'ICT infrastructure' data set.

As can be observed from Figure 8.3, the preliminary tests showed that the data were negatively skewed, confirming the presence of outliers which could distort the regression coefficients. Because of the negatively skewed data observable in the data set, it was important that transformation be done. Transformation was done using an optimally chosen logarithmic function, Log_{10} (6–X), to remove negative skewness. The study hypotheses were analysed using hierarchical multiple regression analysis (ANOVA). Employing a stepwise approach and a mix of statistical procedures, the end result is a list of factors that contribute a surmountable variance in the predictor variables. Further tests for normality are shown in Tables 8.2 and 8.3.

The KMO, which is a MSA, is measured as shown in Equation 8.14:

$$\frac{\sum_{i \neq j} r_{ij}^2}{\sum_{i \neq j} r_{ij}^2 + \sum_{i \neq j} u} \qquad \text{[Eqn 8.14]}$$

where R = [rij] is the correlation matrix and U = [uij] is the partial covariance matrix.

Acceptable values of KMO must be at least more than 0.6 with KMO value of exactly 0.6 translating into a mediocre value. The KMO in this study was measured and confirmed to be more

TABLE 8.2: Tests for normality on all measured items.

Measured items	Kolmogorov–Smirnov[a]			Shapiro–Wilk		
	Statistic	***df***	**Sig.**	**Statistic**	***df***	**Sig.**
ICT_infra	0.132	374	0.000	0.901	374	0.000
PEOU	0.142	377	0.000	0.972	377	0.000
PU	0.117	401	0.000	0.930	401	0.000
Comp_SE	0.178	405	0.000	0.880	405	0.000
Actual_usage	0.129	405	0.000	0.899	405	0.000
Trust	0.149	377	0.000	0.951	377	0.000
Cont_Usage	0.147	374	0.000	0.924	374	0.000

[a], Lilliefors significance correction.
ICT, information and communication technology; PU, perceived usefulness; PEOU.

TABLE 8.3: Kaiser–Meyer–Olkin and Bartlett's Test.

Test		***N***
Kaiser–Meyer–Olkin MSA	-	0.872
Bartlett's test of sphericity	Approx. chi-square	16525.019
	df	2556
	Sig.	0.000

than 0.6 in all cases analysed. In this case, it was reported at 0.872 and highly significant at level 0.001 degrees of freedom, which demonstrates that the KMO test result was adequate for statistical inferences: χ^2 (2556) = 16525.019, $p < 0.001$.

As shown on the scree plot in Figure 8.4, the factors with eigenvalues >1 are those that are likely to contribute more variance to the predictor factors. The identified factors are the ones that are used in the multivariate analysis.

Testing of Hypotheses

All the hypotheses were tested with the following procedure (for demonstration purposes, only the testing of the first hypothesis is shown). The first hypothesis is: 'H1: PEOU of e-Government websites will positively influence the perception of usefulness [(PU)] of e-Government websites and applications' (Bwalya 2012). To remove the skewness, the square root of PU was obtained and regression was performed using the logarithmic value of PU. Table 8.4 shows the descriptive statistics, and Table 8.5 shows the correlation among the measured variables.

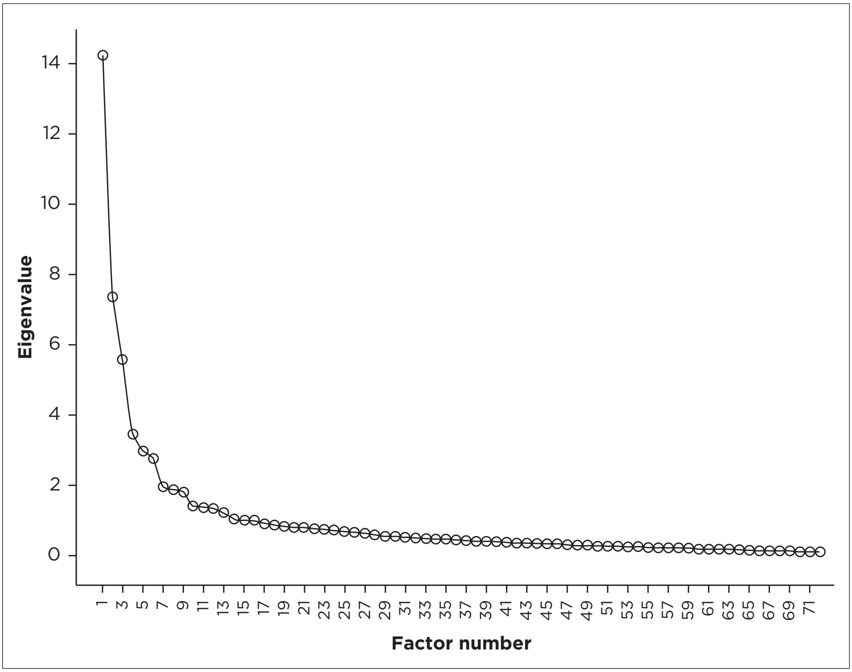


FIGURE 8.4: The scree plot.

TABLE 8.4: Descriptive statistics.

Statistic	Mean	Std. deviation	*N*
Log_PU	0.2794	0.14943	401
PEOU	3.1004	0.78930	377

PU, perceived usefulness; PEOU, perceived ease of use.

TABLE 8.5: Correlations.

Measurement		Log_PU	PEOU
Pearson correlation	Log_PU	1.000	−0.371
	PEOU	−0.371	1.000
Sig. (1-tailed)	Log_PU	-	0.000
	PEOU	0.000	-
N	Log_PU	401	377
	PEOU	377	377

Source: Bwalya et al. 2012.
PU, perceived usefulness; PEOU, perceived ease of use.

The coefficient of determination (R^2) determines what amount of variation in one variable is because of the other variable. In this case, R^2 shows that 13.7% of the variation in the outcome is determined by the predictor variable. Table 8.6 shows the variance obtained in the data set after the outlier case has been removed from the data set for statistical balance.

The ANOVA test was performed to check whether there is large statistical difference among the means of the independent data from the data set. The ANOVA test results are shown in Table 8.7.

TABLE 8.6: Model summary.

Model	*R*	R^2	Adjusted R^2	Std. error of the estimate
1	0.371	0.137	0.128	0.13897

TABLE 8.7: Analysis of variance.

Model 1	Sum of squares	*df*	Mean square	*F*	Sig.
Regression	1.153	1	1.153	59.702	0.000[a]
Residual	7.243	375	0.019	-	-
Total	**8.396**	**376**	**-**	**-**	**-**

Source: Bwalya et al. 2012.
[a], Predictors: (Constant), PEOU.

TABLE 8.8: Residuals statistics.

Statistic	Minimum	Maximum	Mean	Std. deviation	*N*
Predicted value	0.1461	0.4267	0.2794	0.05538	377
Std. predicted value	−2.407	2.661	0.000	1.000	377
Standard error of predicted value	0.007	0.020	0.010	0.003	377
Adjusted predicted value	0.1470	0.4361	0.2794	0.05542	377
Residual	−0.42674	0.34197	0.00002	0.13991	377
Std. residual	−3.071	2.461	0.000	1.007	377
Stud. residual	−3.104	2.464	0.000	1.010	377
Deleted residual	−0.43611	0.34289	0.00000	0.14073	377
Stud. deleted residual	−3.141	2.481	0.000	1.012	377
Mahal. distance	0.016	7.081	0.997	1.454	377
Cook's distance	0.000	0.106	0.003	0.007	377
Centred leverage value	0.000	0.019	0.003	0.004	377

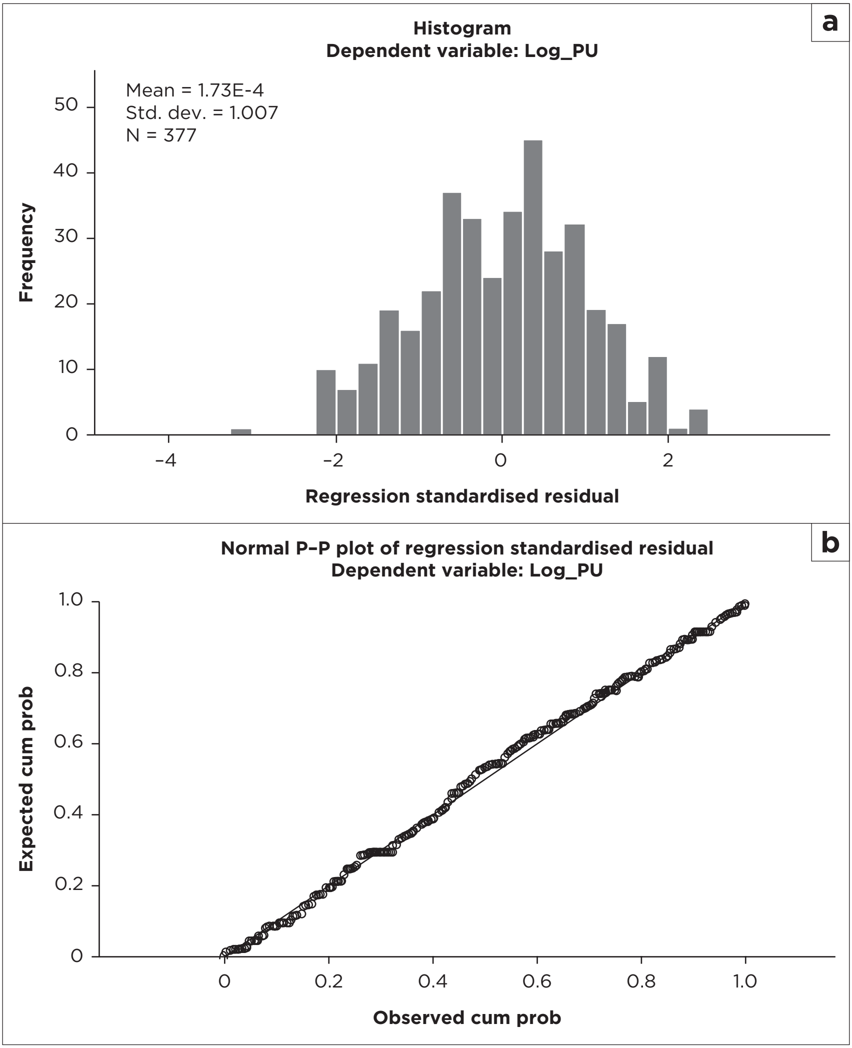
Dependent variable: Log_PU.

The results show a regression analysis, predicting Log_PU from PEOU, which was highly statistically significant with $F(1) = 59.702$, $p < 0.001$. The residual statistics from the data set 'confirmed that the Mahalanobis distance has an acceptable value for one independent variable and does not exceed the chi-square critical value for 1 degree of freedom which is 10.828' (Bwalya 2012:n.p.).

The results were further checked for normality using the P–P plot of standard residuals. It is evident from Figure 8.5 that the data approximately follow a normal distribution function and linearity.

Repeating the procedures shown above on each of the hypotheses, we can conclude as follows:

- On H1, it can thus be concluded 'that PEOU of e-Government websites positively influences the PU of e-Government websites and applications in Zambia' (Bwalya 2012). Individuals are not encouraged to utilise e-Government applications owing to their PEOU or the amount of effort that is needed for them to use the given technologies in the public service delivery platforms.
- With regard to H2, because of non-linearity in the data set, the study cannot state with appreciable degree of confidence that PU will positively impact on acceptance and usage of e-Government applications in the case of Zambia. Furthermore, 'the strong correlation in the coefficients in the Pearson's Correlation matrix and the higher statistical significance ($p < 0.001$) and the acceptable value of [R^2] at 24.6% the study posits that at higher maturity levels of e-Government implementation, it is [evidently] possible that PU [has] a direct positive impact on PEOU and correspondingly e-Government adoption' (Bwalya 2011:n.p.).
- When analysing hypothesis H3, it has been proved that the data set followed linearity and that there was relatively higher statistical correlation ($R^2 = 0.238$). The evident linearity in the data set demonstrates that PEOU will positively influence citizens' adoption of e-Government services.
- Regarding H4, the existence of ICT infrastructure and low costs alone cannot guarantee positive influence on the PEOU of e-Government services.



Source: Adapted from Bwalya et al. 2012.
PU, perceived usefulness; PEOU, perceived ease of use.

