



Assessing public administration readiness to adopt cloud computing in Eswatini

S Gama

 **orcid.org/0000-0003-4316-3339**

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Supervisor: Dr K Ndlovu

Graduation: May 2022

Student number: 32271409

DECLARATION

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DEDICATION

I dedicate this work to the Almighty God who is forever present and by my side in everything that I do. He has been the source of my strength throughout this program and in His shadow I have prevailed thus far. A special feeling of gratitude to my dearest wife Phindile Gama whose tenacity and words of encouragement kept me pushing to the last line. To my kids, Nosibusiso, Nkosiyenzile and Asabusiswa, I say thanks to my angels for the support you always giving to your daddy.

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ABSTRACT

Most governments' strategic orientation to utilize information technology as a vehicle to offer products and services is being influenced by the promise of cloud computing as a pillar for economic growth. As a result, it is critical for businesses to examine their readiness to utilize cloud computing. Technological, organizational, and environmental factors have all proven to be effective in determining readiness levels, and these parameters were utilized in the research to assess the Kingdom of Eswatini's readiness to use cloud computing in the public sector. The purpose of this research was to identify and analyse the essential aspects to consider when considering cloud computing adoption. Based on the Technology-Organisation-Environment (TOE) paradigm, the research takes into consideration the experiences and knowledge of senior government officials to give a theoretical and practical understanding of the Kingdom of Eswatini's level of readiness. The data was gathered using a qualitative approach, with structured and semi-structured interviews conducted at all levels of the Eswatini government. The qualitative data from the Kingdom of Eswatini's technological, organizational, and environmental setting was collected and analysed using grounded theory. The findings of the study contribute to a better knowledge of the elements that the Kingdom of Eswatini should consider in its efforts to use cloud computing to improve the efficient and cost-effective delivery of electronic services. The findings of the research combine the characteristics discovered by the TOE frameworks to build numerous constructs or themes that are determinants of the state of preparedness to inspire government adoption of cloud computing. The research used the TOE framework as a theoretical foundation, and it highlighted the constructs/themes as facilitators or impediments to cloud computing adoption. The findings of the study also serve as a foundation for future research into the issue in the Kingdom of Eswatini and other developing countries. The constructs/themes that emerged were enablers and barriers answering the main research question. The presentation of the results provides a broad perspective that can be used by the Government of Eswatini or any entity to measure the state of readiness to adopt cloud computing to deliver electronic services.

Keywords: Public Sector, Cloud Computing, TOE Framework, State of Readiness

LIST OF ACRONYMS

Abbreviation	Meaning
CC	Cloud Computing
DOI	Diffusion of Innovation
ESSCOM	Eswatini Communication Commission
IT	Information Technology
IaaS	Infrastructure as a Service
KOE	Kingdom of Eswatini
MOICT	Ministry of Information & Communication Technology
NICI	National Information and Communication Infrastructure
PaaS	Platform as a Service
SaaS	Software as a Service
SACU	Southern African Customs Union
TAM	Technology Adoption Model
TOE	Technology, Organisation, Environment

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Chapter 1. Introduction

1.1 Background

Information technology (IT) is facilitating the establishment of a truly networked society by providing opportunities for both public and private sector organizations to improve service delivery. E-commerce has set the standard for efficient product and service delivery, and governments around the world are following suit in an attempt to deliver quality public services (Papazafeiropoulou & Pouloudi, 2014). In the fields of e-commerce and e-government, cloud computing (CC) has emerged as the dominant IT domain (Azman, Suriani, Aziati & Hussein, 2015).

Cloud computing's ability to enable cost-effective, scalable, real-time delivery of on-demand services through the internet at any time has influenced its adoption (Rosati et al., 2017; Uslu, 2010; Pfleeger, Pfleeger & Margulies, 2015, p187-188). Public sector organizations are looking for new ways to deliver services in a more efficient, cost-effective, and long-term manner (Abeywickrama & Rosca, 2020). The desire of national governments to increase their countries' competitiveness in the global economy is pushing the adoption of better and more effective service delivery methods. According to Azman et al. (2015), public and private sector organizations are turning to cloud computing to build long-term IT platforms and deliver high-quality services.

The promise of cloud computing as a pillar for economic growth is influencing the strategic orientation of most governments, who have chosen affordable and sustainable IT services (Abeywickrama & Rosca, 2020). As stated in the government of the Kingdom of Eswatini strategic roadmap 2019 – 2022, information technology has been identified as a critical element in responding to the effects of the covid-19 pandemic and further reviving the ailing economy (gov.sz, 2020). Eswatini has embarked on several IT initiatives aimed at improving the implementation of the e-government policy and stimulating the economy to meet society's present requirements. In light of this, the purpose of this study is to analyse the state of readiness of the Kingdom of Eswatini's public administration to adopt and utilize cloud computing.

The research used the Technology, Organization, And Environment (TOE) framework to narrow down the readiness elements to be considered when contemplating the adoption of cloud computing in Eswatini. The TOE framework views innovation adoption from three perspectives: technological, organizational, and environmental (Oliveira & Martins, 2011). A thorough evaluation of the current environment is helpful to embrace cloud computing successfully and efficiently, as each environment faces distinct problems and opportunities.

1.2 Problem Statement

The readiness for organisations to adopt technology continue to be a fundamental factor in governments' failure to capitalize on cloud computing's potential to supply public services. The research problem arises from a failure to identify the level of readiness of government departments to embrace cloud computing, and this research focuses on the current state of readiness for the Kingdom of Eswatini to adopt cloud computing to improve public service efficiency.

According to the TOE framework, the research challenge focuses on identifying and highlighting the state of the readiness indicators in Eswatini from three perspectives: technological, organizational, and environmental. Chauhan, Bansal, and Allapanavar (2012) posit that, there is an increasing global push to digitize public administration as countries are responding to the challenges of the covid-19 epidemic which has ushered in new ways of doing business. The Kingdom of Eswatini, like the rest of the world, has embraced an e-government approach to provide high-quality public services. It is critical that the Kingdom of Eswatini determines its readiness to adopt cloud computing in order to establish business-IT alignment, which would pave the way for effective cloud computing deployment.

1.3 Research Objectives

The main objective of the research was to assess the state of readiness of the Kingdom of Eswatini in adopting cloud computing and building a cloud computing adoption framework to improve public administration through the delivery of quality electronic services. The framework is based on the technological, organisational and environment (TOE) framework within the context of the government of the Kingdom of Eswatini.

The auxiliary objectives are as follows:

- To highlight the benefits and challenges of cloud computing in the public Sector.
- To determine the implications for the citizens, businesses, other Governments and the government workforce.
- To explore the initiatives that can assist government to sustain cloud computing.

1.4 Research Questions

The main question of the research is as follows:

“What is the state of readiness of the Kingdom of Eswatini to adopt cloud computing to deliver public services?”

The research sub-questions are:

- What are the key factors that influence the adoption of cloud computing?
- How does cloud computing bring value to public administration?
- What are the benefits and challenges of cloud computing for public sector organizations?
- What effects will cloud computing have on the government workforce?

1.5 Importance of the Proposed Research

Cloud computing adoption in the public sector is growing as governments strive for quality service delivery, creating transparency in public administration and improving competitiveness to meet the global demands (Chauhan, Bansal & Allapanavar, 2012). The response of the Kingdom of Eswatini to globalization will have a big impact in determining the competitiveness of the country and attracting foreign direct investment (FDI) to grow the economy. The government of the Kingdom of Eswatini has identified information technology as one a major economic driver among others and the government has adopted an e-government strategy to deliver public services.

This research was vital in identifying cloud computing readiness factors to be considered for the Kingdom of Eswatini to adopt cloud computing as part of the IT product mix to improve service delivery and the competitiveness of the country.

The Kingdom of Eswatini is among the developing countries and this research provides insights on how the government can strategically adopt cloud computing to improve public administration and the competitiveness of the country. This would further assist other developing countries to benchmark their progress towards cloud computing adoption using the Kingdom of Eswatini as a case study.

1.6 Delimitations and Assumptions

- **Delimitations (Scope)**

The research focused on identifying the cloud computing readiness factors to be considered when adopting cloud computing from a government's perspective in delivering digital services. The scope of the study was the government ministries of Eswatini and will confine the readiness metrics within the technological, organisational and environment context. The research type employed was a cross-sectional design where the data and analyses was done simultaneously. As much as the longitudinal research would better inform technology adoption due to the everchanging technological landscape, this research will perform the data collection only once and analyse it to inform a baseline for future research.

The sample size will be determined by reaching the point of saturation informed by the same response to the interviews and documents gathered for the research.

- **Assumptions**

The research was conducted to form a body of knowledge and is in no way engaging in blame for lack of readiness. It assumes that participants will be willing to share information factually and there was no bias in their engagement. The research tapped into ongoing government initiatives that may not be completed and adopted as official documents. In this light, there was a need to sign non-disclosure agreements to safeguard the information that is not public knowledge at the time of the research. The decision-makers in government supported the research and adopted the research results. This will help to inform government strategic direction in adoption of cloud computing for public administration.

1.7 Research Outline

This research is divided into six chapters, the first chapter comprises the introduction, statement of the problem, the objective of the study, the significance of the study and the scope of the study. The second chapter contains the literature review which entails the theoretical review, conceptual framework, and empirical review. Chapter three presents the research methodology which includes research design, area of a study, study population, sample size and sampling techniques, types and sources of data, data analysis methods, and ethical consideration. Chapter four is made up of data analysis and findings. Chapter five contains empirical analysis and presentation of results as well as the discussion of findings. The final chapter includes a conclusion, recommendation, limitations of the study, and area for further study.

This research contains six chapters, the first chapter comprises the introduction. Chapter two comprises of the literature review that seeks to establish an understanding of cloud computing, innovation adoption frameworks and the IT landscape within the context of the Kingdom of Eswatini. Chapter three presents the research methodology which includes research design, research population, sample size and sampling techniques, and the grounded theory used for the collection and analysis of qualitative data. Chapter Four used the grounded theory to present the data collection and analysis of the qualitative data in line with the TOE framework that is used to determine to assess the state of readiness to adopt cloud computing.

Chapter five subsequently presents the research findings from the perspective of the TOE framework to build an appropriate conceptual framework for cloud computing adoption. The research presents the discussions of the findings in chapter six formulating themes that are used to determine the state of readiness to adopt cloud computing. Chapter seven presents the conclusion and recommendations of the research drawing attention to the response to the research objectives according to the perspective of the TOE framework.

1.8 Chapter Summary

This chapter introduced the research background and discussed why the research was conducted in the Kingdom of Eswatini, highlighting ICT advances and efforts. The chapter

then went through the research problem, as well as the research objectives, research questions, and the research delimitations and assumptions. The study outline was provided by emphasizing the overall substance of each chapter. The following chapter presents a theoretical literature review of cloud computing, IT adoption frameworks and the ICT landscape of the Kingdom of Eswatini.

Chapter 2. Literature Review

This chapter contains a literature review pertaining to the research problem as well as the research goal. The theoretical perspective of cloud computing, IT adoption frameworks, and the ICT environment of the Kingdom of Eswatini are presented in this chapter.

2.1 Introduction

To address the issues of poor service delivery, most governments throughout the world are implementing new and improved forms of delivering public services. This is primarily owing to the high cost of service delivery mechanisms (Elkadi, 2013). Finding creative, low-cost, scalable, efficient, and secure means to providing quality services is becoming increasingly popular among countries (Zaharia-Radulescu & Radu, 2017).

Cloud computing is gaining traction as a technological solution to the government's technology issues in implementing economical and long-term electronic services (Almarabeh et al., 2016). According to Xi & Mitrovic (2014), cloud computing has the potential to free governments throughout the world from the burden of investing in costly IT infrastructure, allowing them to focus on their main political mission of serving individuals, enterprises, and governments.

Elkadi (2013) observes however that there is a high rate of failure of government IT initiatives hence there is a great need for extensive examination of the factors that influence the adoption of technology in public administration. A strategic and well-defined approach by governments can help to mitigate the risk of IT adoption failure and this must be informed by vast IT literature and experiences. Oliveira & Martins (2011), avers that one of the strategic and well-defined approaches that are used in assessing IT adoption readiness factors is the TOE framework that uses three contextual viewpoints i.e., Technological, organizational, and environmental context.

2.2 Cloud Computing Paradigm

According to Xi & Mitrovic (2014), Cloud Computing (CC) is one of the information technologies dimensions that is getting attention from the public and private sector as the major driver for the increasing competitiveness of governments and private enterprises.

Zaharia-Radulescu & Radu (2017) observes that CC presents multiple opportunities that will enable a truly digital transformation that is based on sustainability. Cloud-based innovations are poised to play a vital role in transforming the public sector and it is imperative for policymakers to be cognisance of readiness factors of their environment for successful uptake of cloud computing (Abeywickrama & Rosca, 2015).

The promise of cloud computing to decrease costs, increase security, supply infrastructure, and enable data access anywhere, at any time, responds to the issues that governments have in implementing digital transformation (Xi & Mitrovic, 2014). Cloud Computing has drawn many firms to invest in this virtual storage technology because it is considered a way to help enterprises manage and share data in a more flexible, cost-effective, and scalable manner.

Nist.gov (2018) defines cloud computing as *"a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., Networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction"*. It allows for scalable, real-time delivery of on-demand services through the internet at any time and from any location (Rosati et al., 2017; Uslu, 2010; Pfleeger, Pfleeger & Margulies, 2015).

These IT resources are accessed via the internet in a cost-effective and convenient manner with minimum cloud service provider interaction (Asatiani, 2016). By engaging in an ecosystem that provides shared infrastructure, public and private sector organizations can use cloud computing affordances to modify their service delivery mechanisms in a sustainable way (Gillwall & Moyo, 2016).



Figure 2-1 Cloud Computing Paradigm (source: Marston, Li, Bandyopadhyay, Zhang & Ghalsasi, 2010)

2.2.1. Cloud Computing Characteristics

Cloud computing allows access to shared computing, storage and network resources that are provided on demand and consumed as a utility. Outsourcing IT services has become one of the most important organisational concepts to attain competitive advantage and cloud computing enables organisations to transfer the IT risk to a service provider (Almarabeh et al., 2016). Nist (2011) identifies the following characteristics of cloud computing:

- **On-Demand self-service** - to enable self-provisioning of IT resources (such as computing and storage) without the requirement for human engagement on the part of the service provider. This allows the consumer control over how the cloud is used (Pfleeger, Pfleeger & Margulies, 2015). Users could save maintenance and upgrades on physical infrastructures and equipment by using cloud-based infrastructures instead of in-house infrastructures.
- **Broad network access** – enables network connections from a variety of devices, including mobile phones and computers. Cloud computing allows customers to access their data through the internet and makes use of the service's mobility notion (Wyld, 2010).

- **Resource pooling** – service provider runs a multi-tenant platform with dedicated or virtualized environments that promotes infrastructure sharing. Consumers have access to a pool of resources that are dynamically provisioned and made available anytime, anywhere (Dornelius et al., 2017).
- **Rapid Elasticity** – resources are allocated and released to allow for demand fluctuations. Because services frequently have numerous sites to facilitate load balancing for transactions, the resources appear to be limitless to the consumer.
- **Measured service** – to ensure transparency of consumption, resource utilization can be monitored, managed, and reported on in real-time. Variable rates based on usage, rather than fixed costs, are possible with cloud computing (Dornelius et al., 2017).

2.2.2. Cloud Computing Service Models

Cloud computing, as a service-oriented platform, allows users to consume services using various service models, depending on their needs (Dahlberg, Kiuijarvi, and Saarinen, 2016). Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS) are some of the basic cloud services that businesses can use and Rosati et al. 2017 attest that they can be deployed in public, private, community, or hybrid cloud formats.

The cloud computing service models can be explained as follows:

- **Software as a Service (SaaS)** – The cloud service provider owns and controls the IT resources, and the consumer interacts with the cloud application over the internet. Email services, enterprise resource planning (ERP), Google apps, Dropbox, and other SaaS-based applications are examples of the SaaS service model. SaaS users are protected from the costs of infrastructure and application development because the cloud service providers manage both. (Fuzes, 2018; Zahaira-Radilescu & Radu, 2017).
- **Platform as a Service (PaaS)** – The PaaS model allows customers to deploy and operate their applications on top of cloud service providers' underlying infrastructure. The customer does not need to purchase expensive server

infrastructure. Customers can design their apps and use the cloud service provider's infrastructure (Rosati et al., 2017). Google App Engine, Microsoft Windows Azure, Oracle Private Cloud Appliance (PCA), and others are examples of PaaS providers.

- **Infrastructure as a Service (IaaS)** – this cloud computing service model provides physical resources that allow users to develop and deploy applications on cloud infrastructure (Wyld, 2010). Companies lease out data center processing, storage, and network services as an operational expense, avoiding capital expenditure, thanks to the economies of scale enabled by the infrastructure-sharing model.