FIGURE 8.5: Gaussian normal data fit (a) histogram and (b) P-P plot of PU on PEOU.

- On H5, the data show linearity and an R^2 value of 0.085, showing some degree of variance caused by engagement of citizens and businesses in e-Government applications.
- On H6, with R^2 value of 0.135 and clear linearity in the data set, it is confirmed that an individual's level of computer self-efficacy will positively influence his or her involvement in the utilisation of e-Government services. Using transformed variables to remove the effect of the three distinct outliers, the data set showed normality and an R^2 value of 0.076; it therefore follows that positive ICT developments and actual usage will culminate in positive continuance usage of e-Government applications (H7).
- H8 has shown that it is true that appropriate ICT infrastructure coupled with higher PEOU will culminate in improved PU for the case of Zambia's e-Government development.

After concluding on each of the hypotheses, it was now apparent that the homoscedasticity testing was to be conducted to check the variance dispersion of each of the random variables data sets. Using the conceptualisation of the Gauss–Markov theorem, the standard deviations of the data set error items are checked with regard to how they depend on the *x*-value (predictor) with the response variable (*y*) having the same standard deviation. The testing of the residuals for homoscedasticity was done by the Breusch–Pagan test using the regression of the squared residuals on independent variables. The scatterplots on the data set shown in Figure 8.6 demonstrate the spread of the Mahalanobis distances within the different cases in the study. The method of the Mahalanobis distance, as articulated above, presents a scenario where it is easy to check the variance of points from the geometrical mean of the data set. The scatter plots shown in Figure 8.6 indicate that there is a pattern being followed in the display of the data towards a central tendency showing that it is okay to now plot Q–Q plots.

All the data sets included in the regression analysis was subjected to preliminary statistical tests for normality and linearity. The residual statistics shown in Figure 8.7 confirmed that the Mahalanobis distance has an acceptable value and the P–P plot for standardised residue shows linearity in the data set.

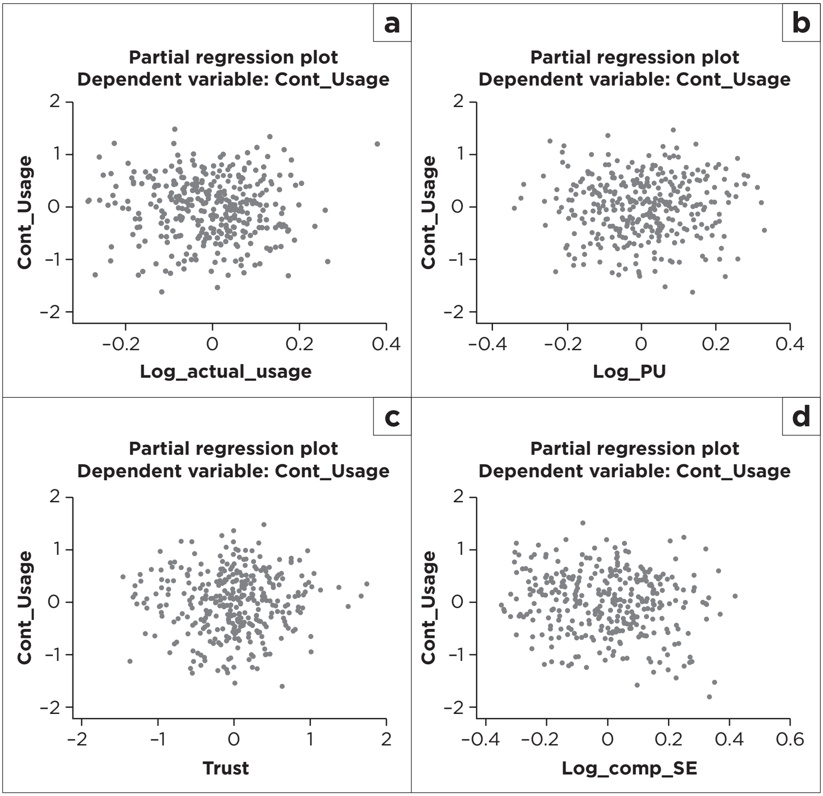


FIGURE 8.6: (a-d) Scatterplots of the Mahalanobis distance of selected factors on CU.

Findings

The empirical data were subjected to a meta-analysis to check the implications of the status of e-Government in Zambia not only from the level of adoption at the individual level but also on the different aspects of e-Government such as level of security and so on. Using thematic analysis, the following were identified as the key factors that influence successful development of e-Government:

- Anticipated users of e-Government platforms need to be aware of e-Government solutions or the intention of the government agencies to implement e-Government beforehand. From this

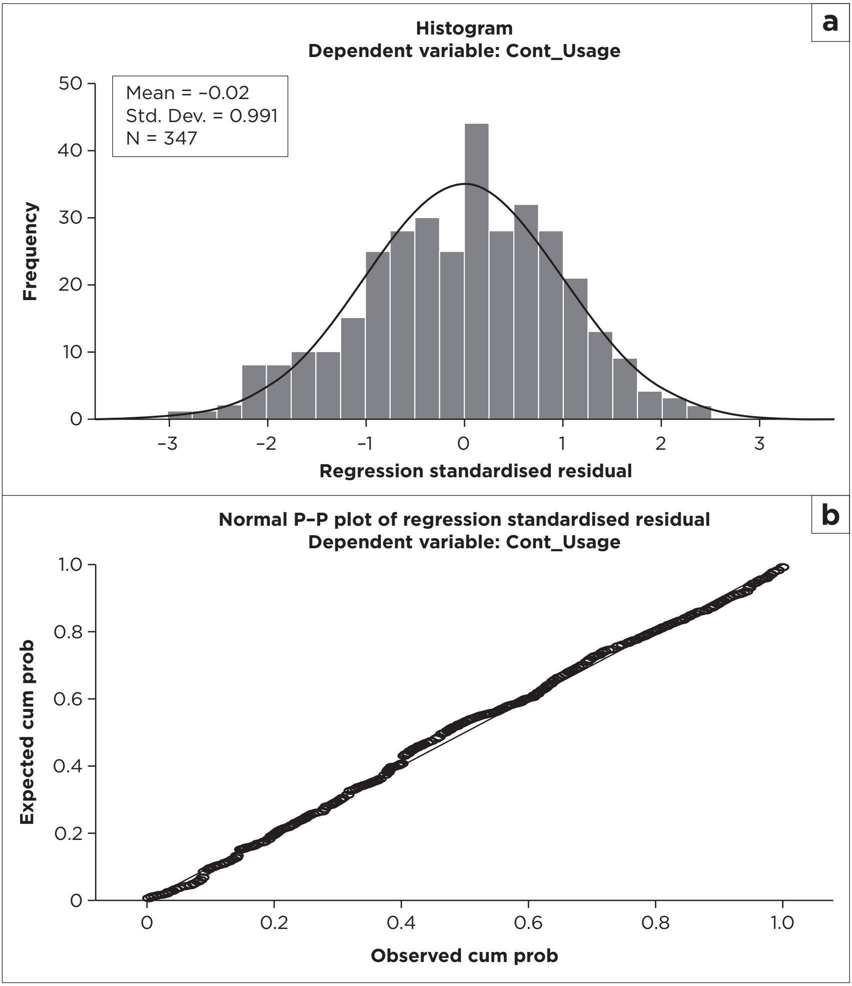


FIGURE 8.7: (a) Gaussian normal data fit of CU on all other variables, (b) P–P plot for standardised residue of CU on all other variables.

study, 49% of the study participants were not aware of e-Government services in Zambia and 21% showed total ignorance of what e-Government is.

- Anticipated e-Government users need to be convinced on the importance and usefulness of e-Government as an innovation to revamp the public service.

- The platforms on which e-Government solutions are designed need to be easy to use so that many people who may have limited ICT skills may be included in the e-Governance value chains. There is a need to include user-friendly e-Government platforms to cater for users' limited experience in interacting with ICT platforms and the Internet. It is not a secret that many of the people in the developing countries may have limited ICT skills which may not be enough for them to appropriately engage in e-Government.
- In order to engage in e-Government, citizens need to firstly trust the government as a governance entity and secondly trust the integrity of the information on its Web platforms. A total of 84% of the study participants indicated that there are no security policies to guide interactions in the online environments. Therefore, it is difficult to provide government information on online platforms for security reasons.
- Infrastructural challenges such as limited ICT infrastructure, expensive Internet access points and lack of well-institutionalised establishments to guide e-Government implementation prevent users from accessing e-Government services.
- Inclusion of local or locally relevant content in e-Government and content in local languages so that the goal towards universal e-Inclusion is achieved.

Each of the factors discussed below has an impact on the low penetration of e-Government services in Zambia owing to low individual citizen and business adoption. The interpretation of the results based on the findings above indicates the following:

1. In general, most of the citizens are not aware that e-Government is being implemented in Zambia. A check with four government departments revealed that they have only a handful of e-Government applications confirming the nascence of e-Government implementation in Zambia.
2. Many e-Government applications in Zambia have limited secure information channels leading to e-Government data being exposed to potential attacks by third parties through different ways such as eavesdropping or information distortion. Most of the individuals who participated in this study stated that they do not engage in e-Government because they are afraid that

their information might land into unauthorised hands owing to limited privacy and security. These unauthorised hands would then misuse the information to the disadvantage of its owners. The government and other implementers of e-Government have not been able to assure the general populace about the security design aspects of e-Government.

3. Underdeveloped capacity for handling ICTs at both the local and individual levels coupled with fragmented and underdeveloped ICT infrastructure. In Zambia, access to the Internet is generally very expensive and individuals would rather physically walk to a government department rather than access public services online. In addition, there are very few free Wi-Fi hotspots where citizens can easily go and access e-Government services. Furthermore, the telecommunications infrastructure is not very developed to accommodate people in the remotest parts of the country. In such an environment, e-Government results in massive exclusion of citizens from the governance and decision-making value chains.
4. Lack of adequate decentralisation in the governance value chains and establishments. Because of limited administrative and political power given to the grassroots, it is difficult for local branches of government to integrate technologies into their business processes.
5. Lack of employees' willingness to promote technology integration into the job and business processes out of fear that technology may replace them. Because of limited education regarding the benefits of e-Government in public service excellence, there are people who resist its penetration into service delivery.
6. Lack of comprehensive e-Government strategy. E-Government is being deployed in small pockets of public services without any overall guiding principles and motivation. This is making it very difficult for e-Government to develop in Zambia.
7. Lack of general understanding of what e-Government entails. Generally, the government and co-operating partners have not done much in as far as promoting e-Government among its citizens is concerned. As a result, a majority of citizens do not know that e-Government is being implemented in Zambia, let alone what public services can be accessed using technology platforms.

There are other factors surrounding the individual citizens that have come out of this study that are too numerous to mention in this chapter. The general picture emanating from this study is that there is a lot that needs to be done if e-Government adoption at an individual level can stand a chance of success in Zambia.

The meta-analysis also reviewed that a lot of interventions have been implemented by both the private and public sectors. Some of these interventions include erection of an optical fibre network in Lusaka by Realtime Zambia and the Copperbelt Energy Corporation costing slightly over US$4 million, enabling own access to more private entities to the international gateway to further increase efficiency in ICT service delivery, encouragement of public–private partnerships (PPPs) in erecting requisite ICT infrastructure for increased access to ICT services, erecting of telecentres in rural areas with a goal to achieve universal access to ICT applications and solutions within the Universal Access Programme (UAP) and so on.

Conclusion

Because of the multidimensional nature of e-Government, it cannot be denied that there are different factors that influence its development. As e-Government implementation in Zambia is at the nascent stage, it is important to identify and understand what factors influence its development and to what extent each of the identified factors influence e-Government development. Using a largely quantitative approach coupled with a multivariate analysis, and a conceptual framework containing constructs from the UTAUT, TAM and TAM2, this study identified the key factors that influence individuals' acceptance and usage of e-Government applications. Keeping all other factors constant, the study aimed to identify determinant factors for individual's e-Government acceptance and usage so as to inform interventions in e-Government. Understanding the factors influencing e-Government acceptance and usage was done in the realm of assessing e-Government readiness (see Ch. 7). The identified factors account for 74% variance among the possible predictor variables. The identification of these factors can inform what strategies and interventions need to be put in place to boost global adoption of e-Government solutions in Zambia and other contextually similar environments. The R^2 value of 0.741 shows that there are other contextual factors that account for the remaining 0.26 variance, and therefore, some studies need to be conducted to further investigate these factors.