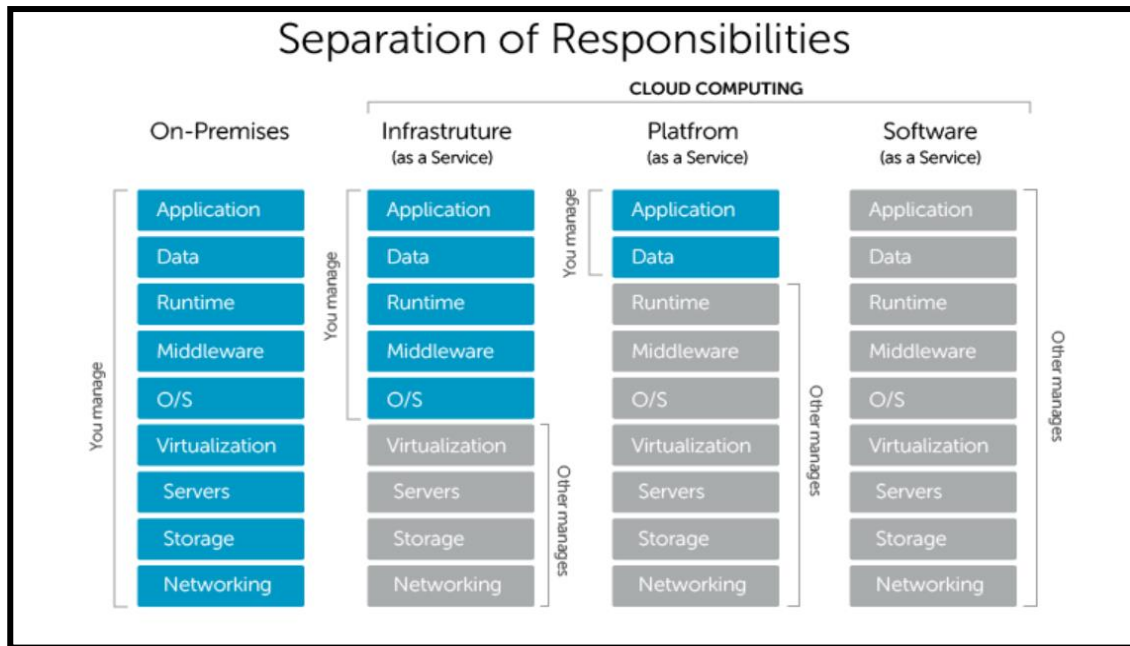


Figure 2-2 Cloud Computing Service Models (source: cloudindustry, 2019)

2.2.3. Cloud Computing Deployment Models

Cloud computing can be deployed and used in different ways depending on the requirements of the user. Deployment of cloud services are classified based on their location and Alshamaila & Papagiannidis (2012) describes the following cloud deployment models:

- Public Cloud** – Over a public network, cloud infrastructure and computational resources are made available to the general public. IT resources are open for consumption by any user or organization. The public cloud is hosted and provided over the internet by a third party. This strategy makes use of economies of scale by leveraging infrastructure sharing, which allows users to share the costs of computation, storage, and networking across several users. This is a typical multi-tenant scenario in which a pool of resources is made available for internet consumption (Fumeaux, 2016).

- **Private Cloud** – This is a dedicated environment for a single tenant who either implements their hardware and applications in their own data center on-premises or rents private space from a third party. According to Owopetu (2013), a private cloud provides managed access, managed services, managed resources, and pooled resources for an organization's exclusive usage. To monitor and control security concerns and provide improved efficiency, a private cloud can be set up behind the company's firewall. This technique is excellent for businesses that handle sensitive data, but it can be costly for small businesses (Zaharia-Radilescu & Radu, 2017).

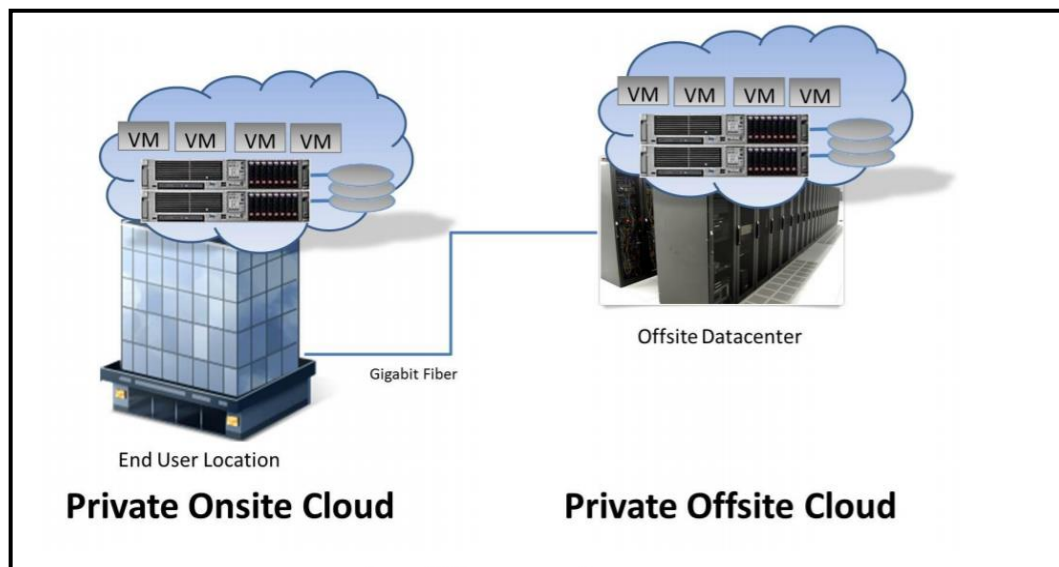


Figure 2-3 Private Cloud Deployment (source: Owopetu, 2013)

- **Hybrid Cloud** – this blends public and private cloud models, with resources offered through both on-premises and cloud services. It combines the best of both worlds to provide users with effective services. This technique is typically used by enterprises with big on-premises workloads that leverage cloud services for load balancing. In this context, data can be stored on-premises to comply with local rules, and then processed in the cloud, making use of the cloud's virtualized computing capability. Furthermore, this architecture is

excellent for bursting into the cloud when on-premises computing is restricted, and the cloud is used for load balancing and speedy provisioning of computing resources.

- **Community Cloud** – This model is common among businesses that have similar business interests and are subject to the same regulatory, compliance, and restrictions. Multiple government organizations or businesses that deal with one another have their processing centralized in a single location to save money and improve security by minimizing the quantity of traffic that would otherwise have to travel across the internet.

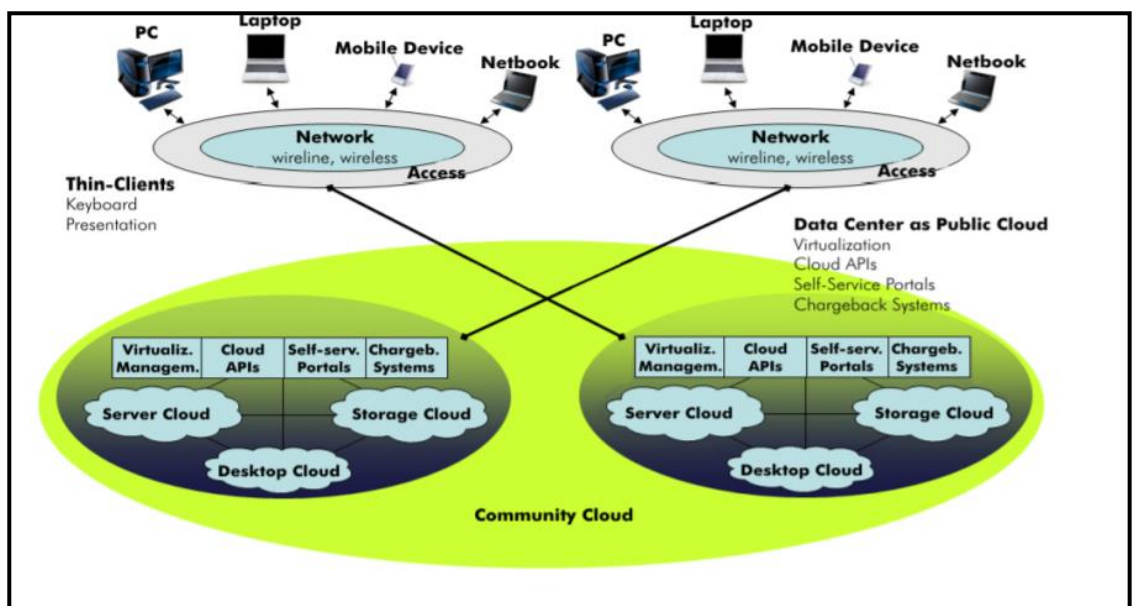


Figure 2-4 Community Cloud (source: Owopetu, 2013)

2.2.4. Benefits Related to Cloud Computing

The anticipated benefits of cloud computing may be the main reason for public and private sector organizations' increased interest in embracing it. Cost reduction, greater capabilities, and increased scalability are among the advantages of cloud computing (Chen, Chuang, & Nakatan, 2016). Cloud computing allows customers to concentrate more on their primary business objectives whilst improving their competitiveness.

The underlying infrastructure is taken care of by cloud service providers, and cloud computing purchasers have minimal requirements following the establishment of a cloud computing system. Cloud computing adds a layer of security to government services and is charged as utility computing based on resource usage. According to Avram (2014), cloud technologies enable fast access to IT resources, cost-effective use of IT resources, and on-demand usage of IT resources because these resources can be released and purchased at any moment.

There are various benefits of cloud computing, and these are summarized below:

- Cloud service providers (CSP) provide quick access to applications and data services shielding enterprises from acquiring expensive IT resources and personnel. The CSPs are responsible for upgrading software and hardware reducing the total cost of ownership for users of cloud computing.
- Public and private sector organisations can use cloud computing services for disaster recovery services as CSPs are able to store data in distributed data centers ensuring quick recovery of services in cases of disasters.
- Cloud computing enables enterprises to change outdated technology to modern technologies as CSPs strive to be relevant by upgrading to new technologies. So, cloud computing offers greater flexibility and efficiency for e-government.
- Traditional government services often entail bureaucratic processes that lack transparency and result in dissatisfied users and businesses. Cloud computing provides improved and more transparent services online resulting in improved service delivery.
- Ease of use and flexibility as cloud computing services offer improved portability and accessibility through the use of the internet which is the backbone for providing services to the customers and through IT, they can access any application regardless of time or location using an active internet connection.

2.2.5.Challenges of Cloud Computing

Despite the numerous advantages provided by cloud computing systems, there are still various problems. Jeyaraj (2018) says that the most significant challenge across public and private sector organisations is security of cloud technologies. This frequently leads to a delayed adoption rate and a reluctance to employ cloud services. Organizations value data privacy above all else and moving data to the cloud is frequently perceived as a breach of data sovereignty, resulting in a reluctance to use cloud services. According to Bokhari, Makki, and Tamandani (2018), the following cloud computing difficulties exist:

- Data leak due to data residing outside the organisation.
- Data location is always unknown resulting in uncertainty of the availability of the data.
- Lack of data segregation as the data is stored in the same infrastructure with several clients using the IT resources in parallel.
- Regulatory compliance is always a challenge as the cloud providers are residents in different jurisdictions governed by different laws and regulations from those of the client.

2.3 Technology Adoption Frameworks

With the rise of technological dependency in our lives and worldwide economic connectivity, a number of academic and industrial researchers have been examining consumer adoption intentions for various technologies (Koul & Eydgahi, 2017).

2.3.1.Technology, Organisation, Environment (TOE) framework

The TOE framework is a theoretical framework that explains how three different contextual viewpoints, namely technology, organization, and environment, impact the adoption of information technology by organizations. It's utilized in ICT adoption because it gives organizations a comprehensive view of technology adoption and use, allowing them to foresee the consequences across the value chain (Palos-Sanchez, Arenas-Marquez & Aguayo-Camacho, 2017). When adopting technology in an organization, the TOE

framework gives guidance for identifying the state of readiness variables that must be considered.

To avoid technology adoption failures, companies must first understand the factors that influence IT adoption. According to Oliviera & Martins (2011), the TOE framework is a useful tool for considering the organization's ecosystem from three perspectives: technology, organization, and environment. The TOE framework has been widely utilized to adapt innovation technologies such as e-commerce, e-government, web services, e-procurement, e-CRM, ERPSs, web services, and cloud computing, according to Chiu, Chen, and Chen (2017). It has been useful in determining how businesses adopt various technology developments (Zaharia-Radulescu, 2017).

As countries implement e-government frameworks to digitally deliver services to citizens (G2C), businesses (G2B), and collaboration with other governments (G2G), cloud computing adoption and absorption in the public sector is gaining traction. The TOE framework, according to Liu (2019), can be used to identify significant institutional characteristics that might assist policymakers to make better decisions about technology adoption in an organization.

Before adopting innovation and technology, there are a number of issues such as internet unavailability, governance, security, laws and regulations that need to be considered (Oliviera & Martins, 2011). Because of the widespread use of cloud technologies, businesses are in a better position to learn from the mistakes of early adopters. Late adopters can now achieve a balance in terms of technology adoption, and cloud computing as a dimension of it is being evaluated by several countries as a driver for the delivery of electronic public services (Zaharia-Radulescu, 2017).

The TOE framework allows firms to define the boundaries of prototyping adoption without impacting overall company operations, and it also allows for seamless integration of technical, organizational, and environmental elements (Liu, 2019). When adopting technology breakthroughs, the TOE framework is beneficial in leveling the dominance of the technical component by bringing to the fore key readiness considerations to be considered as well (Scott, 2007). Different types of technology developments may necessitate different

types of considerations, but the TOE framework provides a good overview of the primary readiness criteria.

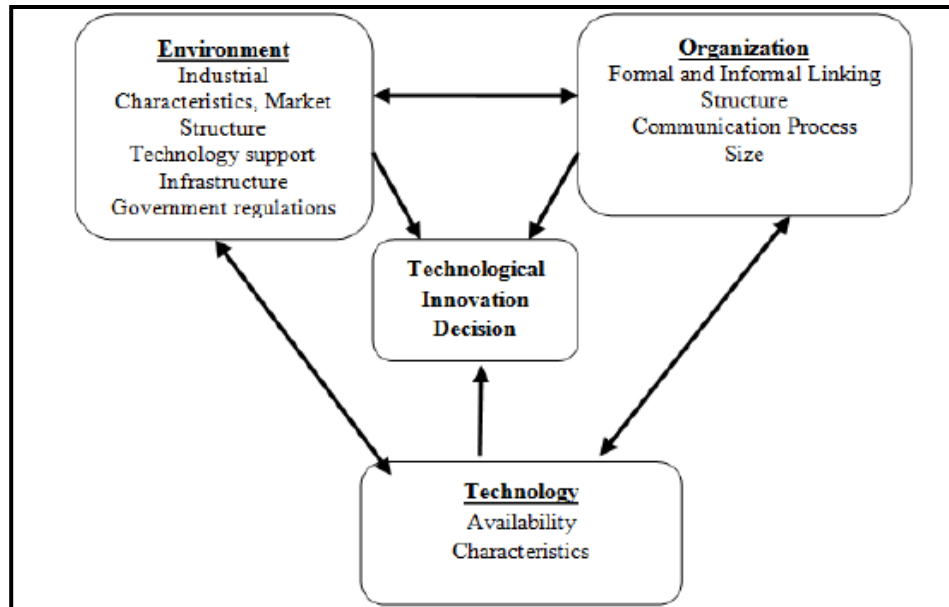


Figure 2-5 TOE framework (source: Tornatzky and Fleischer 1990)

• Technology Context

Internal and external technologies are utilized to change technological competencies and stimulate electronic business transactions in the technology setting. Internal and external technologies, according to Leung, Lo, Fong, and Law (2015), identify the technologies that the business uses and those that are available on the market.

The technological context, according to Awa, Ukoha, and Emecheta (2012), includes IT infrastructure, technical skills, internet use, IT standards, and IT security. These elements are critical in supporting an organization's digital strategy's business operations and are crucial predictors of an organization's preparedness to adopt technology advancements such as cloud computing.

According to Chiu et al. (2017), the relative advantage of technology, compatibility, and complexity, as well as testing, enables the elimination of uncertainties in cloud computing adoption. To enable seamless adoption of cloud computing in the public or private sector, it

is important to integrate already available technologies and upcoming technologies in order to create a technical context that is sustainable (Ismail & Ali, 2013). This research looks into current technologies because they are the foundation of the internal technological landscape, whereas emerging technologies like cloud computing introduce new features to the IT infrastructure, technical skills, IT standards, and IT security, and they test an organization's readiness to adopt the technology.

• **The Organization Context**

The organizational context includes characteristics of an organization that supports technology adoption, such as firm size, centralization/decentralization, managerial structure, human resource quality, top management support, organizational culture, which depicts employee readiness, organizational change processes, internal unit integration, communication processes, cross-functional teams, and champions among employees (Oliviera & Martins, 2017).

To have a better understanding of the organization's objectives to pursue opportunities in technology advances such as cloud computing, it is critical to learn from the mission and vision of the organization (Awa et al., 2012). The ability to forecast future innovations that can create competitive advantage is enhanced by knowledge gained through learning and experience in an organization. Management and employees are aware of previous pitfalls and have the ability to forecast future innovations that can create competitive advantage (Chiu et al., 2017). Meeting the needs of electronic transformation and coordination for cooperative efforts in service delivery requires inter-organizational collaboration among government ministries.

• **The Environment Context**

The environmental context outlines the boundaries within which a corporation operates. Environmental readiness variables include the organization's response to competitive pressure, current laws and regulations, and consumer/citizen readiness to use technological developments (Angeles, 2014). A crucial readiness aspect in deciding acceptance of technology innovation is the government's attitude and support in reaction to external

variables such as citizen and business needs (Papazafeiropoulou & Pouloudi, 2014). Other aspects to consider are bandwidth availability and cost, industry, and market size.

The global competition has put a lot of pressure on governments to adapt their technical solutions to be nimbler and keep up with the continual technological advancements. As they thrive for economic transformation, issues such as foreign direct investments (FDIs), tax regimes, and climate change have an impact on the public sector. Governments are responsible for creating an environment that allows internal and external stakeholders to participate actively in the economy. Governments' strategic decisions to adopt technology such as cloud computing are heavily influenced by the needs of the business community (Oliviera & Martins, 2017).