To measure the different factors that impact on e-Government, it is important to analyse the synthesis of e-Government from multiple vantage standpoints. A candidate procedure in any given context is the multivariate analysis. Multivariate analysis is a complicated procedure which involves many interlinked processes that enable it to investigate a given phenomenon from multiple perspectives therefore providing an opportunity to discern hidden factors. Multivariate analysis is a good analysis technique that is able to help in the identification of key factors influencing e-Government given its multidimensional nature.

PART C

Status of e-Government in Africa

Chapter 9

E-Government in Sub-Saharan Africa

Overview

Many organisations have proposed different criteria for measuring e-Government development the world over. However, there are one or two issues that are usually overlooked, especially given the varying contextual settings in which e-Government is implemented. As discussed in Chapter 2, a good e-Government development methodology needs to take cognisance of the fact that contemporary different forms or models of government have culminated into a quest for semantic and Government 3.0 models. Therefore, it is important that all the known and emerging characteristics of e-Government be considered when measuring the status of development. Anchored by a case from South Africa and the European Commission (EU), this chapter presents some cases from around the world articulating the different e-Government developments. The presentation of these cases is important in order to augment the status of e-Government development in Sub-Saharan Africa (SSA) against other environments.

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Introduction

E-Government research has been growing steadily allowing many researchers to utilise a multiplicity of methodologies in measuring the different issues and aspects around ICT utilisation in the public service business processes. E-Government keeps evolving into various forms such as mobile government (m-Government) and semantic government. As a result, similar aspects of e-Government have been measured using different methodological approaches in different contextual settings given the form that e-Government assumes in that context. Methodological approaches used in any e-Government research are strongly influenced by the contextual setting in the area in which the research is conducted (Elsheikh & Azzeh 2014; Gil-Garcia & Ignacio 2005; Praditya et al. 2017). Although e-Government is slowly maturing as a science, there are very few research articles that have produced clearly defined or novel methodological orientations that would later guide enquiry in this field. Many researchers have used surveys or analysis of documentation to come up with a list of factors that influence e-Government uptake (adoption and usage). Despite the multiplicity of methods utilised in the assessment of e-Government development, there is a need to explore the different experiences in e-Government development the world over so as to understand how the different issues are being circumvented.

With a special focus on SSA, this chapter will explore the level of development of e-Government from selected parts of the world using a case study approach. The SSA is a region towards the south of the Sahara which encompasses all African countries other than North African countries which are part of the Arab League. This study focussed on exploring the level of e-Government implementation in the countries covered and understanding its contextual issues while triangulating with issues in e-Government implementation elsewhere paying particular attention to how each context deals with issues encountered. Measuring the status of e-Government is very important as it allows to check the status of e-Government development and therefore inform the gaps that need to be explored. An appropriate measurement framework is needed to measure the status of Government development. Although designing an e-Government measurement framework is not the focus of this chapter, it proposes a conceptual framework emanating from an empirical study conducted in Zambia. This framework may be used to guide the measurement of e-Government development status, especially in the developing countries and resource-constrained contexts.

There are many approaches to implementing e-Government. Effective and successful e-Government implementation is one which follows a phased approach where piecemeal implementation of technology into the public services is done after carefully selecting clusters for implementation. The clusters are chosen given the general characteristics of the individuals in that area and implementation is done cluster after cluster. The cases presented in this chapter show some of the success stories and key issues that need to be addressed in the different contextual settings. Some countries have solid e-Government development programmes, while others are implementing e-Government without a clear development path. Countries that have a clear e-Government development path have demonstrated their ability to move from one form of e-Government to the other. Brazil has delved into the implementation of e-Government 2.0 demonstrating that they have achieved considerable growth in the implementation of the traditional e-Government. On the other hand, despite having relatively developed e-Government in South Africa, there are still deep-entrenched problems that need to be addressed with the implementation of e-Government (Trusler 2003).

Legal Framework for Information and Communication Technology Frameworks Around the World

In an effort to promote the penetration of ICTs into the different socio-economic setups throughout the world, many governments, developing partners and international organisations have moved to design contextual legal and regulatory frameworks. The following are some of the ICT frameworks that may have wider implications on the penetration of e-Government worldwide:

1. Treaties that may be used to protect intellectual property, especially in this era of desired innovations, revolve around the managerial and technical aspects of e-Government. These include the Berne Convention of 1978, World Intellectual Property Organisation Treaty (WIPO Treaty), the Trade Related Aspects of Intellectual Property Rights (TRIPS), General Agreement of Trade in Services (GATT), et cetera.
2. Principles espoused in the ITU/UN World Summit on information society are basically aimed to unleash the potential of harnessing the different attributes of knowledge and information to drive effective and innovative ways for approaching developmental issues. Developmental issues at all levels of the socio-economic spectrum are pursued for the betterment of humanity.
3. The 2001 Budapest Convention on Cybercrime is an international treaty aiming to deal with crime and inappropriate behaviour executed through Internet platforms and computer networks and systems. Cybercrime can be used to eavesdrop in online transactions, computer-related crime, denial-of-service attacks and so on. In the context of e-Government, if applications are designed based on non-secure networks susceptible to cyberattacks, then citizens and businesses would more likely not adopt them.
4. In continuation of the thinking espoused in the 2001 Budapest Convention on Cybercrime, in the year 2014, the African Union Convention on the Establishment of a Credible Legal

Framework for Cyber Security in Africa was passed into law. This law intends to harmonise the different laws in different African countries that deal with e-Commerce, cyber security, personal data protection and cybercrime control. This is for ensuring that any innovations such as e-Government are implemented in safe online environments.

5. In conjunction with the Southern African Development Community (SADC) e-Commerce Strategy and Action Plan, the e-SADC strategy adopted by the ICT Ministers of the SADC in 2010 aims to promote regional trade through e-Commerce. At the moment, universal adoption of e-Commerce systems cannot be achieved because of low awareness of cybersecurity and cybercrime issues. There is a need to establish national and regional Computer Incident Response Teams (CIRTs) to manage the cybersecurity issues.
6. SADC has further developed Harmonised Cyber Security Model Laws such as e-Transactions and e-Commerce and cybercrime model laws. The model laws can be adapted to suit country contexts.
7. With regard to a wide range of issues negatively impacting on ICT innovations and deployments, the Nations Commission on International Trade Law (UNCITRAL) has a set of rules, conventions and model laws for the harmonisation of international businesses.
8. Each country dedicated to integrating ICTs into its different business processes, to some appreciable extent, has developed national ICT policies upon which many innovations have to be hinged. The ICT policies provide a legal framework that guides all interventions in the ICTs environment.

The different legal frameworks presented above articulated the guiding principles that can be adapted and used in different country contexts in the different aspects of e-Government design. The cases save to help in the understanding of the status of e-Government development in different places and to provide key information that other countries may use for benchmarking. The cases are provided in the following sections.

Cases of e-Government Implementation

Countries are chosen at random from different regions around the world to showcase the different experiences in e-Government implementation around the world.

Asia, Middle East and Oceania

Indonesia

The Indonesian government and stakeholders have invested a substantial amount of money (US$2.8 billion in 2014) given the size of their economy substantiating their commitment to usher in a transparent government using e-Government platforms. The different interventions are hinged on bureaucracy reforms and transformation of traditional governance model to one heavily reliant on technologies. Anggono (2014) posits that the Indonesian e-Government agenda is informed by the 4Cs of e-Government which are articulated below:

1. Connected with multichannel access – The government systems in different departments need to be connected in order for a complete integrated service which allows seamless flow and exchange of information. For example, if one has a traffic fine at the traffic department of the police and goes to the roads department to renew his or her driving licence, he or she cannot be allowed if the systems are collaborative as they will pick it up.
2. Collaborative processes – The government business processes need to be integrated so that multiple users can engage in a shared activity through technology platforms ultimately improving the quality of the service delivery.
3. Continuous improvement – As e-Government changes rapidly, e-Government systems need to be scalable to a point where they can be rapidly redesigned without affecting their functionality.

4. Citizen-oriented development – As the citizens are one of the key entities of e-Government, it is anticipated that they need to be included into the design processes so that the e-Government applications are citizen-centric as far as possible.

Saudi Arabia

In Saudi Arabia, with the 2016 e-Government Development Index (EGDI) of 0.6822, the penetration of e-Government is hampered by the general resistance of the population to conduct public service businesses using technology as a platform, lack of requisite and supporting policy or appropriate legal and regulatory frameworks in different government contexts and lack of defined partnerships between the government and the business sector (Al-Tourki et al. 2012). Although this is the case, it is evident that a lot of strides have been made in Saudi Arabia in as far as e-Government is concerned looking at its score of EGDI.

Malaysia

Using the Multimedia Super Corridor (MSC), Malaysia introduced e-Government around 1996 as a vehicle used to place itself as an information society. Therefore, a handful of interventions and programmes were implemented in a bid to realise the key benefits of e-Government. Some of these include (Suki & Ramayah 2010):

1. Electronic Procurement (eP) – to ensure that all the public tenders are conducted on open technology systems so that there is transparency.
2. Custom Information System – geared towards ensuring that taxes are paid through a system which can leave an audit track to stamp out corruption.
3. E-Tanah, e-Consent, eFiling, e-Local Government – a system responsible for the transformation of different government

systems to ensure that local government services are offered through technology platforms.
4. Public Services Portal (myGovernment) – a central one-stop technology platform that facilitates accessibility to all government services.
5. Pensions Online Workflow Environment (POWER) – a system that allows the management of pensions from employees in different government departments.

Malaysia has a relatively developed e-Government structure (EGDI of 0.6175). Apart from Malaysia and Saudi Arabia, other countries such as Colombia, Kuwait, Singapore (0.8828) and South Korea have dedicated e-Government implementation programmes. Singapore and South Korea are among the world leaders of e-Government implementation. The first approach to revitalise and transform public service delivery in Singapore started with having in place a competent e-Government leadership that was at the centre for establishing the sustainable e-Government model utilised in Singapore, 'putting in place appropriate ICT infrastructure [and other supporting domains of e-Government] (such as appropriate legal and regulatory frameworks, e-Government [leadership structures at community levels, etc.])' (Michael, Rana & Dwivedi 2011:n.p.), followed by other context-informed interventions to bridge the digital divide towards universal inclusion in e-Government (Ke & Wei 2004). In Singapore, the implementation of e-Government is not approached as a mechanised process of putting public services online but as a robust and responsive provision of public services through Internet-enabled applications to increase access and take public services to the doorsteps of the people (Ke & Wei 2004). With its ambitions to maintain a top ranking score and provision of a competent e-Government service, South Korea intends to move all its e-Government services to the cloud. In Colombia, ICT security and privacy including the ICT cost–benefit imbalance has a negative impact on the adoption of ICTs by SMEs (Osorio-Gallego, Londoño-Metaute & López-Zapata 2016). Kuwait has been implementing an e-Government programme that is informed by the local culture and the way of life of the Arabs (Rabaai et al. 2015). It is worth mentioning that if e-Government only depended on ICT infrastructure and innovation, it would have 100% adoption and usage in countries such as Kuwait because of its advanced ICT infrastructure and a vibrant economy which has seen 15 years of sustained budget surpluses (Rabaai et al. 2015). Fakhoury and Aubert (2017) have conducted a study using the UTAUT2 to understand the level of adoption and usage of e-Government applications in Lebanon. About 74% of the variance is explained by the UTAUT2 (Al-awadhi & Morris 2008; Fakhourya & Aubert 2017).

These systems showcase the different instances where e-Government can be utilised.

European Union

The EU is a region with one of the most advanced e-Government infrastructure and development worldwide. This is because of the fact that a lot of work has been done to encourage the proliferation of e-Government at different levels of the society. At the moment, many countries in the EU are talking about cross-border public service delivery which is in the pipeline of being implemented fully (European Commission 2016).

The strategic e-Government drive in the EU is motivated by the desire to have public institutions and the corresponding public administration 'open, efficient and inclusive, providing borderless, personalised, user-friendly, end-to-end digital public services to all citizens and businesses in the EU' (European Commission 2016). The desire to have cross-border e-Government is proposed for achievement by the year 2020 (European Commission 2016). The EU e-Government development has been measured by the Digital Economy and Society Index (DESI) and complemented with the e-Government benchmarking report.

The concept of OGD is gaining ground in the EU and further calls to open up government services and processes. The opening up of government data, services and processes will provide citizens or businesses access to government services and processes for reuse and addition of insights and experiences, thereby increasing their value. In such an environment where there are meaningful advancements in the opening up of government data, knowledge management can be implemented (European Commission 2016).

A new concept being advanced by the EU is that opening government data alone is not enough – there is need to open up services and processes. Opening up services and processes entails that the information flow within government business processes needs to be put in the public domain so that citizens and businesses are aware what happens in both front-end and back-end processes, what resources are used in the provision of services and a clear articulation of how they are procured. In this regard, the design of e-Government should consider how e-Procurement is going to be achieved, the legal implications of decisions made and so on. To achieve the above, it is expected that by the end of 2018, companies in the EU will be able to bid for any public administration or service contracts from anywhere in the union using the e-Procurement platforms (European Commission 2016).

Digital identification is considered as one of the main characteristics for contemporary democracy. Digital identification allows e-Government users to digitally claim their identity online, sign documents, perform advanced online transactions and so on (Vassil 2016). The EU e-Government strategic position encourages the acceleration of the use of e-ID and e-Signature to allow cross-border banking, finance management, e-Commerce and so on at the individual level. The e-ID contains electronic identification, authentication and the digital signature which will open avenues for remote identification and authentication. Estonia uses digital identification cards (ID cards) embedded with an electronic chip and two pin codes (PIN1 – personal identification and PIN2 – digital signature) for individual identification and travel within the EU (Vassil 2016). With the digital ID cards, Estonia has covered a lot of ground in promoting e-Democracy because it allows citizens to vote electronically (e-Voting) and participate in the different governance value chains culminating into increased e-Participation of citizens (Vassil 2016).

Undoubtedly, it can be observed that the EU is slowly positioning itself as a world leader in e-Government development. It is no wonder the United Kingdom is now the world leader of e-Government with an EGDI of 1.000. Many countries and regions will benefit a lot in benchmarking on the strides made by the union.

☐ Americas

In the North American region, Canada and the US emerged as regional and world leaders of e-Government development, whereas in the South American region, Brazil, Mexico and Argentina have made significant progress in e-Government development. Canada comes in at number nine among the countries with the most developed e-Government mechanism, with an EGDI of 0.9153 in the 2016 UNDESA report. E-Government is highly developed in Canada because of massive direct investments in e-Government programmes by the government, use of citizen-centric design model, integration of social media platforms into the main e-Government programmes, a population with high ICT skills and literacy and so on.

The US, with an EGDI of 0.842, is also one of the top countries in the world in as far as e-Government development is concerned. This is owing to the established leadership infrastructure and the different interventions put in place. For example, the Federal Government's Chief Information Officer (GCIO) provides strategic leadership and direction in all the different phases of e-Government implementation. The US government and development partners have put in a sustainable e-Government funding programme (including a dedicated presidential fund for IT projects in 2016) which is able to fund innovations as e-Government evolves. Some of the notable interventions include enhancing federal government's cybersecurity profile in 2015, enforcing guidelines for implementing secure connections across federal websites and systems, designing of the US Digital Playbook containing several guidelines on the design and implementation of digital services, enforcing the *Federal Information Security Management Act* of 2002, having a dedicated Open Government initiative, et cetera.

Africa

On the African continent, Tanzania, Mauritius, Tunisia and South Africa have been seen as the leaders of e-Government implementation owing to the huge array of public services being offered using ICT platforms. Although Africa is generally considered a continent with less developed implementation of e-Government (average EGDI of 0.2661 against global average of 0.4712), many countries are now jumping onto the bandwagon in as far as implementing e-Government is concerned. For example, Guinea and Central African Republic had no global IT presence (no government website) in 2012 but are now migrating some of their public services online. The African e-Government leader, Mauritius, has over 100 different e-Services that citizens and business can access and was the top-ranked country in Africa for NRI.

Tanzania, Kenya and Botswana: E-Government Development Projectile

Tanzania is one of the pioneer countries in institutionalisation of e-Government after having developed the 2013 Tanzania e-Government Strategy and formalising many of the e-Government efforts. The strategy is hinged on several pillars of service innovation, namely:

1. equal access
2. security and privacy
3. benefit realisation and involvement of all stakeholders
4. partnership and outsourcing
5. ease of use
6. interoperability.

At the moment, e-Government implementation has grown to the point of having e-Procurement systems in a bid to mitigate corruption. For example, technologies, such as OpenStreetMap (OSM), can now be used in the framework of e-Government to gather information on abandoned homes which could be a fertile ground for disease. With regard to e-Participation, Tanzania Knowledge Network has done a lot towards promoting online consultations and discussions by ordinary citizens on different aspects of the economy and society to use as input for policy formation and strategising. In this case, citizens are included in the policy and decision-making processes.

Analysing Botswana's drive towards e-Government, Nkwe (2012) articulated the many initiatives that are being undertaken in this regard. Botswana has recognised the different initiatives done at the regional level by the SADC and other co-operating partners and has resolved to dovetail its efforts onto the regional initiatives. It is no doubt that Botswana is poised for good things in as far as e-Government is concerned.

Using a cross-sectional survey design, Makau, Omwenga and Daudi (2015) investigated organisational factors that influence e-Government development and found that only organisational structure, organisational culture and prioritisation of deliverables were key in the context of Kenya. In order to grow innovative e-Government solutions, AfriLabs, which is a pan-African network of technology innovation, has created an iHub in Kenya to act as a centre for exchange of innovative ideas in IT design and usage. In 2017, e-Government (e-Voting) was piloted as a voting platform in the presidential and parliamentary elections.

Mauritius: Excellence in e-Government Drive

As mentioned, Mauritius is the leader of e-Government implementation in Africa owing to its huge commitment in e-Government development, competent regulatory environment, higher ICT skills and so on. The 2013–2017 Mauritius e-Government Strategy aims to empower citizens and collaborate with businesses and usher in a networked government where public information freely flows.

Starting promotion of the e-Government agenda around the 1990s, Mauritius has added e-Services as a platform for citizens/businesses to pay taxes or access government services, citizens to receive their pensions and revenue collection. Some of the e-Services include applying for drivers' licences, school admissions, Mauritian passport, building permits, marriage certificates, motor vehicle licences and so on. E-Services also facilitate online scheduling of appointments at public hospitals and also serve as a platform to pay for government services.

Zambia: Jumping on the Bandwagon of e-Government Implementation

With an EGDI of 0.3507, Zambia is showing some signs of development in as far as e-Government development is concerned considering the fact that in 1998 it completely had no online presence. The case summative statements on the two chapters (Ch. 6 & 8) were devoted to investigating e-Government in Zambia. As early as 2007 and with funding from the Department for International Development, the Zambian government integrated public management establishment control (PMEC) system. This was the start of informal e-Government implementation. The PMEC was implemented to manage the corruption which was ongoing in the public services sectors with regard to ghost workers on the payroll system. The PMEC was designed to integrate with the integrated financial management information system (IFMIS), thereby anticipating an improved control of government expenditure (IRMT 2007).

The empirical research presented in chapters 6 and 8 has shown that citizens perceived e-Government as important as over 75% of the participants ascertained that e-Government can bring public information closer to the people. A further 68% are in agreement that e-Government platforms may be used for paying tax and buying services from utility companies, shortening the wait cycle for e-Government services, reducing the cost of public service and generally improving the whole public administration establishment towards accomplishing its desired goals.

Given the challenges and limitations espoused in the e-Government design, some interventions are being put in place to promote the penetration of e-Government in the different socio-economic infrastructures of Zambia.

For example, in promoting universal access, one of the interventions executed has been the liberalisation of the international gateway in an effort to bring down access costs. The liberalisation of the international gateway in 2010 has significantly resulted in tariff reductions in as far as access to the Internet and usage of ICTs is concerned. Furthermore, in pursuit of promoting and facilitating faster growth in Internet penetration, the government ushered in the new licensing regime under the *ICT Act* of 2009 and expects operators to extend Internet services to all parts of the country using broadband technologies. This has culminated in mobile operators' provision of Internet access through mobile phones resulting in over 600 000 people accessing the Internet through mobile platforms. Furthermore (Bwalya et al. 2014):

> The institutional forces as outlined by the [*institutionalisation*] theory are [*easily*] seen in the different interventions that have been put in place to encourage [*Zambia's*] e-Government development. It is evident that there are robust interventions being pursued on the supply side but challenges are abundant on the demand side as a majority of the would-be e-Government [*consumers*] do not even [*appreciate the value of e-Government and have challenges in accessing relevant ICT infrastructure or platforms*]. (n.p.)

The other factor that has led to the slow development of e-Government in Zambia is that the 'public service employees are not mandated by their institutions to manage information using [ICT]' (Bwalya, Zulu, Grand & Sebina:28). To put it more clearly, although there are some pockets of initiatives guiding e-Government implementation in Zambia, there is no national e-Government strategy.

South Africa: E-Government as a Lever for Public Service Transformation

With the 2016 EGDI of 0.5546, the Republic of South Africa (RSA) is one of the top three countries in Africa with regard to e-Government development. With the overall motivation of the management to improve public service delivery in the government, the South African government introduced IT in the government business processes. The RSA has shown a lot of progress in comparison with its peers in the SSA in as far as integration of technologies in its public services is concerned. Where many SSA countries are grappling with how to provide e-Government services at the local level, South Africa is providing local e-Government services in the cities of Cape Town, Ekurhuleni and Gauteng. Many of the local cities have their own locally flavoured e-Government projects spearheaded by dedicated and competent leadership at the local level. For example, Gauteng has a dedicated Department of e-Government that is driving the e-Government agenda. Despite this being the case, there are still a lot of contextual challenges that need to be addressed for e-Government to be competitive in South Africa. For example, there are so many 'digitally marginalised communities' in South Africa which motivated dedicated investigation into e-Government (Kaisara & Pather 2011:5).

E-Government presents itself as a complex phenomenon which does not only depend on one factor to succeed but a multitude of factors representing the varied socio-economic fibre. Apart from the multiplicity of factors, e-Government success is achieved by the degree of readiness of the various aspects of the socio-economic establishment wherever it is implemented. It is for this reason that understanding of the degree of readiness of South Africa to implement e-Government is being investigated by exploring the different socio-economic attributes in the country's context. In many contextual settings, the development of e-Government is achieved by serious investments towards installing the requisite e-Government infrastructure. It goes without saying that the reason why e-Government has generally failed to meet its anticipated benefits is because of the underdevelopment of most of the dimensions which form the pillars for successful e-Government implementation. These factors are defined over the technological and managerial space, and therefore, any e-Government strategies should appropriately define the technical and managerial constructs (Memarzadeh & Jahany 2014).

Genesis of e-Government Implementation

E-Government in South Africa formally started around 1998 when it was posited in a Presidential Commission on the Transformation of the Public Service report that there was the need for a national information management strategy that would take care of all the government information resources (PRC 2008). Emanating from this report of the commission, one of the recommendations was for the establishment of the State Information Technology Agency (SITA) which was to sit at the centre of e-Government implementation and design in South Africa today (Cloete 2012). After that, it can be stated that meaningful e-Government implementation in South Africa started after the establishment and launch of the Inter-Governmental Relations Forum (IGRF) which was mandated to give leadership in the speeding up of the communication and ICT deployment across the different provinces and in areas where there is traditional leadership which was characteristic of inefficiencies and inconsistences. Over the years, the e-Government conceptualisation has been hinged on the desire to have a revamped service delivery based on the Medium Term Strategic Framework (MTSF), the Public Service Charter, the Service Delivery Improvement Plan (SDIP) and the Batho Pele programme, among others. The overall principles of these different strategic initiatives were 'people first' where public service delivery was to be designed and implemented based on the contextual outlay of the people's aspirations. Today, the overall e-Government initiatives are being spearheaded by the Department of Public Service and Administration (DPSA) and are guided by the 2015–2020 Strategic Plan for mainstreaming technologies in the public sector. Linked to the same strategic plan is the quest for improving public service delivery which is done through the SDIPs.