The contact at the G2G level necessitates a proactive and engaging reaction, and cloud computing can be the right medium for ensuring compliance with mandatory statutes that are frequently implemented at regional and worldwide country collaborations (Dornelas et al., 2017). Cyber-attacks have put data protection and national security in jeopardy, prompting 132 of 194 nations to pass legislation aimed at safeguarding people's data and privacy (unctad, 2020). The response of governments throughout the world to cyber-attacks will have a significant impact on the adoption of cloud computing in public sector organizations. The TOE framework is a powerful tool for explaining how public and private sector organizations adopt innovation.

2.3.2. Technology Acceptance Model (TAM)

Adoption of new technologies is determined by how users accept and use the technology. According to Lai (2017), TAM is made up of user motivation variables (such as perceived ease of use, perceived utility, and attitudes toward technology) as well as outcome variables that includes behavioural intentions and technology use. Government employees' perceptions of cloud services are heavily influenced by their perceived ease of use and utility. Because the research is focused on Eswatini's readiness, the government employees and top management's perceptions of cloud computing are crucial in determining the expected outcomes.

2.3.3. Diffusion of Innovation (DOI)

The DOI requires identifying certain characteristics that indicate why innovation has been adopted as well as the thought process that led to its adoption. DOI is built on the social fabric and the confidence that the new innovation will outperform existing systems. Rogers (1962) proposed the DOI to measure innovation acceptance behaviour in an attempt to understand the adoption of an invention, particularly the reaction of the organization's culture (Ali, Raza, Pua, & Amin, 2018). According to Ali et al. (2018), the DOI can be utilized to raise awareness of innovation among all stakeholders involved. Gomes and Osman (2019) emphasize the following characteristics of innovation that are closely linked to technological adoption:

- **Relative advantage** – relates to the new innovation's perceived utility in comparison to old systems. This can be measured on a number of levels, including cost, efficiency, simplicity of use, and satisfaction. When the relative advantage is high, the technology's adoption rate is also high.
- **Compatibility** – is the degree to which a new invention is compatible with current systems and values, as well as existing experiences and values. Organizational change is not a one-time event, and users frequently assess the compatibility of new innovations with current structures and how they may best implement new technologies.
- **Complexity** – relate to the perceived difficulty in understanding and utilizing technology. Individuals prefer less difficult systems to deploy, hence perceived complexity of any technology tends to slow down adoption.
- **Trialability** – experimenting with technology allows people to dispel any doubts they may have about it. Users are more likely to adopt a new innovation if they can try it out first.
- **Observability** – pertains to the extent to which users can see a new invention after it has been implemented and, as a result, form opinions about the repercussions of adopting it. Observation encourages debate and interest in a new idea.

2.3.4. Cloud Computing in the Government Context

Cloud computing's influence has spread from e-commerce to government processes, assisting efforts to reduce ICT costs and improve efficiencies. The US federal government implemented cloud computing through a strategic strategy that considered the organisational part of the TOE framework, which examines how people's mindsets have changed and how company processes have changed (Wyld, 2010). Governments are leveraging cloud computing's potential to create sustainable digital ecosystems, and there is a significant trend toward monetizing government services to improve the fiscal position and health of the government (Palter & Shilson, 2014).

The UK has created a government-wide cloud computing network to support the country's digital agenda, which includes moving government services online (Wyld, 2010). Saudi Arabia utilized cloud computing to overcome infrastructure difficulties and provide better services, and they are currently rated 52nd in the UN e-government ranking (Mudawi, Belof & White, 2018). Governments are adopting rules to guide the implementation of e-government, which includes the adoption of cloud services, as electronic services in education, health, agriculture, and commerce have risen (Dornelus et al., 2017).

2.4 E-governance in the Kingdom of Eswatini

Eswatini is a country in Southern Africa that shares borders with Mozambique and South Africa. It has a land limit of 535 kilometres and covers 17, 363 square kilometres. Hhohho, Lubombo, Manzini, and Shiselweni are the four administrative divisions in this country. The government receives a substantial portion of its revenue from the Southern African Customs Union (SACU) and is classified as a middle-income country.

Eswatini's administration approved the "e-government strategy (2013-2017)," which lays out the country's strategic goal for e-/m-government. It has also defined the e-/m-government operational framework, which specifies the projects/initiatives that are considered essential for the strategy's implementation. Since then, the country has developed a new e-government strategy and an ICT master plan with the goal of streamlining government activities and creating an interoperability framework to operationalize the government's interconnection.

In Eswatini, government functions are concentrated in Mbabane, the capital city, which allows for cost reductions through infrastructure sharing and centralized ICT support. Because Eswatini has a very small population, the TOE framework can be used to assess the country's readiness to adopt cloud computing. Governments all over the world are working on and spending substantially on e-government technologies to improve service delivery, public administration, cost-effectiveness, and transparency. (2017, Zaharia-Radulescu).

2.5 Political Context

Eswatini is a democratic state with a parliamentary system modelled after the British system, a judiciary, and an executive branch, as well as a traditional monarchy based on chiefdoms. In 2005, the country enacted a constitution that establishes a separation of powers between the administration, legislature, and judiciary. To address the country's developmental issues, the government is now conducting continuing economic and structural changes. Eswatini formed the Eswatini Revenue Authority (ERA) in 2011 to handle revenue collection, which resulted in the effective implementation of the value-added tax in April 2012 to improve the country's revenue streams.

2.6 Eswatini ICT Landscape

In 2009, Eswatini's government formed the Ministry of Information, Communications and Technology (MoICT), which is responsible for the country's ICT policy. The Ministry of Information and Communications Technology (MoICT) established the Eswatini Communications Commission (ESSCOM) with the goal of putting the Communications Commission Act of 2013 into action. The Electronic Communications Act of 2013 establishes the basis for ICT industry regulation, including competition and licensing.

The National Information and Communication Infrastructure (NICI) Policy 2012–2016 outlines the policy and implementation framework for aligning ICT with national development objectives. Eswatini is one of the continent's few surviving monopolistic telecommunications businesses. Market structural issues, the lack of private operators, and regulatory and service provisions fused within the incumbent government-owned monopoly restrictions all

impede broader access to the internet and mobile computing services for individuals and businesses.

2.6.1. Network Readiness index (NRI) – Eswatini

In the network readiness index, which analyses a country's digital transformation journey, Eswatini now ranks 122 out of 134 economies (networkreadinessindex, 2020). The NRI assesses a country's willingness to adopt new information and communication technologies based on four pillars (technology, people, governance, and impact). The following factors are used to evaluate the NRI:

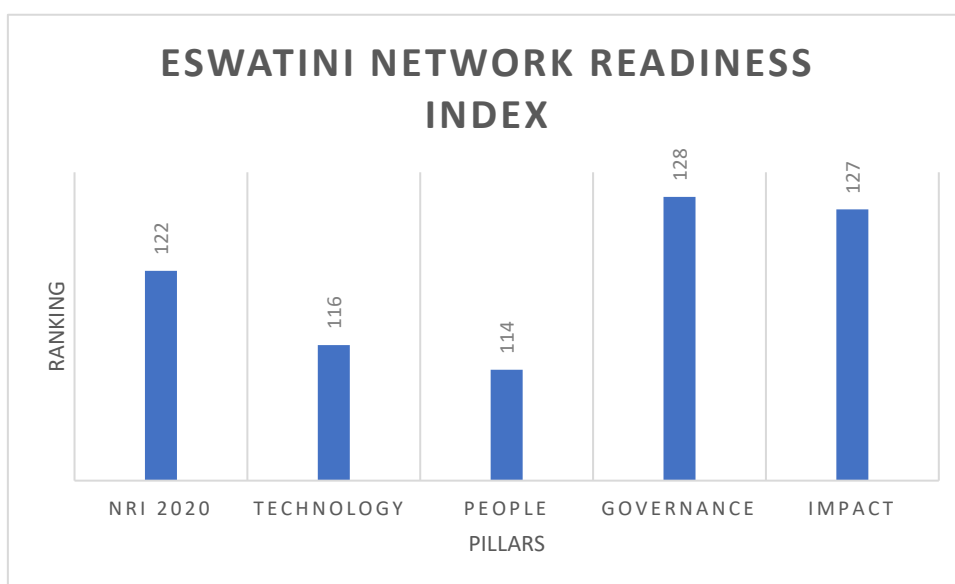


Figure 2-6 Eswatini network readiness index (source: networkreadinessindex, 2020)

The NRI's pillars are divided into various sub-pillars. According to the networkreadinessindex (2020), Eswatini ranks 74th out of 134 nations in terms of contribution to sustainable development goals, 133 in terms of regulation, 133 in terms of quality of life, and 134 in terms of economy.

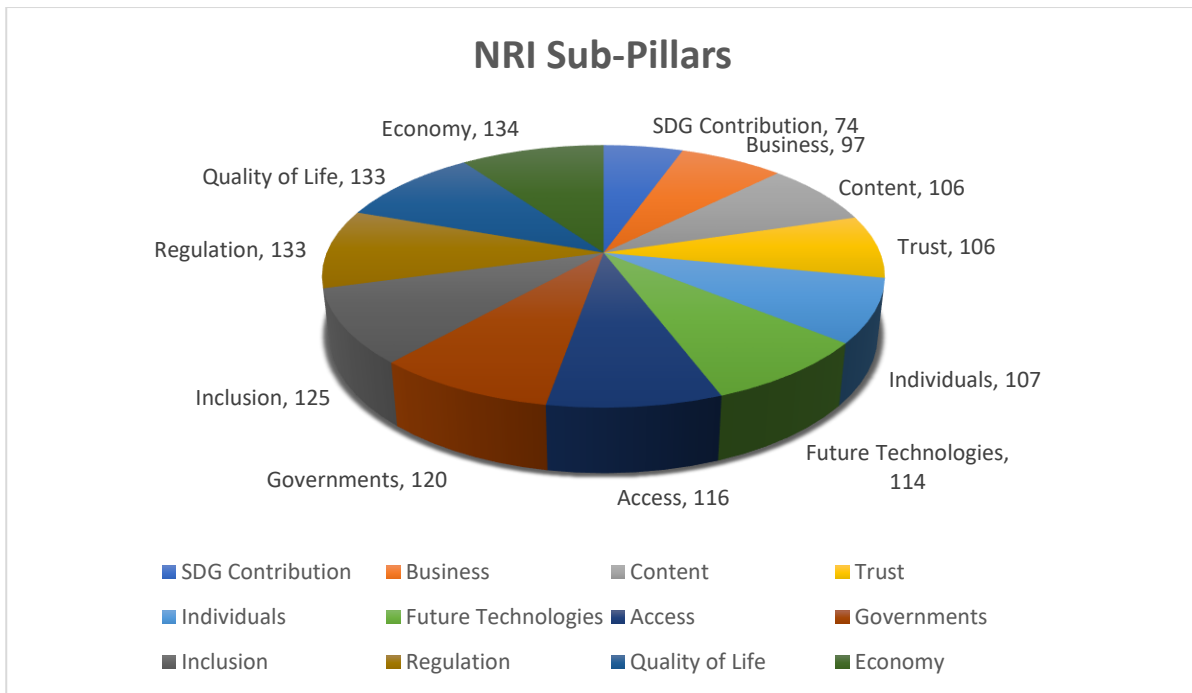


Figure 2-7 Eswatini NRI performance of sub-pillars (source: networkreadinessindex.org, 2020)

2.6.2. Market Structure

ESCCOM is the regulatory agency in charge of Eswatini's communications industry, which includes telecommunications services and networks, broadcasting services, postal services, and radio spectrum use and allocation. ESCCOM (2020) list the responsibilities of the regulatory agency as:

- Licensing all systems and services in the communications industry, including telecommunications, postal, courier and broadcasting.
- Managing the country's frequency spectrum and numbering resources.
- Facilitating the development of e-commerce.
- Approving and accepting communications equipment meant for use in the country.
- Protecting consumer rights within the communications environment.

- Managing competition within the sector to ensure a level playing ground for all players.
- Regulating retail and wholesale tariffs for communications services.
- Managing the universal access fund to facilitate access to communications services by all in Eswatini.
- Monitoring the activities of licensees to enforce compliance with the license terms and conditions as well as the law.

There is a growth of competition in the broadband market as there are new entrants into the internet service providers (ISPs) space. According to esccom.org (2020), the broadband market share stood as follows:

- 80% - Eswatini.net (state-owned entity)
- 17% - Real Image
- 2% - Touch IT
- 1% - Jenny Internet
- 0.5% - Other ISPs

The above statistics show that the state-owned entity (Eswatini.net) controls the country's broadband reducing competition within the broadband market. In Africa, affordability is still a major issue, and Eswatini is no different. Countries in the Southern African Development Community (SADC) are aiming to reduce communication costs, which bodes well for Eswatini's embrace of technology. MTN Eswatini and Eswatini Mobile are the two mobile firms currently operating in the country, with the former having a larger market share due to being the first to enter the mobile field.

2.6.3. Internet Use

Esccom.org (2021) list ten (10) internet service providers (ISPs), two (2) mobile operators and one (1) national telecommunication company. Fixed internet broadband services in Eswatini are provided through fixed-wired and fixed-wireless technology. The country experienced increased use of fixed-wireless as subscriptions in 2020 grew by 26% compared to 2019.

Internet Service Providers	Mobile Companies	National Telecommunication
<ul style="list-style-type: none"> • COMMIT • Computronics • Datanet • Eswatini Post and Tellecommunications Corporation (EPTC) • Jenny Internet Eswatini • POSIX • Prime Technologies • Reall Image • SwaziSat • TouchIT 	<ul style="list-style-type: none"> • MTN Eswatini • Eswatini Mobile 	<ul style="list-style-type: none"> • Eswatini Post and Telecommunications Corporation

Figure 2-8 Eswatini Telecommunications Companies

2.6.4.Mobile Network Population Coverage

The mobile network coverage in Eswatini is shared among two mobile communications services providers using 2G, 3G and 4G (LTE) technologies. According to esccom.org (2021), the combined network population coverage of the mobile companies in 2020 stood as follows:

Table 2-1 Eswatini Mobile Network Population Coverage

Technology	Network coverage
2G	98%
3G	90%
4G/LTE	60%

With strong investments in mobile IT infrastructure and cost reductions for both voice and data, Eswatini plans to increase population coverage for 4G/LTE to 85 percent by 2024. The Kingdom of Eswatini has begun to reduce the cost of data, and a major price decrease has been implemented over a three-year period, encompassing 2018, 2019, and 2020. For the period of 2018 to 2019, the cost per GB was cut from US\$57 to US\$28, according to esccom.org (2021).

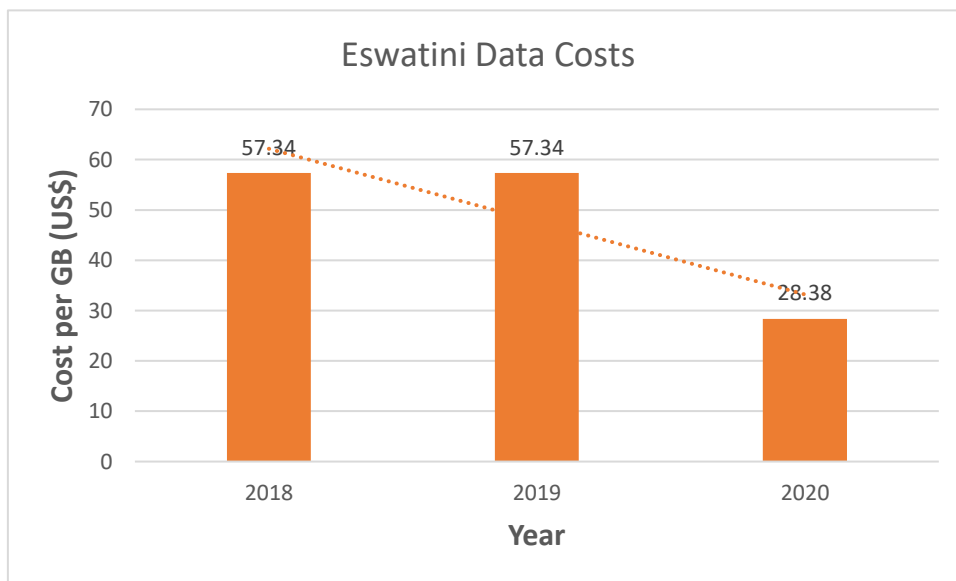


Figure 2-9 Eswatini Data Costs

2.6.5. EGovernment Services

The government of Eswatini has developed a portal that provides access to various government services such as e-health, e-tourism, e-agriculture, population register (gov.sz, 2021). According to gov.sz (2021), the government of Eswatini, adopted an e-government strategy whose objectives were:

- Strengthening intra-governmental communications and information sharing.
- Increasing awareness and knowledge of government intentions, policies and programmes.
- Empowering individuals and communities, providing convenient access to the government and government services.
- Improving the performance of government organisations and agencies.
- Improving government accountability and transparency.
- Presenting government as a single entity, providing multi-channel access to A

According to gov.sz (2021, p. 19), "e-government readiness strategies and programs will be able to be effective and "include all" people only if, at the very least, all citizens have a level of functional literacy and education, which includes knowledge of computers and internet use; where all citizens are connected to a computer; and where all citizens have access to the internet."

The Government of Eswatini aims to leverage on e-government practices to:

- Act as a vehicle for social change by securing co-operation, efficiency and knowledge and efficacy towards the meeting of the Millennium Development Goals (MDGs) and therefore lead to substantive gains in poverty reduction.
- Motivate and facilitate public as well as private institutions in response to standards in education, infrastructure and service provision.
- Facilitate the cohesion of effort between government and the private sector in order to optimise resource management and integration towards sustainable growth.
- Augment Eswatini's competitiveness.

- Create new economic sectors towards which investment and business ventures can be attracted e.g., eCommerce
- Support communication and openness and increase access to knowledge.