The Jacob Zuma government that was ushered into office in 2012 propagated a radical socio-economic transformation agenda which can be driven by a responsive, efficient, effective, professional and productive public service. This is an ambitious programme which also aims to change the socio-economic infrastructure of South Africa to promote even distribution of national resources. It is worth mentioning that such an ambition can only be achieved if there are serious integration of technologies on open platforms for transparent business executions.

There are a sizeable number of interventions that have been or are being implemented in South Africa. Some of the notable pillars upon which e-Government is hinged in South Africa include the following:

1. In an attempt to establish a competent and robust public service to improve public service delivery so that it is in unison across all the government departments, the *Public Administration Management Act* (PAMA) was established. The PAMA intended to put in place norms and standards which would ensure that the level of service across the different government departments is at the same level.

2. Ingraining the e-Government plans, strategies and interventions onto national development plans such as Vision 2030 and Vision 2050 meant the chances for the success of e-Government were great.
3. Earlier e-Government initiatives in South Africa included Batho Pele portal, the e-Natis system, South African Revenue Services (SARS) eFiling and a significantly large number of websites for government services. The only downside to these initiatives was that there was no robust strategic direction for implementing and sustaining of e-Government (Nkomo 2012). However, they have now been integrated into the different policy frameworks to formalise their being the anchors of e-Government implementation in South Africa.

Institutional, Legal and Regulatory Frameworks

Many efforts have been devoted to putting in place a robust institutional, legal and regulatory framework environment. The good thing is that there is no e-Government implementation in South Africa done without reference to established policy. For example, the Gauteng e-Government Framework is informed by the *SITA Act 38* of 2002, *Protection of Personal Information (POPI) Act* 2013, *Free and Open Source Software* policy, SA Connect and *Electronic Communications and Transaction (ECT) Act 25* of 2002. These frameworks articulate mechanisms for equitable and universal access to public services, e-Procurement legislation, identity and digital signatures, ownership of information and data, ICT security and privacy (GCR 2015). Some other policy interventions and measures that have been put in place are the Minimum Information Security Standards (MISS), Minimum Interoperability Standards (MIOS), *Electronic Communications Transaction Act*, 2002 and the *Privacy Public Service Act* (Naidoo 2012). The Government IT Officer's Council (GITOC) was formed to encourage and facilitate a forum for consultation and deliberation of

ICT-related issues by the then newly appointed Government IT Officers (GITOs). The GITOC is an advisory body to the Minister of Public Service and Administration of ICT-related matters (Naidoo 2012).

The following were specific policies that represent the development projects of the institutional, legal and regulatory frameworks supporting e-Government in South Africa:

1. Established in 1998, the State Technology Agency (SITA) was formed to spearhead the quest for improvement of public sector towards sustained and enhanced efficiency and effectiveness of the services provided.
2. Dedicated policy for advancement of technology implementation in the public sector: the 2001 *Electronic Government: The Digital Future: A Public Service IT Policy Framework*.
3. The Public Service Regulations of 2001 enabled e-Government implementation followed by An Open Source Software Strategy and Policy 2006 (Naidoo 2012).
4. *Promotion of Access to Information Act*, 2000 (Naidoo 2012).
5. *The Broadband Infraco Act* of 2007 aimed to establish a new state enterprise which aimed to increase broadband deployment and ensure that there is available and affordable access to electronic communication networks. These networks were to make available services not limited to disadvantaged areas such as underdeveloped and under-serviced areas connecting them to national and international connectivity networks.
6. Together with the Strategic Integrated Programmes (SIPs15), the national broadband policy prioritised e-Health (monitoring of health systems) and e-Education.
7. The *ECT Act 25* of 2002 articulated issues of electronic signatures in the context of South Africa.
8. The 2012 National Cybersecurity Policy Framework of South Africa gave way to the establishment of the Cybersecurity Advisory Council as an advisory council to government on cybersecurity issues.
9. Citizens' right to access government information espoused in the *Promotion of Access to Information Act* of 2000.

10. The assessment of penetration of IT usage in the government business processes is being spearheaded by the Department of Performance Monitoring and Evaluation (DPME) through the Management Performance Assessment Tool process.
11. All the legal and regulatory frameworks are espoused in the 1994 *Public Services Act* (amended 2007) which acknowledges the Minister of Public Services and Administration as the custodian of all government information and electronic government.

Innovative e-Government Solutions

One of the notable successes in the implementation of e-Government in South Africa has been the implementation of the decentralisation agenda even at the local levels such as in Cape Town, Tshwane, Ekurhuleni and Johannesburg. Most of the provincial centres and municipalities have their own portals to allow unhindered access to available information resources by citizens and businesses (Cloete 2012). Some of the successful deployments of ICTs in the public services in South Africa include the following:

1. Successful deployment of an e-Procurement system by the Independent Electoral Commission (IEC) to allow open and transparent bidding of government tenders. This was to allow the tendering processes to be put in the public domain so that stakeholders are put in the loop with regard to decisions being taken in awarding of tenders. This was a measure to mitigate corruption in the tender-awarding processes. This system has since proved to be a success as it has met its originally intended purpose(s).
2. SARS has been implementing the eFiling system in the realm of e-Government to provide a platform for managing transactions related to tax returns online between government and citizens and/or businesses.
3. The national traffic information system (eNATIS) presents itself as an e-Government platform that is used for the application of driving licences as well as the registration and licensing of motor vehicles. Furthermore, it is used to serve

notification for the change of ownership of motor vehicles and the application for the learners' driver's licence. This system has enabled the decongestion of the vehicle licensing locations of the department of roads.

4. In tandem with the other initiatives aimed at improving public service, South Africa subscribes to the Open Government Partnership (OGP) – an international effort for coordinating government performance where citizens can freely participate in the governance value chains. Recently, the Centre for Higher Education Transformation (CHET) is implementing an OGD initiative with a focus of increasing public education.
5. South Africa is also using non-traditional e-Government funding by using crowdfunding with the initiative being spearheaded by the Department of Arts and Culture and Thundafund.com in the framework of bringing crowdfunding creative economy development. The Department of Home Affairs is aggressively implementing fingerprint systems to provide an efficient service to its customers (Mphidi 2012).

Challenges

Although South Africa has done considerably well in developing its ICT infrastructure and coming up with innovative e-Government that can potentially take government to the doorsteps of the people, it has not yet earned the right to rest on its laurels given the disparity in the level of access to ICTs and Internet, especially among the individuals in rural settlements. However, since the 2012 State of the Nation Address (i.e. 2012 SONA), former president Jacob Zuma articulated the government's commitment and resolve to foster massive infrastructure development. As a result, a lot of ICT infrastructure has been erected further reducing the digital divide among the people (Nkomo 2012). Many of the challenges with regard to e-Government implementation are based on the fact of low ICT skills among citizens and some government workers and the general high costs to access Internet upon which modernised government services are provided using ICTs. Slow e-Government penetration in South Africa is exacerbated by high levels of the digital divide (Mphidi 2012).

The major limitations of e-Government development in South Africa involve social and managerial issues. Although this is the case, a majority of the bottlenecks initially experienced when deploying technologies in public services have largely been resolved (Cloete 2012).

Conclusion

The chapter has explored the status of e-Government development in different countries in the world. Many governments around the world have shown adequate motivation to encourage innovations in their different public service domains further opening up opportunities for the citizenry. A lot of interventions and commitments are needed in the public services domain to enhance e-Government penetration so as to improve citizens' experience in engaging with government organisations and accessing public services and information. It has been observed that the EU is positioning itself as a future world leader in e-Government development. On the other hand, although Africa is generally labelled as a dark continent with the potential for very few innovations, it is obvious that e-Government is being implemented on a large scale and at a fast pace.

Understanding the level of development of e-Government in different countries is heavily reliant on the EGDI of UNDESA. The limitation of the EGDI is that, owing to resource limitations, most of what informs it is obtained by rummaging through webpages on the Internet. Therefore, researchers are implored to come up with contextual methods of e-Government development that could complement the efforts of UNDESA. For example, WASEDA University developed its own measurement criteria for measuring e-Government development in Japan using a range of constructs at different levels of e-Government adoption.

Chapter 10

Current Trends and Future Perspectives of e-Government

Overview

Given that a majority of stakeholders in Africa now understand and appreciate the general benefits of e-Government and the need to implement it in many public sector business processes, the prospects for e-Government are many. This chapter discusses the emerging applications of e-Government given the increased capabilities of technology platforms. Each potential application is presented in such a way that both the anticipated benefits and challenges in implementation will be explored. The design of e-Government is changing for the better given insightful technology advancements. This chapter discusses the future models of e-Government which need to be considered in the African context. The chapter discusses convergence of e-Government applications, future technologies and design

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approaches of e-Government applications, m-Government and the different modes of e-Government, and the key emerging issues in e-Government design and practice. This chapter will also articulate the future prospects with regard to e-Government development.

Current Status of e-Government Development

It cannot be overemphasised, let alone be denied, that provision of public services, such as licence renewals, paying of tax, eFiling and electronic voting, and access to different statutes and laws, such as the constitution, using ICTs are a requirement in the contemporary world regardless of context. As of today, almost all governments around the world, save for Somalia and the Central African Republic, have utilised Internet-enabled technology platforms in one way or the other to deliver public services to their people. The implementation of e-Government in different contexts throughout the world has demonstrated that the benefits of e-Government implementation surpass the costs involved.

From the time it was first conceptualised, e-Government has evolved from a mere presentation of static information to more collaborative platforms allowing bidirectional flow of information between government departments and citizens. Provision of information about public services on different technology platforms is not a mere action of making available the information and forgetting about it for people to read but is now positioning itself as an innovation where public services are packaged in a way that allows citizens with different characteristics to access them using global technology platforms and/or effectively interact with government departments.

Technology platforms and systems in the e-Government realm are being designed with reference to the citizens' characteristics (citizen-centricity), and the different approaches employed are defined by the local contextual settings. If the design does not correctly dovetail to these too many entities, then it is more likely that e-Government will fail. As mentioned in this book (see Ch. 2), failure of e-Government culminates into a loss in the possibility to amass anticipated e-Government benefits. Because of the failure of many e-Government implementations owing to lack of clearly defined strategic orientations and approaches, many e-Government projects have failed in Africa. A lacking e-Government service model commensurate to Africa makes the continent lag behind in as far as e-Government implementation is concerned. There is a need for a global African e-Governmental model or framework to be developed, designed with careful consideration of Africa's environmental, cultural, contextual factors and unique characteristics. Such a model would drive the implementation of e-Government in Africa and act as a reference point as e-Government evolves in future.

African and other developing countries need to consider the emerging models of e-Government as most of them seem more flexible and less expensive. For example, m-Government presents itself as a potential version of e-Government in Africa given the higher mobile penetration rate (Ogunleye & Van Belle 2014). By 2020, there will be over 5.6 billion individuals with unique mobile subscribers worldwide. You may want to note that this number is more than the number of people who currently have electricity at their homes (5.3 billion), bank accounts 4.5 billion or running water 3.5 billion. These statistics may suggest that in future, mobile subscription will become a basic right, and therefore, there is an opportunity for e-Government designers to take advantage of mobile platforms as a promising platform for e-Government applications (Broadband 2016).

The future presents scenarios where many people will have opportunities to be online, and therefore, providing public services on Internet-enabled platforms is an opportunity which researchers should take advantage of. Currently, there are many initiatives around the globe aimed at establishing people's presence online. For example, the Global ITU Connect 2020 states that by 2020 there will be an additional 1.2 billion people accessing online applications (Broadband 2016). Further, there will be many investments going forward on technologies and many IT platforms will reach the ordinary people in poorest of places. According to the International Data Corporation (IDC), the total spending on IT will reach around US$2.8 trillion (Broadband 2016).

With regard to the design, implementation or monitoring of e-Government applications, there has been many approaches that have been proposed, and the future presents yet more heterogeneity in approaches further distancing ourselves from a global e-Government model. An appropriate approach to this debate should be focussed on exploring design, implementation and monitoring principles and not delving to design global models. For example, e-Government implementation has mostly been guided by the 'openness, interoperability of e-Government systems, usability, transparency, etc.' (Fitsilis et al. 2009). E-Government maturity is defined differently depending on the content in which it is implemented. This has accounted for a lack of globally accepted maturity models of e-Government even today (Ströbele et al. 2017).