The Kingdom of Eswatini was ranked 128th out of 193 nations in the 2020 e-government development index (publicadministration.un.org, 2021). The 2020 e-government study assesses the scope and quality of e-services, as well as the state of telecommunication infrastructure and human resources. Denmark, Republic of Korea, Estonia, Finland, Australia, Sweden, United Kingdom, New Zealand, United States, Netherlands, Singapore, Iceland, Norway, and Japan are identified as leaders in e-government implementations (publicadministration.un.org, 2021). The e-government development index ranks Mauritius, Seychelles, and South Africa as leaders in e-government development and implementation in Africa.

The Ministry of Information and Communications Technology (MoICT) was established by Eswatini to steer the country's IT policy and offer ICT support to all government departments. The Government Computer Services (GCS) was founded by the Ministry of ICT to provide information technology (IT) services to all government ministries and departments, thus creating a private cloud for the government. GCS responsibilities, according to gov.sz (2020), are to:

- Develop of ICT policies/strategies, advice government computer use.
- Steering committee on all ICT-related issues.
- Provide ICT solutions to the government.
- Provide desktop (hardware/software) network support to all government Departments, provide hardware and software procurement
- Develop and maintain government systems.
- Ensure availability, security and confidentiality of all government data.
- Coordinate and advise ministries/departments on all ICT-related issues.
- Disaster Recovery Planning

The Ministry of Information and Communications Technology (MoICT) already has a full-fledged ICT department that runs a private cloud that provides a variety of electronic

services, including home affairs, e-education, e-health, e-commerce, government accounting systems, and a variety of other e-services. Government computer services host government solutions on an IBM mainframe and develop applications using software ag products. These are Natural/Adabas products, which are legacy environments that are difficult to combine with open technologies.

2.6.6.The National Data Centre

The National Data Center (NDC) in Eswatini was recently constructed under the supervision of the Royal Science and Technology Park. The NDC has been designated as one of the key components of the Kingdom of Eswatini's fundamental infrastructure for enabling e-governance activities. To ensure effective electronic delivery of G2G, G2C, and G2B services, the NDC will consolidate services, applications, and infrastructure. The National Data Center will provide these services through a common delivery platform that is seamlessly supported by core connections.

The NDC will offer a variety of features, including a country-wide central repository, secure data storage, online service delivery, a citizen information/services portal, disaster recovery, remote management, and service integration. The NDC essentially provides public and private sector cloud computing services through an infrastructure-sharing environment that models the entire cloud computing service model. The NDC is already up and running, hosting the government's IBM mainframe and other business operations. According to rstp.org.sz (2020), the mandate of the NDC include:

- Provide a safe and secure ICT ecosystem.
- To house a fault-tolerant ICT infrastructure that allows for any planned
- Activity without disruption to the critical load.
- To augment the Eswatini Government efforts of decentralization and E/m-services roll-out by implementing an enabling ICT infrastructure.
- To help organizations realize lower total cost of ownership (TCO) of ICT assets through offering a centralized ICT infrastructure.
- Provides quality products and services by ensuring a secure, real-time and reliable ICT environment.

- To always provide innovative and sustainable solutions together with customers through collaboration and deliver tailored end-to-end ICT solutions.

2.6.7. Proposed Conceptual Theoretical Framework

The research primarily employs the TOE methodology to assess the government of Eswatini's readiness to adopt cloud computing. The literature analysis provides a solid foundation for developing a conceptual model to assess the Kingdom of Eswatini's readiness to adopt cloud computing. The suggested conceptual model highlights the status of readiness for developing countries to adopt cloud computing by utilizing the TOE framework constructs of technology, organization, and environment. Rui (2007, p.55) says that "compared to previous theories, the TOE framework overcomes the supremacy of the technical perspective and provides a helpful analytical tool". Evaluation of past studies and studies on IT/IS adoption at the organizational level are often generated by employing TOE and DOI (Oliveira & Martins, 2011; Rui, 2007).

2.7 Chapter Summary

This chapter has offered a survey of the literature on the cloud computing phenomena, including its history and concepts. The Technology Acceptance Model (TAM), Diffusion of Innovation (DOI), and Technology, Organization, and Environment (TOE) Framework were all evaluated in order to add to the body of knowledge on innovation adoption. The state and use of ICT in the Kingdom of Eswatini were also identified, including figures for Internet use, e-government, and IT infrastructure such as the National Data Center. The default topics used in the research to assess the status of readiness for the Kingdom of Eswatini to utilize cloud computing were provided by the TOE framework. The research methodology utilized to perform the research is presented in the following chapter.

Chapter 3. Research Methodology

3.1 Introduction

This chapter delves into the research methodology utilized to perform the research, focusing on research methods, sample strategies, units of analysis, data collection, and data analysis methods in order to address the research subject at hand. The systematic and theoretical evaluation of the procedures utilized in a field of research is known as methodology (Johnson et al., 2007; Venkatesh et al., 2013). It's a method of arriving at conclusions based on what the researcher discovers during their investigation (Guba & Lincoln, 1994; perry et al., 1999). Qualitative and quantitative approaches are the two sorts of methodologies available (Johnson et al., 2007; Venkatesh et al., 2013). A research's technique is based on meaning, measurement, or a mix of the two (Johnson et al., 2007; Sechrest & Sidana, 1995).

This chapter also includes a narrative account of the data gathering and analysis processes used, as well as the development of codes, concepts, and patterns. Grounded Theory data collection and analysis stages are frequently done iteratively, according to Lewis (2015), to enable the emergence of patterns, themes, and correlations from the grounded data. The data collection was conducted from April 2021 to August 2021 using purposive sampling with 27 participants. Data was collected and analyzed using theoretical sampling and coding until theoretical saturation was reached, at which point theory began to develop. When the researcher could no longer glean new information from interviews, he deemed the point of saturation to have been reached.

3.2 Research Methods

The research used qualitative research methods, primarily non-numerical data, to collect and analyse data relevant to the Kingdom of Eswatini's technological, organizational, and environmental contexts. In order to build a theory that is matched with the research, it is critical to analyse the experiences and views of the many stakeholders. The data collecting was done in Eswatini to provide a realistic picture of the government's readiness to adopt and use cloud technologies.

Gaining understanding of a phenomenon cannot be reduced to numbers alone, and it necessitates drawing on the experiences and perspectives of those participating in the study. Qualitative data on respondents' experiences with cloud computing adoption in the Eswatini was gathered in order to discover factors that influence or impact clouding computing adoption. Qualitative research aims to produce new concepts and theories by systematically describing and interpreting topics or events from the perspective of the individual or population being examined and Viswambharan & Priya (2016) posits that the methodology used is determined on the questions being asked.

This research used an inductive technique to discover meaning in how people make sense of their environment and react to events. The goal of the inductive method is to create theory by advancing from individual observations to broad generalizations. Inductive research starts with unsolved questions and develops a theory that must be tested (Woiceshyn & Daellenbach, 2018). Technology adoption strategies don't follow a one-size-fits-all approach, but rather follow a key path via data that is grounded in context in order to get the necessary insights for analysis.

According to Astalalini (2013), the inductive technique categorizes data and forms patterns in order to generate theories. Phenomenology is the foundation of inductive research, which focuses on learning from experiences through the following steps: observing occurrences, analyzing patterns, forming themes, connecting the numerous themes, and establishing a theory with the goal of building a model (Woiceshyn & Daellebasch, 2018). The natural setting of Eswatini is used in the research to ensure that there is minimal loss in translation of the grounded data and the research questions are adequately answered. The research made use of interviews to obtain, analyse, and interpret the data content analysis of visual and textual materials, and oral history.

3.3 Population/Sampling

The population is defined as any cohorts that share a common set of features, according to Zikmund, Babin, Carr, and Griffin (2013), and the population relevant to this research will include senior managers who are involved in decision-making in the adoption of public sector innovations. Participants in the research were those who are actively involved in

government decision-making and have first-hand knowledge of government operations in the country. The research used a cross-sectional design to make observations of distinct populations at a single moment in time because it was a one-time survey. The limited time to conduct the research constrained the research to a cross-sectional design because repeated observations throughout time would be impossible.

3.4 Units Of Analysis

The core or frame of what or person is being researched is formed by units of analysis. The unit of analysis, according to research design review (2019), is the foundation for decisions made during the research and can comprise individuals or groups participating in in-depth interviews articles. Individuals involved in the deployment and use of government information technology resources were used as the study's unit of analysis. E-government strategy formulation, principal secretaries in several ministries, IT director accountable for government IT, and companies interfacing with government are all roles that these people play. These people were chosen because they were involved in the adoption of IT at the government level and as users of government services. This allowed the researcher to gain a thorough grasp of the government of Eswatini's readiness to utilize cloud computing.

3.5 Sample Size Selection

It is not possible to engage all of the units of analysis in order to reply to the research questions because this would be time-consuming and costly. It is vital to choose a sample that is typical of the population, and researchers frequently use sampling procedures to decrease the number of cases that must be addressed in the research (Taherdoost, 2016). Probability and non-probability sampling are commonly used in research, with the former assuming that each member of the population has an equal chance of being selected to be a part of the population and the latter assuming that each member of the population has an unknown probability of being selected to be a part of the population (Bhardwa, 2020).

To deepen the research, purposive sampling was used to identify the sample frame, with an emphasis on the managerial levels and attributes of the people and items. Purposive sampling is a method of qualitative research that requires enlisting the help of people or

groups of people who have extensive knowledge of the phenomenon and are available and willing to share it (Etikan, Musa & Alkassim, 2015).

Staff from government ministries were able to describe the existing situation in detail and make recommendations on variables impacting cloud computing adoption in the public sector. Words, phrases, and documentation were used to objectively express this. Furthermore, the research area was chosen due to the researcher's familiarity with and ease of access to the material.

Table 3-1 Targeted Population

Respondents	Target population	Sample size
Office of the prime minister	5	3
Principal secretaries	15	8
Directors	15	6
Government IT experts	10	8
Businesses	10	2

The saturation point, which indicates that enough data has been collected to make the proper observations, was used to establish the sampling size. When cohorts had similar responses and added nothing new to the research, the responses to the interview supplied the researcher with recommendations for determining stability or saturation. According to Saunders et al. (2017), saturation is a criterion for stopping data collecting in research because additional data does not add new concepts and is superfluous. The quality of the research is often jeopardized when the saturation point is not determined.

3.6 Assessing and Demonstrating the Quality and Rigour of the Proposed Research Design

Eswatini has conducted prior studies (national development strategy, national information and communication infrastructure, and e-government strategy), according to gov.sz (2020), and this will serve as secondary data for this research. Secondary data, according to

Ruggiano and Perry (2019), might enrich present studies because they may contain useful data. However, ethical considerations must be considered, as well as ensuring the relationship between former researchers and the units of analysis. Previous investigations were carried out by consultants from the Commonwealth and the World Bank (gov.sz, 2020), both of which are reputable institutions with the necessary knowledge.

Most developing countries are still burdened by legacy systems, and the data collected in prior studies may still be relevant. The study's units of analysis was diverse, since it included both long-serving public workers who have participated in prior studies and new civil servants who have recently joined the government. The research's validity was determined by the time lag between previous studies, which considers changes in technology and government policies.

3.7 Grounded Theory (GT)

The variables influencing the identification of the state of preparedness in Eswatini to embrace cloud computing for the public sector were studied using grounded theory principles. It was evident from the start that a qualitative approach was required to conduct exploratory study that would completely comprehend the underlying issue. GT allows researchers to gather and evaluate data at the same time, revealing the point of saturation early in the research process.

According to Tie, Birks, and Francis (2019), grounded theory discovers and constructs theory from grounded data, allowing the study to be interpretative of developing theories and allowing the researcher to return to the data to make sense of the emerging theories. Grounded theory differs from other qualitative approaches in that it employs the comparison method, theoretical sampling, memo-writing, and simultaneous and parallel data gathering, analysis, and coding (Berthelsen et al., 2018). When analysing and coding emergent data, it's helpful to use grounded theory. In the research, the steps are as follows:

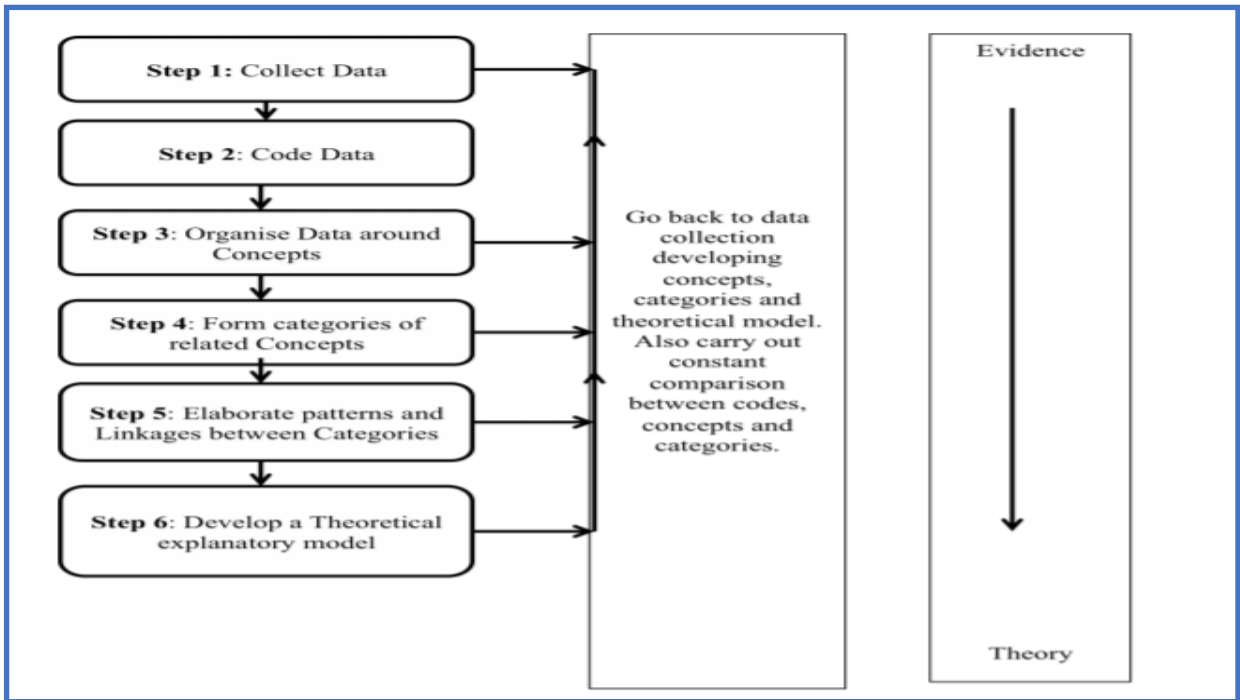


Figure 3-1 Ground Theory Analysis (GTA) steps (source: O'hogan & O'connor, 2015)

3.7.1.Data Collection

The data for this study was qualitative, and it was based on people's knowledge, experiences, and views on the degree of readiness of Eswatini to use cloud technology. The information gathered was based on the Eswatini public sector's technological, organizational, and environmental characteristics. The government has selected information technology as the major driver for economic growth to be competitive and enhance Eswatini's economy.

Because of the accessibility of government senior officials and the institutional memory of this researcher during his time in the civil service, the government of Eswatini supplied the appropriate research site. The researcher was able to grasp the talks with respondents as well as create the emergent theory thanks to the use of deliberate sampling for data gathering. To avoid accidental bias, the researcher used abstract amazement, which requires the researcher to suspend his or her institutional memory about the phenomenon

(Stoupe, 2016). The majority of the questions that explored replies were engaging and prompted in-depth discussions on a variety of topics.

- **Interview Process**

The data gathering sources and their structure are described in this section. Grounded theory assists researchers in approaching phenomena with openness, acceptance, and curiosity (Stoupe, 2015), as well as applying Glaser's "everything is data" premise (2007). This approach directed the researcher to collect any type of data as long as it was useful, and it aided in the formation of abstraction in the early stages of interviewee engagements. Interviews and document analysis were used to gather information. Interviews have always been used by previous researchers and are a key qualitative data collection method that allows the researcher to ask in-depth questions about the topic as well as follow-up with the participants on the topic (Charmaz, 2003).

In contrast to other data collection methods such as surveys and questionnaires, interviews give the researcher direct control over the construction of data. According to Ellis (2016), the main advantage of interviews is that they have the potential to produce deep, rich data because they explore topics in great detail. Interviews allow the interviewer to respond to and probe comments, allowing the interviewer to customize the conversation to what they hear (Sarandakos, 2012). Interviews and document analysis provided the core data collection, and these were utilized to saturate both the main and final rounds of data abstraction.

- **Initial Interviews**

Interviews formed the fundamental and most intensive data collection to develop the concepts and discover the emergent theory. The interviews were conducted once with a particular interviewee due to time constraints and costs. The preliminary questions were prepared to allow a conversational engagement and assist interviewees to converse naturally and free. This allowed the interviewee's thought process to logically follow the line of questioning. Semi-structured interviews were used to allow for in-depth discussions with spontaneous follow-up questions.

Structured interviews were also conducted to keep interview sessions within the scope and manage the data collection not to overwhelm the interviewer. Where possible, the interview questions were sent through to the respondents via email with the request to allow the participants to familiarize themselves with the issues to be discussed. Telephone sessions were conducted where possible to minimize the costs as well observing the covid-19 regulations.

The interviews took place in the respondents' offices for one hour to ensure that their work schedules were not disrupted and that the Covid-19 regulations were followed. The researcher introduced himself and offered a brief summary of the interview's goal during the first contact with the respondents. Following this introduction, qualifying questions were asked to elicit more information about the respondents' knowledge of the issue.