The future presents scenarios where many aspects of e-Government are going to change. For example, among many e-Government researchers and practitioners, there has been transformation in the thinking in that governments no longer implement e-Government just to collect information for themselves but consider the citizen as a main source of motivation for e-Government (Mofleh & Wanous 2008). Further, the e-Government models are already changing towards the utilisation of the semantic Web which is a highly organised knowledge resource for easier access by citizens and government workers (considered as Web 3.0). The functional needs of e-Government systems are also changing. For example, a contemporary e-Government needs to be able to support e-Procurement of government support services and equipment, e-Payments, business licensing systems and shared ICT services so that e-Government consumers are able to take the full benefit of the opportunities offered by e-Government.

Throughout the chapters in this book, it has been demonstrated that e-Government is evolving. Therefore, it is important to conclude this book by looking at the current trends and future perspectives of e-Government. The evolving e-Government implementation models further open up opportunities for the revitalisation of e-Government. Understanding the contemporary and future models of e-Government is very important to keep abreast with the changing e-Government models.

Contemporary e-Government

One of the key focuses of e-Government has been the achievement of a desired level of integration of the government systems to ensure that business processes are seamlessly integrated into one operational and functional domain. Seamless business processes allow interchange of information, which in most cases is needed instantaneously to aid informed decision-making in the different domains of e-Government (Misuraca, Alfano & Viscusi 2011). In order to achieve the above benefits, contemporary e-Government requires repositioning of a majority of entities in the public service delivery hierarchies such as business process re-engineering to accommodate ever-evolving technology platforms and configuration for enhanced service quality levels, integration of government business processes to provide a one-stop platform and network for e-Government services, highly interoperable government services, increased system and platform openness to enable universal access of e-Government services, change of mindset in the individuals both at the supply and demand sides, dedicated e-Leadership and so on (Mus 2010). One of the regions that have really done well in overcoming most of these managerial and technical limitations has been the EU.

From as far back as 2005, the EU had already understood the role of e-Government on future competitive public service (see eEurope 2005 Action Plan; CoR Studies 2003). Although the EU has one of the most advanced models of e-Government implementation, it is also grappling with a host of issues given as follows:

1. Electronic identification, security and trust (huge disparity between the supply and demand of e-Government applications brought about by issues revolving around security and trust).
2. Low uptake (EU citizens are sceptical about fully adopting e-Government applications). For example, Austria has 100% of its public services accessible online but only 50% of the citizens actually engage in e-Government.
3. Cross-border service interoperability. The EU envisages a future where public services in one EU member can be accessed in other countries of the EU. This will allow businesses in one country apply for registration and permits, and pay value added tax (VAT) in another country with ease because the government systems will be integrated at the technology, managerial and legal levels.
4. E-Participation. Facilitating a scenario where citizens are able to participate in political discourse and be able to communicate with each other, the society and politicians to exchange ideas and obtain information from government systems (Davies 2015).

Unfortunately for Africa, most of the basic problems of e-Government are still persisting resulting in most of the countries not experiencing the main benefits of e-Government implementation. Even in 2018, it is still clear that many African countries are grappling with underdeveloped ICT infrastructure with expensive access choices; limited financial resources to develop requisite ICT infrastructure; inadequate institutional, legal and regulatory frameworks; limited ICT skills to engage in e-Government among the majority of the population; lack of clearly defined public–private partnerships (PPPs); limited data and information management capability in the government departments; et cetera. These challenges that most African countries face make them miss out on the anticipated benefits of e-Government. In order to overcome challenges in e-Government design and implementation, it is important to network with other regions implementing e-Government. Regional and cross-regional co-operation is important to share lessons and foster e-Government at local levels of different contextual settings. In the realm of north–south partnerships, a Finnish association (Association of Finnish Local and Regional Authorities [AFLRA]) cooperated with six countries in Africa to share notes on e-Government implementation and demystification of e-Government concepts. Further, this project also wanted to understand e-Government readiness for e-Government in African countries at local levels (Meyaki 2010).

Current trends in e-Government applications call for joined-up services that are effective, simple to use, shaped around (the citizen) and responding to the needs of the citizen, and not merely arranged for the provider's convenience (Gugliotta et al. 2005).

One way to harness many of the benefits of technology implementation in the public services is migrating to e-Government 2.0. The transition from e-Government to e-Government 2.0 is mainly an inter-process integration agenda which is defined not only by technology interoperability and integration but also by standards, business rules and procedures, policies and so on (Sun et al. 2015). E-Government 2.0 is implemented using Web 2.0 and semantic technologies such as RSS feeds, blogs and social network platforms. Sun et al. (2015) proposed a framework for migration from e-Government to e-Government 2.0 envisaged to overcome design, semantic and syntax, application and interoperability challenges that may be encountered during the process. Many countries are motivated to move towards the implementation of e-Government 2.0 given the many anticipated benefits that come with this migration. The e-Government 2.0 is going to link the traditional key stakeholders of e-Government (government, citizens and businesses) for a networked and seamless flow of information and other contextual resources.

There are clear indications that e-Government will continue changing given the changing environmental settings. These changes are necessitated by the changing regulatory environment; short life cycles of technology, which are used as the main access point to e-Government applications; changing delivery models – from multichannel to channel-neutral platforms given the ever-evolving technology means; changing business models – calling for massive business re-engineering in the government sphere; changing roles of governments towards more responsiveness, accountability and transparency; and the general changing behaviours of the general players in the e-Government environment. Although there are diverse names popping up referring to the use of new and emerging technologies in public services such as e-Government 2.0, m-Government and semantic government, the general understanding and principles defining e-Government will remain. Therefore, it is important to ensure that the basic principles of e-Government are understood.

Emerging Technology Infusion into e-Government

Although e-Government has been using technology from its inception, the emerging technology platforms and innovations are changing its flavour. Because of technology advancements, it is easy to note that contemporary e-Government has moved from the intermediary development phase of Government 2.0 (during the 2000s) towards today's 'digital by default' agenda implemented on semantic technology platforms (Katsonis & Botros 2015). Janowski (2015) has classified the development (evolution) of e-Government into four distinct but logically connected stages. These are:

1. digitisation
2. transformation stage
3. engagement
4. contextualisation – where the real effect of e-Government on the individual and the community at large is felt.

In this fourth stage, e-Government impacts on both the internal government procedures and external relationships. The articulation of the different stages through which e-Government evolves accentuates the fact that the future will continue to present evolving e-Government applications.

Although there has been greater development of technology, it is worth mentioning that some of the potential technology platforms such as social media have not made it into e-Government designs despite the promise. Despite increased interest in social media research, its use in e-Government is still nebulous and subjective with no clear direction on how social media can be embedded on e-Government designs given the varying contextual complexions. As discussed below, the emergence of social media (with its characteristics of user-generated content, relational networking and online user identity creation) and its wider adoption and usage everywhere in the world positions it as a potential e-Government platform (Magro 2017). Many governments around the world are already using social media as a medium for information management and not necessarily as e-Government platforms. The use of social media as an e-Government platform creates opportunities for e-Government to be widely adopted and used by all possible users through pervasive technologies such as Internet-enabled mobile phones (Magro 2017). Many researchers have given conceptual directions of the potential of social media in e-Government but not the actual design guidelines or pointers on how this can be done. This is a grey area that needs to be explored in a dedicated study (Magro 2012). Therefore, there is a need for actual e-Government designs incorporating social media given the local contextual characteristics.

Prospects for Developing Countries

Given that e-Government is continuously being adopted by a majority of countries around the world, it is safe to state that its developments in different contextual settings in developing countries will continue. Worldwide, there has been a strong push towards adoption of m-Government, and many e-Government designs have been motivated to design mobile-ready applications. It is worth acknowledging that there are a myriad forces and advantages attributed to m-Government. Some of them include growing number of mobile phone users which is a primary platform/tool for accessing m-Government applications; pervasive or ubiquitous capability which enables government information and services to be accessed pervasively and not physically confined; relatively low cost; increased e-Participation levels regardless of the socio-economic status of the citizen(s) and business(es), thereby culminating into higher levels of inclusiveness; higher usability potential because of easy learning platforms on mobile gadgets (very few people do not have the capability to use Internet-enabled mobile phones even in the developing country contexts); easy infrastructure setup owing to the already-existing mobile phone infrastructure in most areas; and so on (Maranny 2011). With the wider penetration of Internet-enabled mobile technologies in the development world, there are high chances that e-Government development will be achieved using the m-Government model.

There has been a strong movement towards opening up of government data, and many e-Government designers have been motivated to embed open interfaces and systems in their designs to ensure that government data are put in the open platforms for citizens to access at their own accord. To encourage more engagement on the government data, progressive countries in e-Government implementation demand that the data be open. Open data have data standards and metadata in the open to encourage free access to the data and promote innovation and to showcase transparency in governance procedures:

- Governments are now transcending towards implementing smart governance that allows responsive government facilitated by requisite technologies and emerging technologies (e.g. fog computing) (Davies 2015).
- Emerging technologies such as cloud computing and fog computing stand to reduce the cost of public service by up to 25%.
- The EU has launched a dedicated e-Leadership programme focussing on both large enterprises and SMEs to nurture effective and dynamic leadership cadre who will drive the e-Government agenda given the ever-changing dimensions (Davies 2015).

Technology adoption at the individual level is one of the factors that show the degree of e-Government development in an area. However, technology adoption is a complicated phenomenon which depends on the mental and physical state of an individual using the technology. For example, poor usability capability and stressful work situations may easily negatively impact the degree to which technology is integrated into the different public business processes (Cajander & Eriksson 2007). E-Government literature is replete and littered with many examples of studies investigating factors influencing adoption of e-Government applications. Although individual adoption of technology is a complicated affair, anecdotal evidence points to strong desires for individuals in developing countries to access public services using technology platforms given the convenience it comes with. In this regard, it can rightly be stated that there are higher chances for e-Government development in the developing countries.

Designing Effective and Adaptive e-Government Systems for the Future

This whole book has been articulating the need to include local contextual characteristics in the design of e-Government applications. A look at many designs of e-Government reveals that there is usually a logical error in the design approach. Instead of a top–down approach in developing e-Government, there is a need to consider the bottom–up approach where strategies such as interoperability frameworks, awareness campaigns and access mechanisms need to be made at the local level and replicated upwards towards a national best practice. There are very few countries, if any, that have encouraged this type of e-Government development. By so doing, it will be possible to truly incorporate local context characteristics into the design of e-Government.

At the very beginning of e-Government, there is a need to consider the development strategy of e-Government which gives the roadmap on how the whole e-Government development is to take place. In Qatar, the implementation of e-Government follows a defined implementation roadmap guided by the following maturity model:

1. putting in place requisite hard and soft infrastructure in preparation for the delivery of e-Services
2. expanding the number of e-Services by migrating most of the traditional services online
3. completing the migration of public services from traditional to digital services.

Further, e-Government is hinged on overall national strategies; a robust legal, institutional and regulatory establishment; a comprehensive set of project charters; and so on. Such an elaborate implementation cycle may help in the design of the actual e-Government modules.

In designing the architecture (system descriptions and functions, technical components and interconnections, etc.) of e-Government, there is a need to carefully consider the context. In designing the IS architecture, e-Government designers may use some of the more common systems development methodologies such as the System Development Life Cycle Analysis, Structured Systems Analysis and Design Method (SSADM), Object Oriented Analysis and Design Method (OOADM), designing a prototype and so on (Dehkordi et al. 2012).

Any design of effective platforms able to capture the attention and interest of consumers, especially the younger ones, demands that these designs be based on technologies that are convenient for mobile platforms (Fang, Scavarda & Waxin 2017). The future will aggressively demand for dynamic and versatile e-Government design that requires a parsimonious design based on open and scalable standards that can be used to extend or redesign e-Government solutions as new technologies emerge. In the design of e-Government applications, it is desirable that emerging concepts such as enterprise social media (ESM) need to be integrated into e-Government design so as to revitalise the communication models between government entities and the citizens or businesses (Alimam, Bertin & Crespi 2017). ESM is based on Web 2.0 technologies such as RSS, mashups (new services as a result of an aggregate from diverse online sources), social bookmarks, wikis, blogs and so on (Alimam et al. 2017). Another key requirement for future e-Government applications is the interoperability and integration of the systems. E-Government systems are built to interoperate, so that efficiency, accountability, transparency and services can coordinate across different government departments at a lower cost (Novakouski & Lewis 2012). Technological dimensions such as e-Government system interoperability, complexity and the place of new technologies take centre stage in designing e-Government systems (Eom 2010; Cestari et al. 2014).