- **Interview Guidelines**

The questions were prepared in a logical and cohesive order and were based on the TOE (technical-organizational-environmental) linked aspects. Follow-up questions were included and asked solely to allow interviewees to express their own opinions and viewpoints on certain issues of interest to the researcher. The following were the primary themes of the interview guide:

- General questions to calm both the interviewer and respondent.
- Background information about the ICT landscape of government.
- Information about government ICT policies
- Cost of government ICT services
- Interviewees' perceptions about technological factors.
- Interviewees' perceptions about organisational factors.
- Interviewees' perceptions about environmental factors.
- Interviewees' perceptions about the barriers to ICT transformation
- Interviewees' perceptions about the current government ICT initiatives

3.8 Validity and Reliability

The validity and reliability of qualitative research are important characteristics of research quality because they reassure readers that the research's conclusions are legitimate and trustworthy. When working with primary data, researchers might become subjective, influencing how the data is interpreted (Thakur & Chetty, 2020). It is impossible to trust research investigations that do not regularly yield valid outcomes. According to Haradhan (2018), reliability refers to the assurance that identical information would be revealed by alternative studies, whereas validity refers to the level to which the researcher is able to tap into the participant's knowledge and experience.

3.8.1. Construct Validity

In testing reliability of the data, the researcher utilised triangulation, where questions on the same construct was, were asked in different ways e.g. For the technological construct the question of the cost of IT infrastructure was posed to two interviews as follows:

Interviewee 1: “what is your perspective on the cost of technology infrastructure on the intention to adopt cloud computing?”

Interviewee 2: “do technological factors such as cost have a positive or negative impact on the adoption of cloud computing?” Please explain.

3.8.2. Internal Validity

Internal validity is the degree of certainty that the causal link under investigation is reliable and unaffected by other factors or variables. To establish internal validity, probing questions were utilized to construct cause-and-effect relationships on the responses of interviewees. The following probing questions were asked to establish the relationship:

Question 1: “how does the cost of maintaining the in-house applications impact the desire to stay relevant to modern technologies?”

Question 2: “why does the cost of maintaining in-house applications considered as an important factor when contemplating the adoption of cloud computing?”

3.8.3.External Validity

The extent to which the findings drawn can be extrapolated to a larger population is determined by external validity (Findley, Kikuta & Denly, 2020). It describes how far the research findings can be extrapolated to the entire government and other stakeholders. The government can be seen as a catalyst for cloud technology innovation and adoption inside the public sector, as well as the ideal trend by the larger society, particularly in developing countries. The questions were created in such a way that they could be utilized in a similar environment outside of government and the results could be generalized to a larger context, despite the fact that the research was conducted at the government level.

3.8.4.Reliability

The consistency of the answer and replication of the same results by different researchers are used to determine the research's reliability (Findley, Kikuta & Denly, 2020). The research's credibility was established by comparing government officials' comments to government policy declarations. The researcher was unable to organize a due diligence committee to help supervise the process due to time constraints and the covid epidemic. By default, government personnel reflects government policy, hence the consistency of responses from several departments was used to assess the reliability.

3.9 Measurement and Coding of Constructs

This study's measurement items were created in conjunction with a literature evaluation of the TOE framework. In creating the interview questions, this research identified three TOE factors with a total of 14 measuring items after analysing a large body of literature.

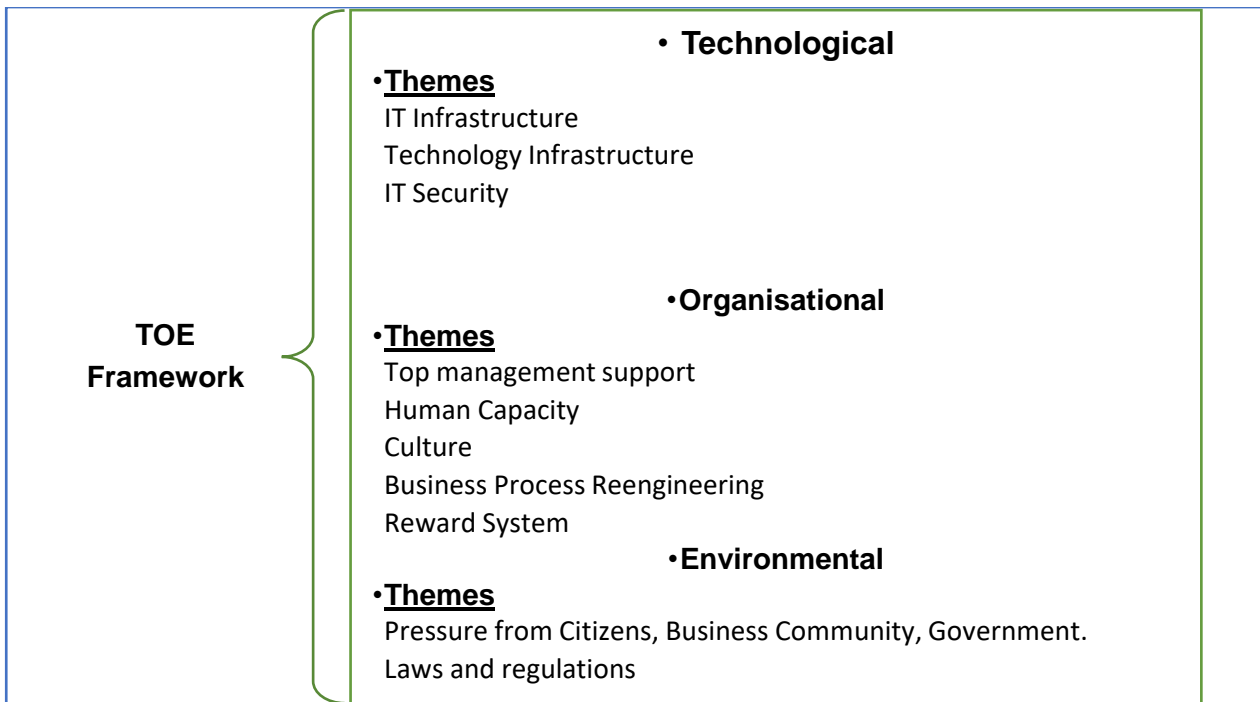


Figure 3-2 Readiness Measurement Variables

Each construct's variables describe their entire competency and impact the shift in readiness state. These criteria make up the TOE framework's measurement model for determining Eswatini's readiness to use cloud computing.

3.10 Dependent and Independent Variable

Variables are important to understand because they are the basic units of the information studied and interpreted in research studies. Researchers carefully analyse and interpret the value(s) of each variable to make sense of how things relate to each other in a descriptive study or what has happened in an experiment.

- Dependent Variable**

The dependent variable is a variable whose value may change as the value of another variable changes (Shukla, 2018). The state of readiness of Eswatini, which is determined by the change in the value of the measurement variables, is the dependent variable in this study.

- **Independent Variable**

The independent variable is defined as the variable of which value affects the value of another variable (Shukla, 2018). The attributes of the TOE framework constructs will form the independent variables of the research study.

3.11 Applied Ethics

Ethics in research, according to Fouka & Mantzorou (2020), comprises the protection of participants, including researchers, in their daily work as well as the publication of the research findings. Ethics are critical for any research's legitimacy, and Fouka & Mantzorou (2020) describe ethics as the dynamics that entail decision-making about what is wrong and right. This researcher's ethical considerations include:

- **Informed consent** – Permission was obtained for the researcher to collect data from multiple government ministries. As the curator of government business, the prime minister's office gave access to all ministries (see Appendix B). To relieve fears about non-compliance with Eswatini's data privacy rules, the research's objectives were outlined, and probable findings were provided. All interviewees were given the researcher's contact information.
- **eliminating the risk of harm** – participants were assured that they would not be subjected to any form of social disadvantage ensuring that they are protected from discomfort. The researcher declared any desire to record the conversation and the consent of the interviewee was solicited and consensus was reached on recording any conversations.
- **Protection of anonymity** – Participants' anonymity was preserved and used as necessary. To safeguard the interviewees' identities, pseudo names were employed in the memos (see Appendix A).
- **Protection of confidentiality** – All data collected, and research findings adhere to strict confidentiality rules, in particular where the information is not available in the public domain. Non-disclosure agreements were willingly signed when a participant requested them.
- **Withdrawal of participants** – participants had the option to withdraw at any time during the study because participation is voluntary.

- **Avoiding deceptive practices** – participants were asked clear and specific questions. The research employed all authorised resources to ensure that fraudulent methods were not used.

3.12 Chapter Summary

This chapter has gone over the technique and methodologies used in the research in great detail. The research approach was chosen to correspond with the research objectives, which aim to capitalize on the participants' knowledge and experiences in their environment. The grounded theory was found to be the most suited since it enables the collection of qualitative data through structured and semi-structured interviews. The interviews allow for a more in-depth discussion of the findings, which are presented in the next chapter. The data analysis and findings of the research are also presented in the next chapter, using the TOE framework to categorize the factors evaluating the state of preparedness to embrace cloud computing in Eswatini.

Chapter 4. Data Analysis and Findings

4.1 Introduction

This chapter presents and analyses each of the TOE Framework factors and the constructs based on the interviewees' experiences and knowledge. The analysis reflects the thinking and experiences of the key stakeholders. Various factors constrained the reach of the researcher, and such factors included the covid-19 restrictions with the total shutdown of various activities and the political unrest in Eswatini. These prevented the researcher from getting a wider reach of the participants.

4.2 Overview of Qualitative Stage

This gives an overview of qualitative data analysis and the processes that were used during the data collection stages. Interviews were used to help the researcher obtain a better understanding of the phenomenon as well as the interviewees' perspectives. This research was done at the interviewees' work offices with an hour's constraint to set the frame of mind of the interviewees on the themes under study. Interviews, according to Aldhaen (2020), allow the researcher to uncover measurable and accurate accounts of the conversation topic, allowing for the development of trustworthy information.

In-depth probing and recording of the interviewee's voice, as well as how they tie their emotions to meaning and experiences, is possible with qualitative interviewing (Nayak & Narayan, 2019). Semi-structured interviews were used, and the themes were developed based on the research's conceptual interests. The questions were broad in nature, avoiding probing the interviewee's technical knowledge while allowing them to express their opinions on a specific topic with minimum help from the interviewer. The first engagement of the interview reviewed the background and demographic information of the interviewees to alleviate the stress that typically arises with qualitative interviewing (Aldhaen, 2020). Subsequent questions ascertained the interviewee's perception regarding the TOE factors that determine the state of readiness to adopt cloud computing in Eswatini.

4.3 Data Analysis Procedure

Grounded theory (GT) methodologies, according to Tie et al. (2019), unpack the data analysis and results into a set of interrelated concepts that comprise a substantive theory. The essence of GT is the creation of theory based on facts gathered through a rigorous method to ensure that the research is of high quality.

The TOE framework's technological, organizational, and environmental factors were coded and used as the initial codes. The primary data was then used to match patterns, and developing themes were categorised into new codes as appropriate. The following analytical steps were used to examine the data:



Figure 4-1 Data Analytical Steps

The data analysis is an iterative process, with each iteration providing the researcher with a better understanding and explanation. Several revisions were made during the analytical

process, particularly between stages 1 and 3 where the TOE factors were used to drive the identification and formation of links between concepts and themes.

4.4 Analysis of the Technological Factors

The technological factors were analysed based on IT infrastructure, technical infrastructure, IT standards, IT security, IT skills and internet use.

4.4.1.IT Infrastructure [ITINFRA]

The state of preparedness of an organization to embrace technology or any innovation is influenced by IT infrastructure, which is a major dimension of the technical factor. To successfully implement technologies and increase the efficiency of delivering electronic services, adequate IT infrastructure at both the national and organizational levels is critical.

The head of government business at the prime minister reiterated the importance of the IT infrastructure *“the government has taken a policy decision to compel all government ministries to move towards a paperless office and ensuring that services are available 24/7/365”*.

In an interview with one principal secretary stated that *“information and communication technologies (ICTs) have become a critical component of the public sector in many developing countries around the world. Nowadays, ICTs have been recognised for their potential to transform governments by enhancing the efficiency and effectiveness of the delivery of public services by governments. The government of Eswatini has developed an e-government strategy that aims to improve the delivery of e-services and the lack of IT infrastructure has been a barrier to its implementation”*.

IT infrastructure enables government agencies to communicate information and successfully participate in reform projects. According to the statistics, the government lacks IT infrastructure that would allow federal agencies to share information. Before considering the adoption of change initiatives, the government will be required to invest in new equipment and train its people.

Another principal reiterated that *“government is investing in IT infrastructure that is vital to deliver improved services, minimise efforts and reduce human errors yet there are not enough IT professionals within government.”*

The Director of IT Services stated during the interview that *“the government has wisely setup a directorate whose mandate is to provide centralised IT support for all government ministries i.e., Network support, desktop support, IT procurement, and application development. But these services are compromised by lack of budget to evolve with modern technologies as we remain with legacy systems that are not interoperable making it difficult to share information with other stakeholders outside government”*.

Another aspect that the Director of IT Services highlighted is that *“the lack of budget makes it difficult to build the necessary human capacity to maintain and improve the current architecture. The government is losing valuable expertise as the IT personnel always move to the private sector for better salaries and incentives”*.

Further, the Director of IT Services highlighted that *“the government employees are resisting introduction of IT-based technologies due to fear of losing jobs. The government has introduced a biometric attendance system to improve staff attendance and this receiving great resistance.”*

In an interview with another principal secretary, he said that *“some employees have been working at their jobs for over 30 years and are close to the retirement age, so they find it difficult to learn new technology at this stage of their lives. Thus, these employees resist change”*.

A majority of interviewees highlighted that there is a great need to acquire the appropriate IT infrastructure to deliver quality services. The Director of IT Services stated that *“high-speed broadband with fibre optic cables and mobile technology has improved coverage in the country but the cost per gigabyte is one of the most expensive in Africa. Whilst there is enough IT infrastructure to deliver basic e-services the high-cost of data is making it difficult for ordinary citizens to access government services”*.

4.4.2. Technical Infrastructure [TECHINFRA]

According to Cantu (2017), the availability of infrastructure as an enabler for the adoption of IT projects such as cloud computing is critical to the nation's development and successful public policy. Eswatini's reliance on South Africa and Mozambique for energy and internet connection is a major weakness in the country's technical infrastructure.

Most responses from an interviewee's emphasised the importance of a well-built and robust technical infrastructure. The principal secretary of the ministry of public works and transport said that *"road networks and communication backbone are essential for the successful IT transformation and adoption of emerging technologies. The adequate technical infrastructure is essential to implement transformation, therefore, our ministry is making arrangements to acquire appropriate and up-to-date hardware, machinery, and equipment"*.

Director of the Ministry of Commerce, Industry & Trade explained that *"the Kingdom of Eswatini is a developing country thus, our technical infrastructure is not adequate. Our reliance on South Africa and Mozambique for basic infrastructures such as electricity and internet are a major concern for the government"*.

The government of Eswatini strategic roadmap (2018 – 2023) states that the government has invested in various infrastructure such as new airport, improved ICT infrastructure, improved water quality, and rural electrification program improving access to energy (gov.sz, 2021).

The Eswatini e-government strategy states that *"government is aware that an efficient technical infrastructure contributes to the economic growth by lowering domestic production costs, enhancing economies of scale in the production process and creating process and creating economic opportunities. Road transport is the main communication mode"*.

Further, the Eswatini e-government strategy highlights that *"the leveraging of an e-government strategy to achieve a reform of public administration and the manner of how it interacts with society should be one and not the prime objective that a well-crafted e-government strategy should achieve"*.

In the case of e-government, a government's decision to embrace an e-government strategy should be viewed outside the confines of changing the way public institutions offer services and are held accountable (publicadministration.un.org, 2021). By establishing e-government as a crucial propellant for achieving an information society and an information economy, it provides the platform and motivation for continued economic and social progress.

4.4.3.IT Security [ITSEC]

The key technological aspect that has been cited as a negative in the shift from an on-premises system to a cloud-based service is security. According to Ahmed and Hossain (2014), security is a fundamental concern in any cloud computing environment. Cloud computing uses remote cloud servers to store sensitive data, necessitating the usage of identity management and authentication. *"It is difficult to determine the dependability of cloud services"* was the most common reaction to IT security concerns. The respondents were concerned about information confidentiality, and the government's dearth of cyber security expertise made the government executives skeptical about cloud computing adoption.

One manager with the of e-government office raised a concern of security when he said that the *"government is concerned about having data residing out of the country as this may compromise state security. As much as cloud computing has benefits, the issue of data sovereignty is a major drawback at the present moment to move from on-premises to the cloud"*.

The Director of IT Services response to IT Security was *"most government ministries do not comply to any IT standards and moving to cloud services would be beneficial to adherence of IT standards as there would be little for the employees to do on-premises as most processes are done on the cloud"*.

This brought up the topic of IT Standards, which should be considered while assessing the degree of readiness of technical creations. According to Jiang, Gao, Zhao, and Chen (2020), the industry 4.0 era will rely on technology standards to successfully deploy complex technologies such as artificial intelligence. Current IT standards must be considered in order

to ensure that they are consistent with best practices. The interviewees correctly identified the issue of IT standards, which was an emergent theme of the technology factors.

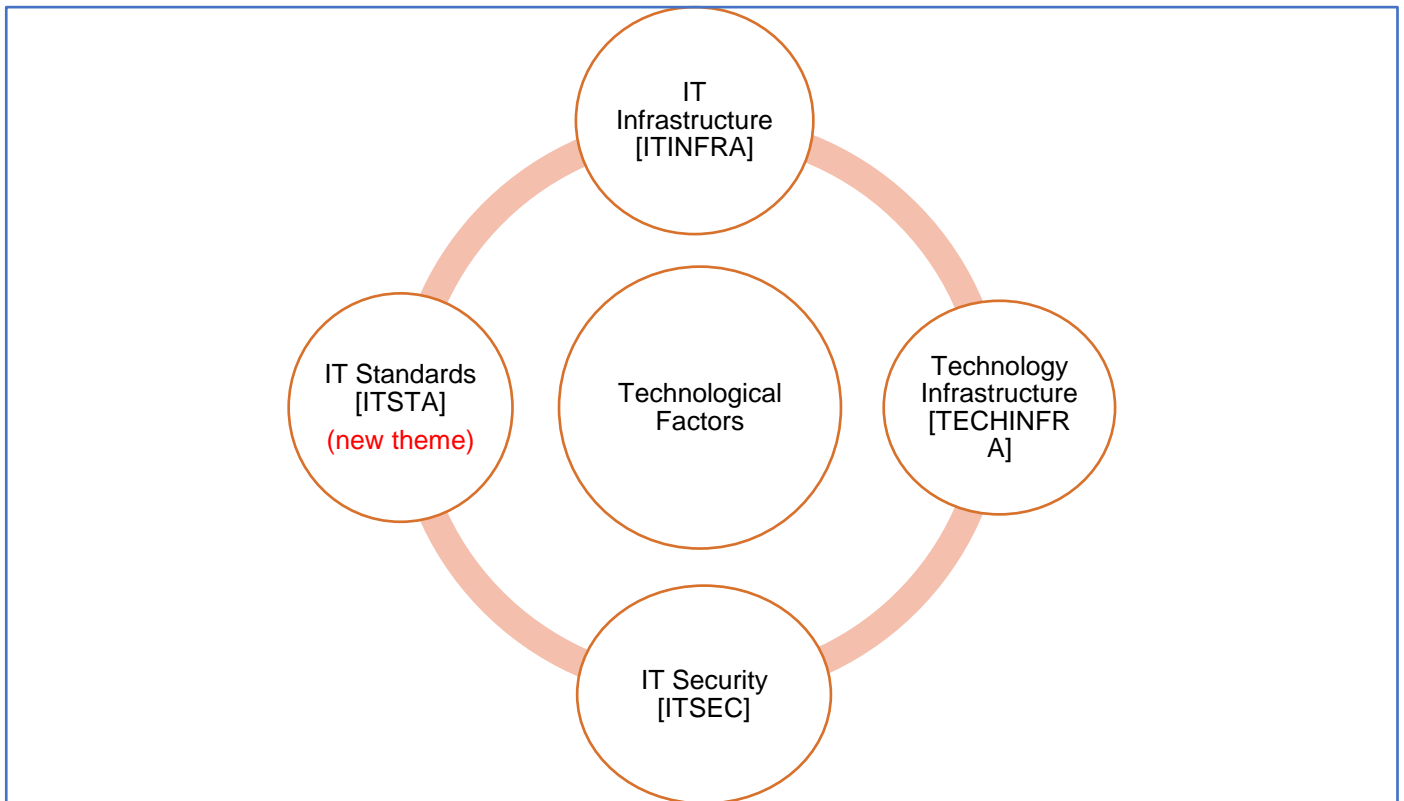


Figure 4-2 Technological Factors Coding

Various themes that measure the degree of readiness are included in the technological elements, and during the interviews, an additional topic from the pre-determined themes was recognized. When discussing the use of cloud computing, IT standards emerged as a new issue to explore.

Table 4-1 Definition of the Themes of the Technological Factors

Themes of the Technology Factors	Coding	Theme Definition
IT Infrastructure	ITINFRA	Government has setup in-house IT support with investment in networks and application development. These resources however remain legacy as there is no budget to transform to modern IT technologies.
Technology Infrastructure	TECHINFRA	The government is dependent on external stakeholders for technology infrastructure such as electricity and the internet. This makes the cost of adopting technologies much expensive.
IT Security	ITSEC	Security is at the core of any technology adoption. For cloud computing, there is a risk of losing control of the data as it is resident outside the country.
IT Standards	ITSTA	Guides for the successful implementation of innovation and artificial systems

4.5 Analysis of the Organisational Factors

The internal resources of an organization that have a large impact on the acceptance and implementation of an invention are among the organizational factors outlined in the TOE framework (Al-Hujran, Al-Lozi, Al-Debei & Maqableh, 2018). Firm size, top management support, organization structure, organization culture, reward system, availability of human capabilities, and slack resources are some of the organizational aspects that must be addressed while adopting an innovation, according to Al-Hujran et al., (2018).

4.5.1. Top Management Support (TMSP)

Eswatini's government is hierarchical, and decisions are made from the top-down, with power concentrated in the hands of those at the top. According to McKinnie (2016), an invention is unlikely to be accepted if top management is not dedicated to the project. As a result, senior management support is seen as one of the most important variables that can help or impede the acceptance of change projects. It is expected to create an enabling atmosphere by making decisions that encourage knowledge production, employee awareness, and self-efficacy (Al Shaar, Khattab, Alkaied, and Manna, 2015).

Responses from the principal secretaries alluded to the fact that there is greater top management support for IT transformation as the country has adopted information technology as a pillar for economic stimulation. One of them alluded to the fact that *“the ministry of finance has availed budget for IT transformation, and it is now in the hands of the technocrats to formulate a future environment for the country. This may not be enough, but it can set the baseline for the adoption of technologies that would be used to improve the economy of the country.”*

The Director of IT Services shared his sentiments and said that *“commitment of top management drives the change process and if top management is committed to implementing change, it gets done predominantly. Otherwise, people resist leaving the comfort zone and adopting new ways of doing things”*.

Another principal secretary said that *“for government to successfully implement new technologies, there must a full understanding from the top on the objectives of the change otherwise lack knowledge and support makes changes less effective”*

Interviewees agreed that governance skills and knowledge levels play an important role in transformation. Responses from the prime minister's office emphasised that *“for top management to successfully implement changes, there must be full adherence to governance standards, knowledge, competence and organising capacity to implement it effectively”*.

This remark sparked a new conversation about organizational variables, emphasizing the significance of good governance principles. According to Apec (2011), governance in the public sector refers to the methods through which goals are set and achieved while adhering to ethical norms. The topic of governance emerged as a new theme during the TMSP debates. To reflect governance as one of the themes that must be considered for successful cloud computing adoption, this new theme was coded as **[GOV]**.

4.5.2.Human Capacity (HCAP)

Employee acceptance and acknowledgement of changes is dependent on their capacity to do their jobs to the desired levels, and their skill levels determine how genuine and authentic the change is perceived (Collings, Nyberg, Wright, & McMackin, 2020).

The interviewees raised a major concern pertaining to the lack of human capacity to drive government IT initiatives. In one of the interviewees, a principal secretary commented that *“government has enough human resource overall but there is a lack of skilled human resource as we do not have enough qualified, trained and skilled personnel”*. He further lamented that *“government recruitment is not based on merit, but corrupt elements often take over and influence the recruitment processes”*.

Often, the government is alive to the fact that human capacity development is a very crucial element to drive transformation and is a measure determinant of the readiness to adopt innovation. This however requires investment in training programmes for the public sector. One officer from the prime minister’s office alluded to the fact that *“we are much alive to the fact that there is a general lack of ICT skills within government and human capacitation programmes must be put in place for successful adoption of cloud computing or any other innovation”*.

The Director of IT Services being at the operational level of government IT support stated that *“training is very important to improve the level of service being provided to government ministries and we have formulated a training programme to improve the skills of our engineers, in particular, the IT security section and application development team to build the necessary application programming interfaces (APIs) for information sharing”*

Another principal secretary highlighted that the “*government has engaged several partners and the republic of China on Taiwan and government of India have donated sponsored IT programmes to improve the IT skills of the government employees. However, the poor reward system is unable to retain the skills as the competent staff often leave government employ and join the private sector*”.

4.5.3. Business Process Reengineering (BPR)

The Eswatini government is heavily reliant on routines and patterns that have become the accepted standard. Government ministries' business processes will be difficult to change since they have been ingrained in the culture of service delivery. Radical adjustments will be required to transition the public sector to cloud services. Government authorities, on the other hand, see the transition to cloud computing as a major problem. The interviewees expressed grave worries about present ministry business operations.

The Director of IT Services said that “*the current business processes are suitable for on-premises solutions, and it will be difficult to adopt cloud services as they would not fit into the current business processes. There will be a need, therefore, to review the current business processes and ensure that they reflect the current operations of the ministries*”.

The prime minister's office also raised a concern on the relevance of the current business processes “*we have business processes that were crafted a long time ago and with no cloud in mind. The adoption of cloud will therefore call for a review of the business processes to be in line with the modern technologies*”. The prime minister's office further lamented the lack of chief information officers in the various ministries to drive the transformational agenda. One officer commented that “*government has failed in the past years to re-engineer the business processes of the ministries and moving to the cloud will have to be done in a fit-for-purpose manner not just because a new technology has emerged*”.

One of the principal secretaries stated that “*business process reengineering must be done first although, for large, complex government organisations such as ministries, this will be a daunting task and will take time to complete*”. Gov.sz (2021), states that the Eswatini e-government strategy stipulates that “*there shall be chief information officers (CIOs) in each*

government ministry that will be the change agent and align the technology adoption of each ministry with the needs of the particular ministry”.

The CIOs will facilitate the implementation of a reform agenda through provision of specialist inputs as well as by developing a time-bound and costed action plan for sectorial transformation. The e-government strategy further states that the “*CIOs will assist government departments in devising and implementing a prioritised transformation agenda by employing principles of organisational project management and change management”*, gov.sz (2020).

The Ministry of Public Service whose mandate is the employment of civil servants is concerned with the slow pace by the government in undertaking the business process reengineering. The principal secretary opined that “*employees by their nature feel uncomfortable with new ways of doing things and often resist change. The business process reengineering exercise would create awareness amongst the civil servants on the transformation agenda. But at present, the civil servants are not ready to change, and they may resist moving operations to the cloud”*.

To impact the thought process and acceptance of the change, it is clear that the vision and objectives of the change effort must be successfully communicated. According to Jalagat (2016), efforts to change frequently confront problems connected to resistance; as a result, procedures must be put in place to reduce resistance and establish an environment that promotes a smooth transition. One of the strategies that can be used to handle opposition and increase Eswatini's readiness to adopt cloud computing is business process reengineering.

The interviews on BPR were lively and elicited a new point of discussion among the organizations when it comes to cloud computing in the public sector. Change management arose as a new theme, which was coded as [CHMNGT]. The degree of change management is crucial in determining whether or not employees accept new technologies. According to Amborski & Heaberg (2013), cloud technologies necessitate a shift in thinking and how an organization responds to daily business difficulties as well as how it manages its employees.

4.5.4. Culture within Government (CULT)

In terms of culture, the majority of interviewees expressed concern about how things are done at the government level. According to Striteska & Sein (2021), numerous public sector organizations are dealing with inefficient and ineffective service delivery and are now seeking innovative strategies to improve service quality. The need to deliver on the political mandate has overcome the fear of changing culture, and hence the culture within government ministries will change.

The Prime Minister's Office opined that any transformation must be in line with the needs of the people but be cognisance of the ubiquity of information technology. One officer commented that *"the current environment is based on the needs of the people and the move to the cloud may receive resistance as it would want people to change their culture which is embedded into their traditions and organisations."*

Continuous adaptation of a company's strategy must accommodate emerging changes but must be aligned to the context. One principal secretary stated that *"culture influences the behaviour of employees and managers, and their behaviour leads to the adoption or rejection of transformation agenda"*. Most interviewees see culture as a barrier to change and as an important metric to measure the state of readiness to adopt cloud computing in Eswatini and in most developing countries. According to oecd.org (2021), policymakers need to consider the following:

- Culture as an economic and social investment, not simply a cost.
- Culture proofing a range of policies to create a level playing field for creative professionals and firms in terms of access to employment, innovation and business support measures.
- Mainstreaming culture is an integral part of wider policy agendas, such as social cohesion, innovation, health and well-being, the environment and sustainable local development.
- Improving internationally comparable statistics and the evidence base on the scale, scope and impacts of cultural and creative sectors, both as a driver of economic growth but also well-being, social cohesion and sustainability.

- Building the capacity of national and local governments to integrate culture into broader economic and social development strategies, in line with the sustainable development goals.

An interview with one of the principal secretaries highlighted that *“public organisations generally have strong bureaucratic orientation, avoiding both change and risk. Bureaucratic culture is a barrier to change and regardless of the pressures on organisations to change, organisational culture remains a barrier to change”*.

According to gov.sz (2021), the strategic direction of Eswatini as stated in the e-government strategy states that Eswatini is focused on decentralisation and local government to strengthen the different aspects of public reforms. There is therefore bound to be a change in culture to influence the new ways of doing things.

4.5.5. Reward System [RWSYS]

To adopt and sustain innovations, transformation necessitates the availability of the requisite knowledge. Employees are expected to have the technical knowledge and skills needed to execute cloud computing. The interviews found that a majority of competent workers quit the public sector to work in the private sector due to the government's low remuneration program.

The Director of IT Services stated that *“there is a high attrition rate within the ICT cadre in government as people are attracted by the high salaries earned in the private sector and this often leaves the government with no local expertise forcing reliance on consultants. These consultants become expensive in the long run making it unsustainable for the government to keep them”*.

One participant among the principal secretaries lamented the inferior remuneration of the ICT employees *“government needs to introduce financial compensation and other reward schemes such as bonuses to attract the much-needed skills into the public sector. There is a lack of incentives for civil servants which often results in people leaving government and those remaining lacking motivation”*.

The general view of the interviewees is that there should be rewards for exceptional employees. One principal secretary said that the *“government is committed to rewarding high performers and there are policy reforms to that regard”*. For public sector organisation globally, the hierarchies and governance structures are often more visible than in private sector organisations (eggars, 2015). The Director of IT Services said that *“the digital transformation of the Eswatini government is concentrated on the heads of department of the various ministries and barely includes the rest of the employees”*.

4.6 Analysis of the Environmental Factors [ENV]

Environmental responses were not as detailed as the other aspects, and interviewees agreed that Eswatini's rules and regulations should be modified to allow for the adoption of innovations such as cloud computing.

4.6.1.Laws and Regulations [LWREG]

The legislation that is anticipated to guide the adoption and usage of technology such as cloud computing is not in place, according to gov.sz (2021). The Eswatini government has drafted bills that are supposed to be passed into acts of parliament, but they have been on hold for the past three (3) years. The following bills have been introduced: - Data Protection Bill - Electronic Transactions Bill - Computer Crime and Cyber Crime Bill

The Director of IT Services stated that *“currently there is no cloud policy to guide the adoption of cloud computing, and this will make it difficult for employees to use cloud services outside a policy”*.

The lack of suitable legislation, according to the principal secretaries, is an impediment to cloud computing adoption. The lack of legislative leadership was a frequent response to the impact of environmental conditions on Eswatini's willingness to adopt cloud computing. All of the comments alluded to the three-year-old measures that have been pending in parliament.

4.6.2. Pressure from business and citizens [PRESS]

A majority of the interviewees cited the pressure from citizens and the business sector as prominent drivers to undertake a digital transformation in government. The office of the Prime Minister said that *“the business sector has tasted the affordances of e-commerce and now they want the same from the public sector”*. Further, the Principal Secretary in The Ministry of Home Affairs observed that *“the citizens want to use their mobile devices to access government services, and this can help to curb the long lines of people often waiting to get services”*.

One of the directors of the Ministry of Commerce, Industry and Trade said that *“in our endeavour to attract foreign direct investment, we have met challenges of the absence of the appropriate legislation that guide cloud computing as multinational companies trade globally leveraging of cloud computing”*. There is pressure from businesses for the government of Eswatini to adopt cloud computing, but the absence of the legislation is proving to be a barrier.

The ubiquity of mobile devices especially cell phones have seen the citizens wanting to consume government services from anywhere anytime. In an interview with one principal secretary, it transpired that *“citizens want to apply for national ids, passports and other certificates from the comfort of their homes. But due to the challenges of the on-premises system being unable to have a wider geographical reach, the ministry is unable to satisfy the need”*.

Another principal secretary said that *“the absence of cloud computing is prohibiting their operations with foreign governments who have already embraced cloud computing and are able to operate anywhere anytime”*. Government ministries are citing the demands from citizens, businesses and governments as prominent drivers of digital transformation.

4.7 Revised TOE Framework in the Context of Eswatini

The qualitative data analysis provides much greater insights on the state of readiness of the government of Eswatini to use cloud computing, as can be observed from the interviews. The study found that technical, organizational, and environmental factors all have a role in

determining the readiness of Eswatini to adopt cloud computing. In the technological and organizational variables, the qualitative data also highlighted the introduction of new themes.

The IT standards have arisen as a new issue to consider while implementing cloud computing among the technological factors. During discussions with interviewees about organizational variables, a new theme for consideration emerged: governance. This adds to the pre-determined themes found through the literature study prior to the qualitative data collection, and they are interconnected to offer a picture of the state of preparedness for cloud computing adoption in the public sector.