The need for efficient and effective e-Government services cannot be overemphasised. Efficiency is achieved by ensuring that electronic documents (e-Records) generated in the e-Government are embedded into workflow technology to automate e-Government business processes (Yousef & Martin 2017). E-Records in e-Government serve to act as a medium through which record trails (which are at the centre for transparency and accountability) are implementable in an e-Government medium. Contemporary e-Government systems demand that there is a need for the use of standard XML schemas to export public records from one place to the next. Critical issues to consider when designing the e-Records attributes are metadata and the 2001 ISO 15489-1. A further requirement for contemporary e-Government design and implementation is that information management specialists need to be endowed with appropriate skill sets for handling records in highly dynamic environments. There is a need for standards describing record formats and accessing attributes given the rapidly changing technology platforms.

From an information management perspective, some of the key documents to be produced within the realm of e-Government include transaction records (mostly automatically generated from the electronic business processes) and document-based records (generated from day-to-day operations of the government unit). A robust e-Government strategy is therefore one that makes provision for the implementation of a secure ERMS mandated to do the management of different types of records generated.

In considering the future e-Government systems, it is important to consider all the dimensions of e-Government including the naming paradigms. Although many synonyms have been used (interchangeably) and accepted to mean the use of technology in the provision of public services, such as e-Governance, e-Government and digital governance, there is a need to distinguish them in order to clearly give them their actual meaning. The desired development of e-Government 10 years ago is currently being experienced as many e-Government applications can now be accessed ubiquitously on different technology platforms. There is no doubt that the private sector has taken full advantage of the different benefits that social media has to offer. There is a dearth of information articulating concrete cases for the design and implementation of e-Government upon Web 2.0. The emerging trends such as incorporation of advanced analytics (such as big data analytics and predictive analytics) into e-Government designs provide opportunities where government can make informed instantaneous decisions, monitor economic activity more precisely, provide quick response to discontent among citizens or businesses, check the level of e-Participation and e-Democracy attained at any given time and better engage with the citizens.

Social Media as a Platform for e-Government

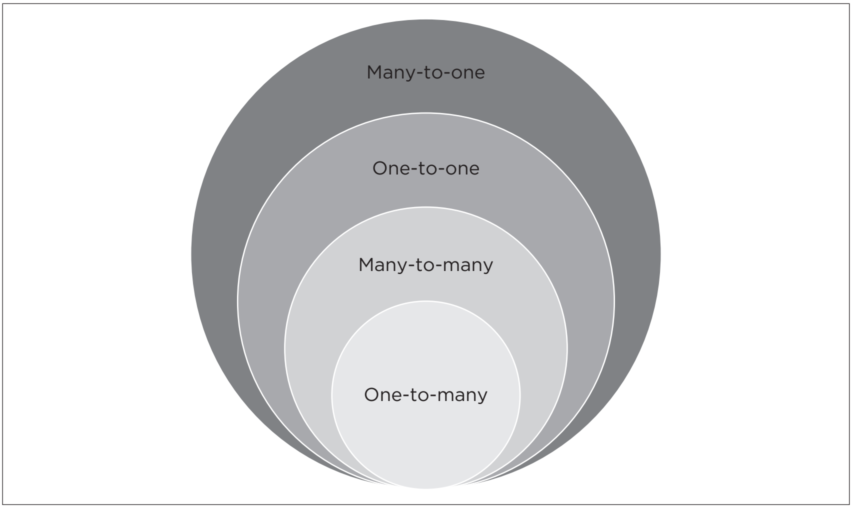
Of late, there has been continuous recognition that social media is a good platform for e-Government services (Figure 10.1). Social media is an excellent platform through which government units can easily reach citizens owing to its being an excellent information access and collaboration platform. Social media has a big potential to be used as an e-Government platform owing to its potential strengths of facilitating collaboration, empowerment, time and participation (Magro 2012). Another advantage of social media is that it presents itself as an informal platform that can allow citizens to be more open when contributing to debates on national issues and giving their input on draft legislations. Given the advancements being witnessed in the social programming models, future designs and implementation of e-Government are going to embed social media platforms for easier reachability to the citizens and businesses.

Based on Web 2.0 technologies (such as blogs and microblogs [Twitter, blogs and wikis], media sharing sites [YouTube and Flickr], social networking sites [Facebook and Google+], RSS feeds and Wikis), e-Government 2.0 was conceptualised to bring about better ways of managing information and sharing it given its heterogeneous forms. For example, RSS provides opportunities where structured information can be used for vertical and horizontal integration of e-Government systems (Dixon 2010).

In order to take advantage of the emerging social media collaborative platforms, many e-Government solutions are designed to be accessed on social media platforms. There are different degrees of collaborations that social media platforms offer as a progressive medium for communication, interaction and collaboration between government units and citizens or businesses, or among themselves in each group. The different models of collaboration on social media platforms are shown in Figure 10.1.

The collaboration models are discussed below:

1. The one-to-one collaboration model is mostly used between an individual and a government department, for example, a citizen downloading information from a government department. One-to-one interaction models are used mostly in entertainment and dating sites.
2. The second type of collaboration model is the one-to-many model which is generally used in situations where a producer



Source: Conceptualised upon Leszczyński and Sajduk 2015.

FIGURE 10.1: Collaboration platforms of social media.

of information or services makes many people access those services such as university offering courses through e-Learning platforms or hospitals offering their consultational services and other forms of medicine through online platforms (telemedicine). In e-Government setup, this can be used in the form of e-Government portals where citizens can access the services provided on the convenience of their technology platforms.

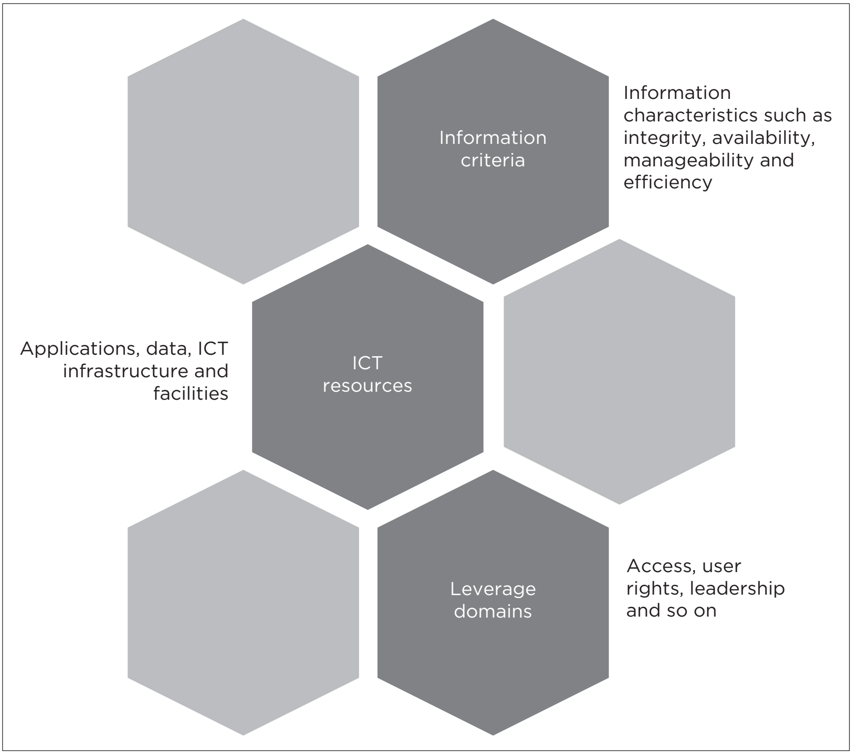
3. Many-to-one interaction models entail information coming from many different sources to an individual. A good model is the Facebook media platform, where many people post things which an individual can then access and has opportunity to comment on or download. Interaction and collaborative platforms can be designed upon this model to ensure that citizens freely participate in the decision and policy-making processes.
4. The many-to-many interaction model includes media platforms like Flickr, Wikipedia, peer to peer and knowledge networks. E-Government innovations can be designed upon these media platforms so as to reach as many people as possible.

Social Media platforms are already being used by many governments, presidents and powerful people to reach as many of their supporters and citizens as possible. For example, Twitter is slowly emerging as a dynamic platform that can be used for effective communication and interaction between the government departments and citizens. There are serious achievements around the world towards transforming of Twitter from a one-way to a two-way communication platform. Therefore, governments around the world are slowly adopting Twitter as one of the key e-Government platforms (Antoniadis, Zafiropoulos & Vrana 2016). Despite the lack of clear empirical evidence on social media usage in e-Government setups, there is undoubted agreement among researchers that social media is a potential platform that needs to be embedded onto e-Government designs to promote interactions with citizens. This can promote a semi-formal environment where citizens can open up and find interactions with government departments given the 'freeness' of the environment (Magro 2012).

Understanding the potential of social media also involves a clear understanding of the three domains of interrelated e-Government service domains given the context in which it is implemented. The modus operandi of contemporary e-Government transcends along the three arms of addressing internal government concerns such as technological and operational issues (integration of ICTs into the different business processes), institutional issues and political issues (e-Democracy, e-Participation, etc.) (Janowski 2015).

The three key domain requirements are shown in Figure 10.2.

The interrelated domains are integrated with one another to achieve the sole purpose of e-Government implementation. The main domain is the information criteria domain which ensures that the information e-Government platforms carry has overall integrity and its application in different business processes culminates into efficient and effective public services. This information should further have integrity, be available, compliant to the different business rules and overall government rules and regulations, be manageable and always maintain the acceptable levels of confidentiality.



Source: Adapted from Iribarren et al. 2008.

FIGURE 10.2: Three interrelated domains of e-Government services.

Having information that obtains all the given rules above in the e-Government environments makes it competitive so as to provide an excellent service to citizens and businesses. Data, information and information technologies are critical determinants in e-Government development and e-Government IS. Therefore, requisite design of e-Government needs to ensure that there are matched data structures, perfectly designed databases and so on (Eom 2010).

The ICT resources provide the means, medium and the necessary avenue through which e-Government applications can run. ICT resources include the ICT infrastructure and different technology facilities. They further include the applications and e-Government data. Because ICT resources enable the different e-Government applications to run, technology is therefore the key enabler of e-Government. The last domain is the leverage domain that includes the access procedures and mechanisms, user rights, leadership and so on.

Future e-Government

In this chapter, different scenarios of e-Government in the immediate, medium and long-term future have been articulated. Given the many discussions, it can be stated that innovations in e-Government are going to flourish in a bid to continuously provide competent and relevant-to-the-context e-Government applications. The following depicts some innovations or current line of thinking which may have a huge impact on the e-Government of tomorrow:

1. The EU has dedicated research clusters that are investigating different aspects of e-Government. For example, led by scientists from Greece, interoperability innovations are being actively pursued with the understanding that the different models and platforms developed are going to guide the integration efforts of intra- and supra-government IS to implement the cross-border integration. In another team, some scientists in Italia are investigating different aspects of big data analysis and OGD in order to advance the EU e-Government agenda. Within the confines of their motivation to be world leaders of e-Government, the EU has suggested that opening government data alone is not enough – there is a need to open up services and processes. By so doing, government will be providing services in open platforms which can be reached by citizens, and therefore, this will culminate into improved trust of government services.
2. Other than merely providing efficient and effective public services, key contemporary and future e-Government design and implementation will be extended to act as one of the vehicles for economic development. The Chinese government is already using this e-Government model as a platform for increasing and monitoring economic activity among citizens and businesses. For example, by accessing government

information on registration or requirements for registration of a business or compliance assessment, Chinese businesses can now enter the global market value chains faster and be ready to capture opportunities seamlessly and within shorter periods of time (Williams et al. 2014).