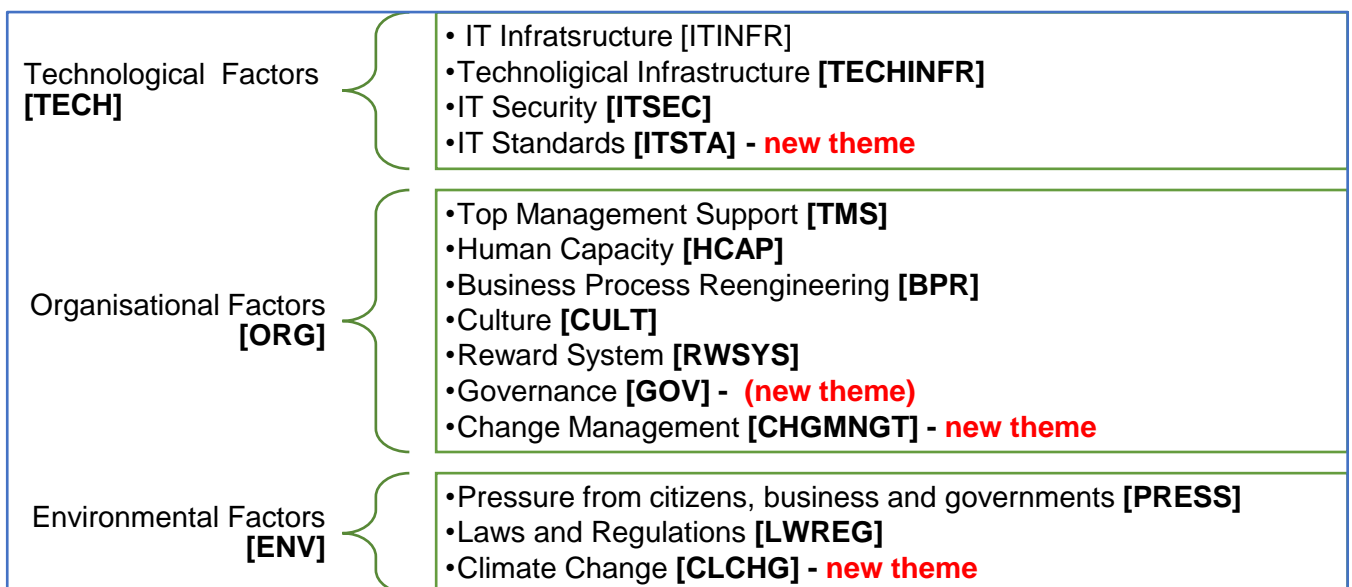


Figure 4-3 Critical Factors for adoption of CC in the Public Sector

4.8 Chapter Summary

This chapter featured a qualitative data analysis that focused on government top officials and drew on their expertise and experience working for the Eswatini government. The researcher conducted in-depth interviews with many officials from the government of Eswatini, including the Prime Minister's office, Principal Secretaries, Directors, and the Director of IT Services. The qualitative data gathered and analysed in this chapter was based on the technological, organizational, and environmental contexts to gain a thorough understanding of the Kingdom of Eswatini's readiness to adopt cloud computing.

Chapter 5. Discussion of Findings

5.1 Introduction

The research findings are presented through the participants' perceptions based on their knowledge and experiences, leading to the construction of a meaningful and applicable theory to the environment. The qualitative data collection mentioned in the previous chapter was based on three key variables: technological, organizational, and environmental, as well as many themes that emerged from these factors. Based on these characteristics, the data reported in this chapter are used to establish and create a theory for assessing the Kingdom of Eswatini's readiness to adopt cloud computing for the public sector. The chapter ends with a summary of the main aspects that explain the emerging hypothesis. The categories and subcategories that lead to the creation of substantive theory are depicted in the diagram below.

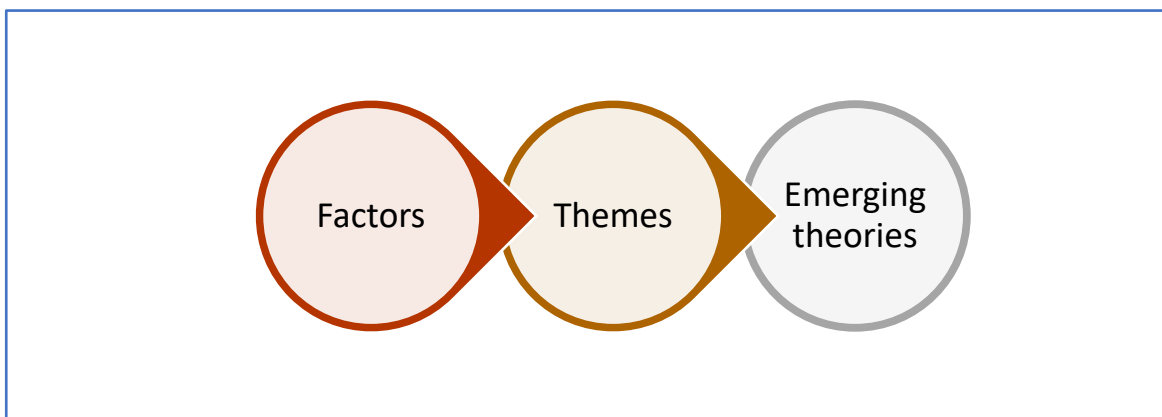


Figure 5-1 Levels of categories leading the emergence of theory

5.2 Response Rate

Interviews were performed, and a large response was received, especially from government officials, who accounted for more than 80% of the total. The high success rate was due to the researcher's self-administered interviews, in which the targeted respondents were alerted in advance of the data collecting day. The excessive response rate was improved by making follow-up calls to make clear enquiries.

Table 5-1 Respondent Response Rate

Respondents	Target population	Sample size	Response Rate (%)
Office of the prime minister	5	3	60
Principal secretaries	15	12	80
Directors	15	13	87
Government IT experts	10	8	80
Businesses	10	2	20

5.3 Findings in Grounded Theory

Researchers might use different approaches to explain phenomena to correlate with different contexts or processes as stated by participants when presenting qualitative findings (Reay, Zafar & Montero, 2019). The quantity of categories and codes developed is less important in grounded theory findings than the conceptualisation that is informed by the researcher's analytic effort. The phenomena being researched is the Kingdom of Eswatini's readiness to utilize cloud computing for the public sector.

The research looked into technological, organizational, and environmental aspects, rather than advocating for or against cloud computing use. The participants were allowed to express the phenomenon based on their knowledge and experiences in Eswatini's government activities. As a result, the participants' apparent solutions and paths forward were incorporated into the evolving theory, namely, the level of readiness for the Kingdom of Eswatini to use cloud computing for the public sector.

The variables that contribute to the emerging theory (i.e., the state of preparation for the Kingdom of Eswatini to use cloud computing for the public sector) are now detailed.

5.4 Critical Factors Impacting the Adoption of Cloud Computing

Given the perceived risks involved in the adoption of cloud computing and the effect of these risks on an organization, several perspectives provide a fuller understanding of the situation and provide a foundation for further research

5.4.1. Technological Factors [TECH]

According to Abed (2020), an organization's technical aspects explain technological awareness and traits that influence the adoption of IT innovation. IT Infrastructure, Technology Infrastructure, IT Standards, and IT Security are the topics that resulted from the examination of technological elements that are thought to influence the adoption of IT in an organization. These themes have a variety of interactive elements that contribute to the participants' perceptions of the technological context and their comprehension of it.

IT Infrastructure [ITINFRA]

The majority of respondents recognize the relevance of IT infrastructure in cloud computing adoption since it serves as a foundation for the organization's IT investment. The existence of legacy systems was cited as a barrier to moving to another platform by the majority of respondents when it came to the amount of automation in the ministries.

For example, the following extracts from the interview were captured:

Prime Minister's Office: *"We use the basic computer and laptops to conduct our work and we leverage on the in-house built systems that were built to automate our business processes."*

Principal Secretary 1: *"Most of the work is done in our computers and laptops as we do not have bespoke systems to conduct our anchor work"*

Principal Secretary 2: *"Across Government, we all rely on the in-house systems which are now considered legacy. This has placed the government in a predicament as we are unable to incorporate the new business processes. I would say the level of automation is not at the level we would it to be as Government"*

The respondents agreed that the country has a low level of automation and that business processes have advanced but IT infrastructure has lagged behind.

Citizens and businesses expect to be able to access services from the comfort of their homes and offices, thanks to the widespread use of IT and mobile devices. The cost of bandwidth in the country was also discussed with the respondents, with the majority of them believing that the cost was too high for regular residents and that it was impacting corporate profitability.

One of the Directors said that "*The government is aware of the unaffordable bandwidth costs, and this is a barrier towards the adoption of technologies and most 4IR innovation would need high bandwidth. The government has set up a regulatory body to guide the telecommunication industry and this body will also oversee the price of bandwidth to ensure it is in line with the affordability* "

One of the Principal Secretaries also alluded that "*We have a problem as a country as we have one service provider, and this company has monopolised the industry. So, they determine the pricing and we as consumers are just price takers.*"

One of the participants from the business sector voiced their concerns on the cost of the bandwidth in the country "*the cost of bandwidth has shot up our cost of production and this is making our services uncompetitive*".

Because of its unreliability and high expenses, the majority of respondents were negative about the current ICT network infrastructure. This reflects a lack of general inefficiencies and the ICT infrastructure's incapability. As a result of the data acquired during the interviews for this research, it is possible to infer that the current ICT infrastructure lacks the efficiency and capacity required to provide an efficient ICT service.

Businesses are required under data localization policies to store and process data locally rather than on servers located outside of the country's jurisdiction. Data localization laws are becoming more common, owing to security concerns and the risk that a country's sovereignty may be jeopardized. The respondents agreed that the government lacks

suitable laws and regulations to guide the use of cloud computing, particularly the storage and processing of data outside the country.

The Prime Minister's office pointed out that the country's data protection and privacy laws are missing to provide guidance on the adoption of cloud services. One of the officers at the Prime Minister's office said that "*currently the country does not have the necessary policies to guide the location of government data outside the country*".

5.4.2.Organisational Factors [ORG]

Organizational issues, according to the majority of respondents, are critical factors to consider when implementing innovation. The interviewees expressed their opinions on a variety of issues affecting government ICT initiatives. The following sub-categories were evaluated as organizational factors: Support from top management, human capability, reengineering of corporate processes, and a culture and reward system.

Top Management Support [TMSP]

The attitudes of top management, according to the respondents, play a critical influence in influencing the readiness of an organization to accept ICT projects. This is especially relevant in light of public institutions' hierarchical and bureaucratic mindsets, which the Kingdom of Eswatini shares. Most Government ministries have principal secretaries who are part of senior management, but cabinet ministers have critical decision-making abilities that have gradually trickled down to lower-level employees. This emphasizes the importance of higher-level management in Eswatini's administration, as well as the significant impact it has on lower-level management's ability to carry out decisions.

The respondents were asked about their impressions of the budget allocated by the government to ICT activities, and the respondents' most common response to top management support was a lack of funding for government projects.

The Prime Minister's Office response was that "*Government is currently facing economic challenges just like the rest of the world and most projects have been facing budgetary challenges. The country is making means to accommodate new projects but the fiscus is not enough to cater for most projects*".

The principal secretaries who are accounting officers in the various ministries also were of the view that the money given to them from the fiscus is not enough to fund their projects. One of the principal secretaries commented that *“the government can only afford salaries for the civil servants and does not have the funds for projects and various projects in my ministry have been put on hold.”*

The Director of IT Services also lamented the lack of funding to initiate new projects. He said that *“the IT department currently undertake projects that are only maintaining the current IT systems and we are unable to undertake new projects due to lack of funding.”*

The responders unanimously agreed that Eswatini's current financial issues are preventing the start of new initiatives. Moving the government to cloud computing will necessitate funds, which could prove to be a hurdle. The absence of finance, which will have a huge impact on cloud computing adoption, has arisen as a new theme from discussions about top management support.

Business Process Reengineering (BPR)

According to Bhaskar and Singh (2014), BPR comprises rethinking business processes in order to increase performance and achieve value in products and services. Most interviewees saw BPR as a critical component of cloud computing adoption since it measures business-IT alignment. IT products and services should be purchased in accordance with business processes to ensure that they are compatible with the current environment.

An IT architecture is essential for showcasing the interconnectedness of IT components in an organization. According to Uddin & Huang (2019), firms must analyse and evaluate current business processes to determine the relevance and application of new innovations. Transformation not only alters an organization's structure and methods of operation but also facilitates the spread of technology. The public sector is difficult to change, and BPR has a significant impact on organizational integration, and many countries have failed to implement technological transformation (Uddin & Huang, 2019).

The Prime Minister's office in Eswatini is responsible for the public sector BPR and they said that *"the government does not have an enterprise architecture framework that guides the business processes of the various ministries but relies on the e-government policies to manage changes in IT"*.

Most of the principal secretaries acknowledge the non-existence of the BPR culture and one of them responded that *"the ministry does not have any BPR program and is normally led by the collective of the cabinet ministers on the priority projects and further BPR is often viewed as a cost that can be avoided."*

Another principal secretary said the *"the ministry often overlook BPR as the country does not have a balanced fiscus that can fund the BPR initiatives. We often find ourselves implementing the same business process."*

The Director of IT Services reported that they are often constraint by the lack BPR initiatives and they find themselves automating the same business processes in various government ministries, *"we have challenges in innovating our solutions as the business processes in most government ministries are not changing."*

Culture [CULT]

The majority of interviewees said that culture plays an important part in adopting and adjusting to change, and the Kingdom of Eswatini is a country with a strong attachment to social culture, which is linked to the country's political posture. They emphasized the importance of instilling a new culture in the country in order to influence the adoption of new methods of doing things.

One participant from Prime Minister's office pointed out that *"the country has an embedded culture based on traditional norms and there is a lot of work that needs to be done inculcate a new culture in managing government operations."*

The principal secretaries as accounting officers for government operations voiced out the limited powers, they have in disciplining government officials. One of the principal secretaries voiced out that *"the employment of civil servants is done by the Ministry of Public Service and the workers sign contracts with that particular ministry. The other ministries are*

given employees of the government to work with and as accounting officers, we find it difficult to manage change as the employees do not have employment contracts with their line ministries.”

Another principal secretary also stated that *“the culture within government employees is embedded in the political system which has deep traditional roots and we find it very difficult to manage the civil servants. The move to cloud computing would be a good move for the country but there will need to be a lot of work in changing the mindset of the government employees as well as the citizens of the country who are also used to the traditional ways of accessing government services.”*

The Director of IT Services was however optimistic that the IT cadre within government would quickly embrace cloud computing saying that *“being technical people, the IT cadre would welcome the move to cloud computing as they appreciate its pros and cons.”*

The majority of interviewees voiced concerns about the culture of government officials as well as people, indicating that Eswatini will need to improve its cultural stance. Overall, the interviewees agreed that culture is a key element impacting cloud computing adoption in Eswatini.

Reward System [RWSYS]

The reward system, which comprises the recruitment and retention of competent individuals in an organization, is one of the organizational elements impacting the adoption of innovation. Employee satisfaction is critical to an organization's long-term viability. In terms of the reward system, the research found that the Eswatini government's reward system is inadequate and unable to attract and retain qualified workers.

One principal secretary alluded to the fact that *“the public sector is unable to match the remuneration scheme of the private sector, and this makes it difficult for government attracts and retain the appropriate talent.”*

The Director of IT Services also weighed in on the issue of the remuneration scheme pointing out that *“I have lost a lot of talented individuals who had been attracted to the private sector leaving the government with less IT expertise.”*

Another principal secretary added that *“the government is losing valuable skilled personnel to the private due to the low remuneration and this leads to poor IT skills for the government.”*

The government's inability to compete with the private sector due to its poor remuneration structure contributes to excessive human resource turnover, leaving the government with inadequate IT capabilities. As a result, another theme related to the organizational aspect has emerged. The demand for IT skills to support government IT services has arisen as a new theme.

5.4.3.Environmental Factors [ENV]

In comparison to technological and organizational aspects, environmental factors were highlighted less frequently in the interviews. Environmental elements include the firm's operating environment as well as features that influence the organization's business behaviour, such as competitors, consumers, suppliers, and government relations. Environmental considerations, according to Pateli, Mylonas, and Spyrou (2020), include exterior aspects that have a stronger influence on IT adoption. The comments of the interviewees on environmental variables had a common denominator that related to government-imposed restrictions and regulations on cloud data storage.

The Prime Minister's Office when responding to the availability of cloud policies said that they are leveraging on the data protection and privacy laws to safeguard personal data. One of the officers said that *“the lack of proper legislation to guide cloud technologies in the country will delay the adoption of cloud computing in government. Without a proper framework to guide the government, it will be difficult to allow government data to reside outside the country.”*

Another officer at the Prime Minister's Office said that *“the government is skeptical about using cloud computing without the appropriate regulations as this would open the government for lawsuits involving different jurisdiction.”*

The principal secretaries were in consensus that the pressure from the business sector to integrate with government data anytime and anywhere was giving them pressure to adopt cloud computing. One of the Principal Secretaries pointed out that *“the business community*

wants the government to avail the government data via Application Programming Interface (APIs) to improve their business processes.”

The view of another principal secretary was that “citizens are requesting that the government services be availed online anytime anywhere as they have mobile devices that they can use to access government services. This will help to reduce the queuing of government services and further help the citizens to reduce transport costs to government offices.”

The Director of IT Services pointed out that “the government relies on external suppliers to provide maintenance of the IT environment and is always facing challenges of currency fluctuations exposing the government to expensive contracts.”

Further, the Director of IT Services pointed out “that currently the country does not have the necessary policies to guide data protection and there are no clear guidelines on the data sovereignty. We are aware that some countries have confined government data within their borders, and we also need to clearly provide guidance through the appropriate legislation on this issue.”

Most of the principal secretaries lamented the lack of appropriate broadband for internet citing mostly the lack of policy to guide the local telecommunication companies on internet provision. one of them commented that “with the current internet provision that the country as a whole has, it will be difficult to sustain cloud computing as its services leverage on the internet. Therefore, broadband connectivity relies on other companies which we do not have control of.”

The lack of cloud policy was identified by the Director of IT Services as another barrier to adopting cloud computing, “the country does not have a cloud policy currently and this will leave so many gaps and assumptions on the operations of a cloud environment.”

During one of the interviews, there was mention of the advantages that cloud computing would bring in enhancing the country’s green policy in an attempt to reduce carbon emissions. One of the principal secretaries highlighted that currently “the country is filled with a lot of hardware, and we do not have a disposal policy that guides the disposal of such

equipment. This defeats the country's efforts of improving the sustainable development goals set out by the UN on the reduction of carbon emission."

The aforementioned comment sparked a discussion about environmental problems such as climate change and the country's green policy which emerged a new theme. The adoption of cloud computing can significantly improve the country's global green index, thus it's critical that Eswatini's government pass equipment disposal laws that will guide the disposal of the equipment it now has.

5.5 Chapter Summary

The important components of the research were examined in this chapter, as well as the critical factors for assessing the state of readiness for cloud computing adoption in the public sector in the context of Eswatini. This chapter also described the qualitative data gathered throughout the research process, which will be utilized to influence cloud computing adoption decisions in the future. Eswatini government officials were interviewed in semi-structured interviews. The research's primary findings are given in the chapter and are identified as critical factors that generate many themes that lead the assessment of an environment for the state of readiness assessment.

Chapter 6. Research Conclusion and Recommendations

6.1 Introduction

Using the TOE framework, the ultimate goal of this research was to determine the state of readiness for the Kingdom of Eswatini to utilize cloud computing in the public sector. As a result, this section summarizes the research findings, conclusions, and recommendations to help guide the Kingdom of Eswatini's implementation of cloud computing. This research looked at the state of readiness using the TOE Framework and the following criteria:

Table 6-1 Revised TOE Framework (Eswatini Context)

Factors	Constructs/Themes	Variables
Technical [TECH]	Infrastructure Technology [INFRATECH]	Power [POW], Broadband [BROD]
	IT Infrastructure [ITINFRA]	Applications [APPS], Networking [NETW]
	IT Security [ITSEC]	Cyber Security [CYBE]
	IT Standards [ITSTA]	Best Practice [BPRAC]
Organisational [ORG]	Top Management Support [TMSP]	Leadership [LEAD]
	Human Capacity [HCAP]	IT Skills [ITSK]
	Business Process Reengineering [BPR]	Change Management [CM]
	Culture [CULT]	Organisational Culture [ORG-CUL]
	Reward System [RWSYS]	Remuneration [REM]
	Governance [GOV]	Policies [POL]
	Change Management [CHMNGT]	Change Vision [CHVIS]
Environmental [ENV]	Pressure [PRESS]	Pressure from citizens [PRES-CIT]
		Pressure from Business [PRES-BUS]
		Pressure from Government [PRES-GOV]
	Laws and Regulations [LWREG]	Acts and Bills [ACT-BILL]
	Climate Change [CL-CH]	Carbon emission [CBEMS]

6.2 Response to Research Objectives

The purpose of the research is to determine the Kingdom of Eswatini's readiness to use cloud computing in the public sector. The following is a summary of the interviewee's

perspective and responses to the research objectives based on the qualitative data obtained. The responses illustrate the challenges to cloud computing adoption as well as the facilitators.

6.2.1. Technology Factors [TECH]

- **Technology Infrastructure [TECHINFR]**

Enabler: As evidenced by the growing number of Internet Service Providers (ISPs), there is a movement to liberate the telecommunications industry in Eswatini. The existence of companies in the telecommunications industry, as well as multiple ISPs, attests to this.

Barrier: The country is reliant on a single electricity supply, leaving it without a backup. One supplier, a state institution, has monopolized the national communication backbone.

- **IT Technology [ITTECH]**

Enabler: Because Eswatini has a fully developed Government IT Department that provides IT support to the government for application development, networking, and cyber security, the country possesses baseline IT technology.

Barrier: The qualitative data suggested that the country has a large number of legacy systems that, due to a lack of interoperability, would prevent the deployment of contemporary technologies.

- **IT Security [ITSEC]**

Enabler: the qualitative data collected does not reflect many enablers for the country to adopt cloud computing.

Barrier: The government lacks IT security guidelines to guide compliance with IT resource confidentiality, integrity, and availability. Most interviewees saw this as a risk, especially when it came to opening the government network to the cloud. Because the government has not put in place processes to appropriately secure the government IT environment, the qualitative data collected does not reflect any enablement at this time

6.2.2.Organisational Factor [ORG]

- **Top Management Support [TMSP]**

Enabler: Top management support, according to the respondents, is crucial for the adoption of cloud computing, as indicated by the enactment of relevant laws and regulations to guide the usage of cloud technology inside the government. Three bills are currently awaiting parliament's consent to become laws i.e., Data Protection Bill, Electronic Transaction Bill and Computer Crime and Cyber Crime Bill.

Barrier: The qualitative data suggested that the government lacks budgetary support, which jeopardizes the cloud environment's long-term viability.

- **Human Capacity [HCAP]**

Enabler: To capacitate the government's human resources, the government has formed relationships with strategic partners. The Republic of China on Taiwan is providing technical and financial help to the country in order to develop relevant IT capabilities inside the government.

Barrier: The qualitative data demonstrated a widespread shortage of IT skills in government, with most interviewees predicting a skills gap in supporting cloud technologies within the government.

- **Business Process Reengineering [BPR]**

Enabler: There are some basic business processes that can be used to get started with cloud computing. The qualitative data gathered indicates that the majority of interviewees acknowledged the existence of business processes, notwithstanding their scepticism about their importance.

Barrier: Existing government business processes are geared for on-premises services, and they will need to be reviewed to fit with cloud computing.

- **Culture [CUL]– Social and Organisational**

Enabler: The qualitative data gathered does not indicate a favourable environment for cultural transformation as a result of cloud computing adoption. According to the majority of interviewees, a drive to **transform** the culture, both socially and organizationally, will be required.

Barrier: Individuals are imbued with culture in the country, which is primarily driven by the historic structure of the culture, which has established social conventions. Organizational rules have now been inculcated with social norms. A comprehensive

change management program will be required to accelerate the adoption of cloud computing in the public sector.

- **Reward System [RWSYS]**

Enabler: Based on the government of Eswatini's reward structure, the qualitative data does not suggest enablers for cloud computing. The respondents agreed that the government's remuneration system can be a great enabler in attracting and maintaining the right IT skills within the government to effectively advance government IT initiatives.

Barrier: Employees are at the heart of any change initiative; therefore, a well-defined compensation system is essential for attracting and retaining talent. According to the qualitative statistics, the government is losing the majority of the IT knowledge it develops to the private sector. As a result, the government has no competence to support its IT environments.

6.2.3.Environmental Factors [ENV]

- **Pressure from citizens, business and government [PRESS]**

Enabler: The widespread use of mobile devices and the adoption of e-commerce in the country can have a big impact on how government services are delivered utilizing cloud computing. Eswatini is one of the African countries that has seen a rise in the use of mobile phones.

Barrier: The country's value chain is ineffective due to a lack of infrastructure for the efficient delivery of technological services.

- **Laws and Regulations [LWREG]**

Enabler: The qualitative data gathered shows that the government of Eswatini has taken the initiative to put in place policies that would guide cloud computing. Currently, data protection bills are being considered by the legislature for passage into laws.

Barrier: In the qualitative data, the lack of policies to guide cloud computing adoption has been noted as a barrier to cloud computing adoption. The lack of clarity on data sovereignty is stifling cloud computing development, and the country's lack of data security and cybercrime rules puts it at a disadvantage with the international community.

6.3 Contributions of the Research

The research results emphasized in the findings offer a significant contribution to the theoretical knowledge required to identify the state of preparedness for cloud computing adoption. Technology, organizational, and environmental variables are identified as essential concerns for cloud computing adoption in the research. The government of Eswatini has information at its disposal, including a literature review and the current environmental situation, such as fiscus concerns, to consider together with literature study and the existing environmental scenario to use cloud computing. Further research on the phenomenon can use this study as a starting point and use the qualitative data collected in this study as a benchmark.

6.4 Limitations of the Research

The research has limitations, which are important when considering how to generalize the findings to the entire population and how to apply the enablers and barriers in various circumstances. The following limitations were encountered:

- Because the research was done during the height of the epidemic, the number of respondents was limited by the prevalent Covid-19. The research was aimed at senior government officials and the business sector, but because of the pandemic scare, most of them were unavailable.
- Due to a limited budget, it was necessary to use multiple channels to obtain a larger unit of analysis. The business sector had implemented severe lockdowns and was unable to communicate, while citizens were confined to their homes, preventing the researcher from making real-time observations on the supply of government services.
- Because other countries may have different contextual factors, the study's generalizability is limited to Eswatini.

The above-mentioned limitations call for consideration of further research described in the below section.

6.5 Directions for Future Research

The research was carried out utilizing cross-sectional research, which means it focused on a specific point in time. As a result, future research using longitudinal research to track the state of technological, organizational, and environmental aspects over time could help impact decision-making on cloud computing adoption in the Kingdom of Eswatini and elsewhere. This would also provide additional confirmation of the qualitative data's reliability and validity. Further research in other contexts (e.g., SADC countries) with demographics similar to the Kingdom of Eswatini would increase the research's external validity. More participation from the private sector and individuals would also be beneficial in validating the research's findings.

6.6 Chapter Summary

This study used the TOE paradigm for innovation adoption, which has been widely used in the literature. It established a clear framework for assessing the government of Eswatini's readiness to utilize cloud computing in the public sector. However, a review of the literature found a paucity of resources for cloud computing adoption in the public sector, especially in developing nations.

The TOE framework's elements included different themes that were utilized to analyse the phenomena, such as technological (ITTECH, ITINFR, ITSEC, ITSTA), organizational (TMSP, HCAP, BPR, CULT, RWSYS, GOV, CHMNGT), and environmental (PRESS, LWRG, CI-CH). Each of the topics was categorized as either an enabler or a barrier, and the findings suggest that the country's barriers may be prohibitive to the adoption of cloud computing for the public sector.

The enablers and barriers answered the main research question, and the presentation of the findings provides a broad perspective to provide information that the Government of Eswatini can use to acknowledge the status of each of the constructs and use grounded theory in conjunction with context to decide on cloud computing adoption. The research does not seek to suggest a certain position to the Eswatini government, but rather to emphasize the current situation of the identified TOE elements. There is no one-size-fits-all

method for embracing cloud computing; everything is contextual; hence the research merely states the facilitators and impediments in addressing the research objectives.

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APPENDIX A: Interview Memo

What is your opinion on the legislative framework of IT services in the country?
<p>Responses:</p> <p>1. Prime Minister's Office <i>"There are various laws and regulations that have been drafted and awaiting approval from the legislative wing of the state. These include Data Protection Bill, Electronic Transaction Bill, and Cyber Crime & Computer Crime Bill. These bills are meant to guide the use of IT assets of the Government. So, there is a gap among the state organs, and this has a negative effect on the adoption of innovation in the country".</i></p> <p>2 Principal Secretaries: <i>"The cabinet has proposed the appropriate laws to be enacted but the parliament is taking a lot of time to approve and set these into Acts of Parliament to be implemented and guide the IT sector in the country"</i></p> <p>3. Director IT Services <i>"We are constraint by the lack of the appropriate legislation to transform the Government IT architecture that includes the use of cloud computing as we are not coping with the technological changes due to budgetary constraints".</i></p>
Please explain your role in the ministry
<p>Responses:</p> <p>1. Prime Minister's Office <i>"My role is to guide the IT investments that the government is making and ensuring that they are aligned to the business of ministries. I provide recommendations to the Prime Minister"</i></p> <p>2. Principal Secretaries <i>"I drive the business of the ministry and reports to the Minister"</i></p> <p>3. Director IT Services <i>"I am responsible for implementing Government IT policies and reports to the Ministry of ICT"</i></p>
What is the level of automation in the ministry?
<p>Responses:</p> <p>1. Principal Secretary1 <i>"We have enough to pull through the day, but we are lacking in terms of automating all our services"</i></p> <p>2. Principal Secretary 2 <i>"We rely on the IT Services, so we take what they give us. But not happy at all"</i></p> <p>3. Principal Secretary 3. <i>" Our systems are not evolving so we are sitting on legacy systems and struggling to provide quality service".</i></p> <p>4. Principal Secretary 4: <i>"I feel it is giving the country what it needs as we are a small country, so I am satisfied".</i></p>
What progress has been made to date in the delivery of online services in your ministry?
<p>Responses:</p> <p>1. Prime Minister's Office <i>"Nothing much as the country has not been able to implement the eGovernment strategy."</i></p> <p>2. Principal Secretaries <i>"As leaders of business, we together with other Principal Secretaries have lobbied for adoption of online services but the challenge of the fiscus has always been a barrier"</i></p> <p>3. Director IT Services <i>"From an implementation point of view, we have made progress though I can say we are at the bottom of the maturity level as our online services are not static. We only</i></p>

provide capture programs and downloads of forms and documents. Our environment is not interactive at present"

What is your understanding of cloud computing in terms of benefits and challenges?

Responses:

1. Prime Minister's Office: *"Always on services that are available anywhere anytime. Though we would have challenges with citizens who are not familiar with technology like the old people and the literate group"*.
2. Principal Secretary 1: "Government services will always be available, and this will improve efficiencies."
3. Principal Secretary 2: "Innovation for me. but I am dependent on IT services."
4. Principal Secretary 3: "several backups and always-on services. But not sure of the cost".
5. Principal Secretary 4: "Not really sure as I am not IT oriented."
6. Principal Secretary 5: "I am not sure but stand to be advised by the IT team."
7. Principal Secretary 6: " solving a lot of problems for us and possibly reduce the costs. My worry is the security and the risk of having sensitive data stored anywhere where we are not aware. But the world is going that route, so we have to do our research on the security issues."
8. Principal Secretary 7: "not aware really".
9. Principal Secretary 8: "Relieve our IT team to concentrate on the last mile issues and that would improve the level of service and the country's competitiveness."
10. Director IT Services: "great benefit in terms of reduction of Capital costs and we would also be able to concentrate on supporting the ministries from the last mile. challenges would be running the cloud infrastructure concurrently with the on-premises infrastructure as there may be compatibility issues. But it would be a nice challenge for the team."

APPENDIX B: Informed consent form

TELEGRAMS: PRIME
TELEPHONE: 2411 7906
 2411 7983
FAX: 2404 3943



PRIME MINISTER'S OFFICE
P.O. BOX 395
MBABANE
H100
ESWATINI

YOUR: REF

OUR: REF

02 March 2021

Sibusiso Gama
P. O. Box 4807
Mbabane

Student No: 32271409

Dear Sibusiso Gama

Re: Permission to conduct a research project

The eGovernment unit within the Prime Minister's office acknowledge receipt of your request to conduct a research project involving the Government of the Kingdom of Eswatini. We have reviewed the request in particular the research objectives and the research questions that the project attempts to respond to. These are pertinent to the government of the Kingdom of Eswatini strategic direction in adopting Information Technology as a pillar of our economic recovery as well as response to the effects of the Covid-19 pandemic.

The eGovernment Unit hereby authorize you to conduct the research project and this permission will provide you access to the various government ministries to collect the appropriate data. Please further note the following stipulations that should be observed:

- The project must be done with ethical confines protecting the government as well as the researcher.
- The interviews must be done within the stipulated 45 minutes timeframe.
- The privacy of the interviewee must be always respected.
- The results of the research project must be shared with the eGovernment unit
- Prior arrangement must be made for the interview sessions.
- The country's Covid-19 regulations must be adhered to protect everyone involved in the research project.

If you have any questions regarding this letter of approval, you can contact me at: Tel: +268 78029016 / 76062017 email: ndlangamandlab@gov.sz / bonga.ndlangamandla@gov.sz

I am looking forward to a successful engagement on the research project.

Sincerely,

Bonga Ndlangamandla
Executive Secretary (e-Government)

APPENDIX C: Interview Questions

Question	TOE Factor
What is your opinion on the legislative framework of it services in the country?	ENV
Is cloud computing specifically recognised and provided for in your legal system?	ENV
In your view, how do citizens perceive this government department service delivery program?	ENV
Please explain your role in the ministry	ORG
Does the current government IT architecture provide effective and efficient support to government business processes?	ORG
Does the country have the necessary skills to manage the various technological?	ORG
Does the government have the necessary training plan for the IT personnel? If so, what is the level of success of the department's training program?	ORG
What is your perception on the budget that government provides for IT?	ORG
Does the government have an enterprise architecture framework? If yes, please briefly explain its conceptual view.	ORG
Does the country have a mechanism to measure the level of business-it alignment? If yes, what are the matrix used to perform the measurement?	ORG
How does the Government Reward System fare with the industry standards?	ORG
In your opinion, how receptive would the staff be towards changing to cloud services?	ORG
Please explain the key drivers that enables the ministry to deliver services.	ORG
What is the average salary of your staff? Is it competitive with market remunerations?	ORG
What is the level of automation in the ministry?	TECH
What progress has been made to date in the delivery of online services in your ministry?	TECH
What is your understanding of cloud computing in terms of benefits and challenges?	TECH
What do you believe are the necessary conditions to ensure successful e-government?	TECH
Please explain the how the technology architecture of government is organized? I.e., decentralised, or centralised.	TECH
Does the government keep an inventory of IT Assets? If so, how is the data collected and stored?	TECH
Does the IT department perform in-house development or buy off the shelf solutions?	TECH
What is your view of data residency, data localization and data sovereignty?	TECH

Are there policies, procedures, standard operating procedures to provide proper governance of government ICT Assets?	TECH
How expensive is the bandwidth in the country?	TECH
Does the government have a cyber security strategy? If yes, is it effective enough to protect Government ICT assets?	TECH
How are government IT resources procured?	TECH
What is the state of online services offered by the ministry and how would you rate its success?	TECH
What ICT systems/ applications/services are currently in use within the organization?	TECH
Are you satisfied with the e-government services that are in place now?	TECH

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