3. The development of Asynchronous JavaScript and XML (AJAX) and increased designers' competencies in coming up with diverse interaction platforms using the Application Programming Interfaces (API), the possibilities of Web 2.0/3.0 applications given different contexts are unimaginable (Sankar 2014).
4. In the near future, there will be unprecedented automation of government business processes, reducing the participation of government employees in the production of public services using technology platforms. When this stage is reached, there will be direct interaction between back-end computers and the citizens or businesses accessing government information or services using technology. In this scenario, government workers are completely removed from the equation and only those managing the technology from the back-end processes are left in the system (Cajander & Eriksson 2007). No matter what degree of automation we reach and what degree of process integration is achieved, there will always be a need for a human touch as the decisions are made (Cajander & Eriksson 2007).
5. There will be an urgent need to incorporate big data and predictive analytics as a policy analysis tool in e-Government designs.
6. Justice through OGD will be made possible. Other than the e-Government 2.0 movement, another active movement is the Open Government initiative which espouses that contemporary meaningful government needs to be hinged on transparency, improved services and public value. There will be opening up of processes and procedures to increase accountability and transparency.
7. Loose coupling between e-Government 2.0 and technology modernisation and implementation in public service delivery platforms allows classical e-Government to transcend towards technology governance. Technology is the key enabler for achieving efficient business processes and places people at an angle where they develop activities based on the contextual setting of the organisation.

8. With regard to the human resource base, it is important to note that the future demands very competent individuals, be it the public or private sector. The implementation of e-Government will need revolving competencies given the complexity it will continue assuming. Millennials with varying and increased competencies enshrined on technologies are now slowly taking over the world of work. Public sectors around the world will need to attract the millennial generation into their ranks in order to remain competitive.

In addition to the above, the following are some of the changes anticipated for the future in the realm of e-Government:

- Technology will change rapidly at a pace not comparable to the current pervasiveness of technology. New technology innovations such as 3D printing and virtual medical personnel will change the impact of technology on public services.
- Social media explosion has the potential to completely change the model of e-Government in the future towards more interaction models and inclusiveness of Jim and Jack.
- With collaborative governance taking centre stage of governance models, it is more likely that governments will come up with more innovative platforms so that citizens and businesses may become more of partners in the governance agenda. This can be demonstrated by the emergence of dynamic communications systems, such as the virtual public body, and this would change the way citizens and government interact and collaborate for the better.
- The emergence of smart cities as a public service transformation paradigm will transform the information and knowledge management strategies and practices of most governments. The provision of information will be expected in open platforms so that citizens can universally access it and improve their way of lives around urban areas. This is cardinal given the projected increase of world urban population to 6.9 billion by the year 2050 by the World Economic Forum (WEF).

For the future, the demand for some of the desired qualities of e-Government which may be present now will be pronounced.

However, these qualities will be more poised to focus on the competitive balance. Some of these qualities are:

1. Striking a balance – a balance is needed between the internal and external environment 'in as far as efficiency and effectiveness is concerned' (Bwalya & Mutula 2014:n.p.).
2. Citizen-centricity – the need for the consideration of the citizen in all the implementation cycles of e-Government will be more pronounced. E-Government solutions are going to be designed based on the characteristics of the citizen.
3. Innovative – generally, learning organisations and public organisations need to be flexible so as to be able to easily reposition themselves using rapid prototyping to easily incubate ideas and emerging delivery models so that they can remain competitive.
4. Transparent – important for building trust and legitimacy of the government department and its leadership.
5. Connected – need to collaborate with different entities across sectors, government departments, borders and organisations with a view to engage with different stakeholders (PwC 2013).
6. Agile – ability to constantly scan its environment and perceive emerging situations as well as appropriately react to unforeseen events in an acceptable manner without jeopardising long-term options and strategic balance of the organisation.

As mentioned earlier, it is important that e-Government researchers and practitioners need to dig deeper into their intellectual and innovative capabilities to explore deep and emerging issues in e-Government research and practice. Some of the focus domains are articulated in the following paragraphs.

As technology delves towards the realisation of machine-to-machine (M2M) connectivity, communication and interaction opening up unimagined applications barely thought of 10 years ago, it is important for e-Government to explore M2M possibilities, especially for back-end console processes. Broadband (2006) articulates the following issues that need to be explored in this domain:

- Developing of e-Government applications with enhanced data processing and analytics capabilities built on the principles of machine learning and optimisation.

- Reducing the workforce in the public services so as to reduce the cost of e-Government provision.
- Placing e-Government at the centre of implementation of smart cities, especially in the creation of 'knowledge cities'.
- Exploring the emerging dimensions of big data and predictive analytics.

Cloud computing and fog computing (based on IoT, SaaS, etc.) – towards the revitalisation of public services through rapid transformation and business process re-engineering. There will be a need for e-Government designs to take advantage of cloud computing and fog computing platforms. This will directly culminate into reduced cost, increased efficiency and effectiveness in as far as public service delivery is concerned. This will be made possible because the cloud computing technologies observe the following characteristics: on-demand self-service (information resources have to be accessed immediately as and when they are desired and called for), broad network access (network should be configured in such a way that it allows anywhere, anytime access of resources by individuals with different cognitive capabilities), resource pooling (use of multi-tenant model with merged computing resources), rapid elasticity (balancing of the availability of the IT resources) and measured service (ability of the cloud platform to measure the usage of IT resources accessed by the consumer) (Nedev 2014). The use of cloud computing platforms may culminate into the moving of all e-Government services to the cloud translating into reduced need for governments and co-operating partners to spend huge sums of money on putting in place expensive ICT infrastructures.

Although already happening, future government will have more emphasis for fully networked government components. As posited by the 2013 PWC research, the transition of government will happen from government models which will change from hierarchical government systems to networked, from concentrated workforce to dispersed and transitional workforce who can set up workspaces pervasively anywhere and anytime, from tightly coupled (concentrated workforce) to loosely coupled (dispersed workforce) workforce, from specialists to cross-trained generalists and so on (PwC 2013). Based on the principle of networked and integrated e-Government business processes, the following will hold:

- Opening up public data to other agencies and the public sectors encourages more transparency on government business, provides better services on publicly available data and creates opportunities for information services companies.
- Collaboration and sharing of tasks between one level of e-Government (national) and other levels (supra-national) allow improvement in the level of efficiency of the public services and also generally improve the effectiveness of public services.

Funding Models

Funding is one of the critical elements of competitive e-Government. The need for appropriate, adequate and sustainable funding is more pronounced given the need for increased innovation, agility and responsiveness demanded by future e-Government applications. Future funding of e-Government application will be more robust and dynamic with the traditional PPPs which are at the centre of funding in most of the developing countries' funding of traditional and contemporary e-Government pushed to a less dominating role. Figure 10.3 shows the different funding elements of e-Government

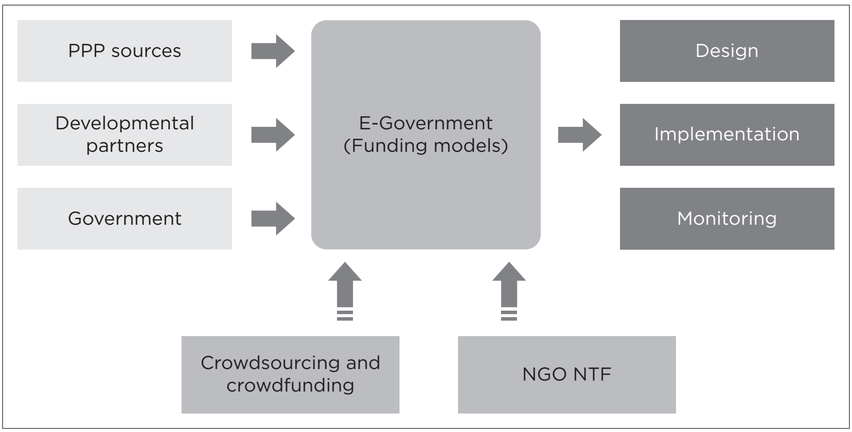


FIGURE 10.3: Funding models for e-Government.

and demonstrates that the need for sustained funding cannot be overemphasised given the continuous need for e-Government design, implementation and monitoring.

The emerging model is the partnership between government and non-government organisations' (NGOs') non-traditional funding (NTF). This kind of partnerships is hugely beneficial because it brings not only finances but also competencies and capabilities on the e-Government scene which the government departments would not normally possess. The other funding model is crowdsourcing and crowdfunding which can be explored given the context in which e-Government is implemented.

Research Direction

Being a multidimensional concept, there are many dimensions and angles that one can take to, given the interest and need. The list below is not mutually exhaustive but attempts to provide general themes that can be unpacked to more detailing levels. Given the emerging and future nuances of e-Government, the research areas that e-Government researchers may like to consider to explore are as follows:

1. Talent management – understanding the competency profiles for e-Government design, implementation and monitoring. Example could be the technical competencies needed to innovate context-aware e-Government solutions.
2. Leadership – what leadership qualities, styles and any dimensions are required for managing the different aspects of e-Government.
3. Smart funding and financial management – think of ways on how e-Government can sustainably be funded in future by designing funding models in a given context.
4. Partnering and networking – need for the design of more models in partnering for e-Government implementation.
5. Prioritisation and implementation planning – as e-Government cannot be implemented all at once, it is important to come up with contextual models that will appraise project in terms of urgency for implementation.

6. Programme, project and risk management – how to manage e-Government as a project using the established project management principles from the project management body of knowledge.
7. Performance management and outcome assessment – performance measurement metrics for public officers.
8. Rapid prototyping – because of the need for e-Government applications to be rapidly repositioned (redesigned) to accommodate change, they need to be as agile as possible. Rapid prototyping is one of the methods that make it possible for e-Government solutions to be easily and quickly redesigned and redeployed when there is a change in the user requirements or technology.
9. Sustainable outcomes and citizen-centricity – given a context, how can we ensure that e-Government remains relevant at all times? How do we ensure that the design includes all the attributes of the citizens?
10. Use of intelligence scanning – providing internal–external balance by cordially involving both internal and external stakeholders at the different levels of e-Government design, implementation and monitoring.
11. Ensuring that the key characteristics of e-Government are embedded – key characteristics include agility, connectedness and transparency (openness).
12. Funding models – funding models must take into account the context in which they are implemented.

Conclusion

Generally, there is great potential for e-Government to revitalise the way citizens and businesses interact with governments. With the potential of the emerging governance models where citizens are going to be looked at as partners in governance rather than the governed. The future presents scenarios where the cost of public service provision will be significantly reduced owing to the reduction in numbers of the workforce in the public service. The reduction in the workforce will be made possible by the higher technology penetration rates in public business processes and the recruitment of millennials with multiple competencies in the public service workforce.

It has also been articulated that social media is going to play a huge role in changing the collaboration and interaction patterns within and outside government. Social media presents itself as a potential tool that can revitalise the way public services are accessed. The implementation of OGD is going to go a long way in opening up transparency and accountability practices within the public service spheres. Design of future competitive e-Government should be done in such a way that the applications are designed on open interfaces which are highly scalable to allow the extension in the functional and non-functional system characteristics later. Future government departments will require higher agility and flexibility in order to re-engineer their business processes to accommodate spontaneous changes. As mentioned by the EU, opening up government data is not enough to prove transparency in government business processes. It is important to further open up the services and processes so that citizens can tangibly monitor how governments make decisions and how to take them to task if need be.

Technology is changing so fast that currently we are busy talking about e-Government 2.0, semantic government and big data and predictive analytics, and tomorrow, we will be talking about genome informatics modelling in e-Government and we will require that e-Government adapts to the emerging technology solutions and innovations. As e-Government changes a lot because of fast-changing technology platforms, governance models and citizens' needs, it is important to keep checking what is happening in the internal and external environment for e-Government to remain relevant. A good implementation and monitoring of e-Government is a kaleidoscope of the successful implementation of e-Government.

Although e-Government research is growing at a great rate, there is no significant literature on so many aspects (e.g. service quality). Although Kaisara and Pather (2011) extended the e-Service quality research into the e-Government domain with website design, communication, navigation, information quality, site aesthetics and information quality as the service quality dimensions, there is still a lot that needs to be done in this regard. In conclusion, e-Government researchers and practitioners are implored to dig digger into their capabilities and bring out clear scenarios of how e-Government can reduce the cost of public service delivery and how it can easily be designed and implemented with respect to context (Heeks & Bailur 2007).

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This scholarly book shows the key projectile in e-Government research and practice and identifies the gaps which African researchers need to explore. The importance of more African researchers doing rigorous e-Government research is that context will eventually be enshrined into e-Government design and practice, increasing the success rate of e-Government projects in Africa and other contextually similar environments. It articulates the emerging dimensions of e-Government by discussing contemporary trends in big data research, data governance, predictive analytics, business intelligence. and bringing out scenarios of how these relate to e-Government.

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